Ecological Farming

Principles, Techniques That Work and Farmer Innovators in the Philippines

Padilla

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Principles, Techniques That Work and Farmer Innovators in the Philippines

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Foreword

"Life is a continuous process of learning, There is always something to learn."

This is one of the most important statements made by one of the farmers, whose knowledge and experience is presented in this book.

Today, farmers are facing harsh challenges. A very vibrant and dynamic world has entered the rural areas and their lives. Years ago, the socio-economic fabric in rural life had basically predictable patterns and consisted of their own knowledge systems that were based on experience and learning by experience. Knowledge systems had validity for longer periods of time. Today, the amortization time of knowledge is becoming shorter and shorter. Learning has become one of the most essential resources for the improvement of people's livelihood.

This book, compiled by AGTALON, is an accumulated wealth of knowledge and experiences of farmers in the Philippines. It explains how nature works in order to make us learn from natural mechanisms, which is an essential component in low-external input agriculture. It also addresses areas such as soil and water conservation, which is the very basis of any sustainable agriculture practice. Furthermore, it presents examples of natural regulatory measures to control insect pests, such as the case of diamond-back moth. The case study of the bio-intensive gardening demonstrates that limited spaces can become highly productive through skillful management and it can address home consumption as well as income needs.

The development of rural areas has become a very complex issue, encompassing aspects such as access to natural resources as well as services and knowledge. This book is addressing one very essential part of this complex: knowledge of good agricultural practices. Indeed, continuous learning is the most essential ingredient towards development.

MISEREOR has supported the making of this book, because it is part of its policy, to support learning processes. The readers of this book are encouraged not only to read it, but to enliven its contents within their own situation. Information in itself has no value. It is humans who are giving life to information and who transform information into human-centered development. Therefore you, the reader, is also responsible for this.

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- my kids, Yayo, Nikka and Kayla for bearing the lessened time I had to spend with them and for providing continuous inspiration.

Thank you very much!

PART I

The Tropical Ecosystem: Productive But Fragile

"All is one and interrelated."

-Sri Aurobindo

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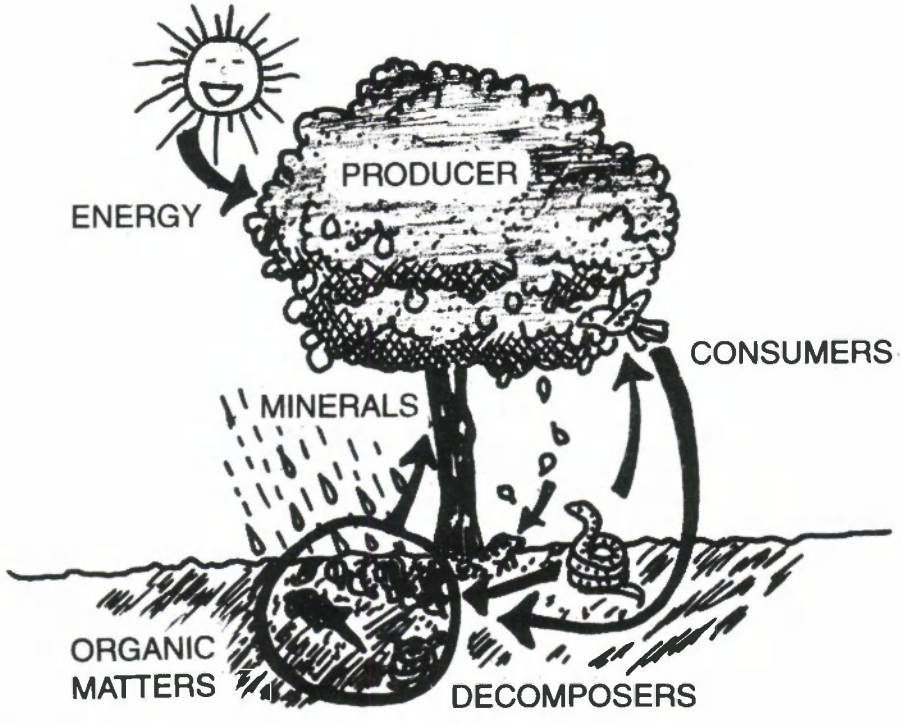
1 The Tropical Ecosystem: Productive But Fragile

1.1 Plants produce food using energy from the sun

The sun is the ultimate source of energy in the ecosystem. This energy is used by plants to produce food. The process of converting solar energy into plant parts or biomass is called photosynthesis. The biomass produced serve as food for animals. Less plants means less photosynthesis. Less photosynthesis results to less biomass or food for all those dependent on them.

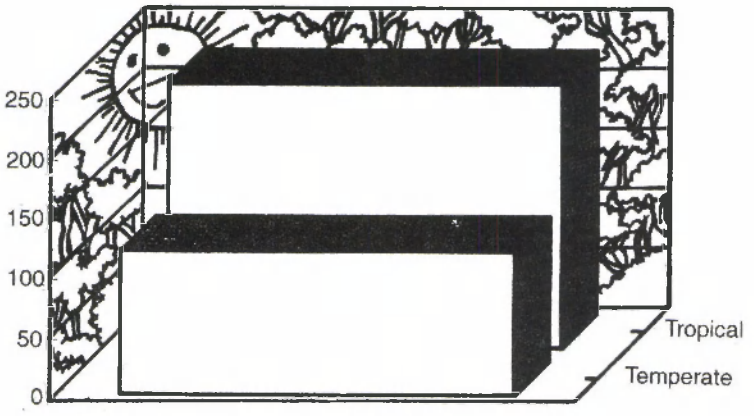


Forest Nutrient Recycling

1.2 The tropics has high biomass production

With more sunlight (or solar energy) available, more biomass is produced, provided that there is sufficient water and nutrients. The tropics where the Philippines is located, receive twice as much solar energy as the temperate zones of Central Europe.

Amount of Solar Energy

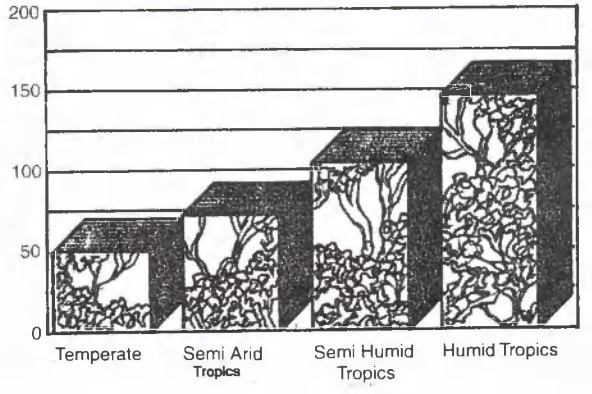


(Trewartha, 1968)

Consequently, the potential for biomass production in the tropics is twice to thrice as much in the temperate countries. The humid tropics has a potential of producing 146 tons of biomass per hectare. Compare this to 50 tons per hectare for temperate United Kingdom.

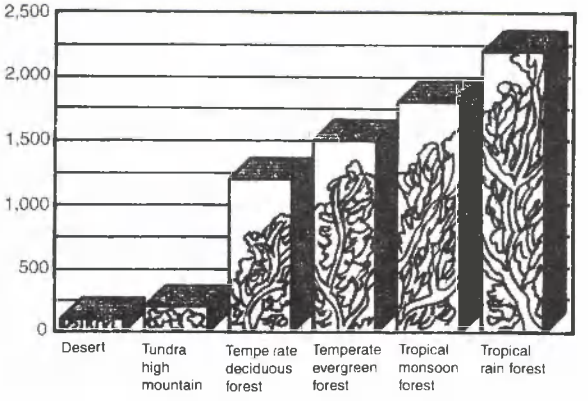
In the natural environment, the tropical climate is represented by the tropical rainforest. The tropical forests are two times more productive than temperate forests. It is but logical that one expects a higher agricultural production in the tropics. But such is not the case.

Potential Dry Matter Production of Natural Environment in Different Climates



(Holiday, 1976)

Biomass Production in Different Ecosystems



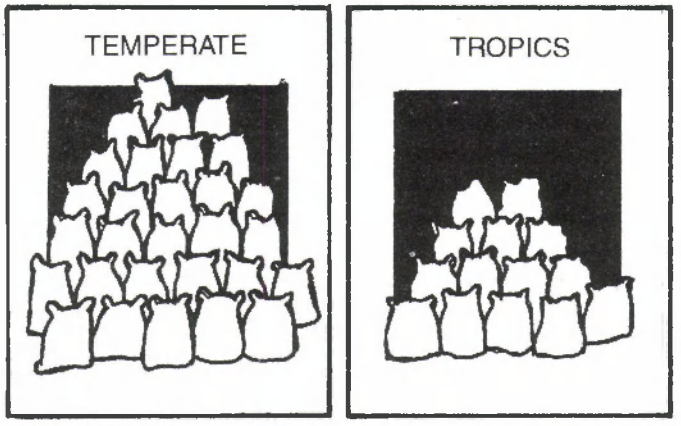
(Mori, as cited by Murakami, 1991)

1.3 The tropics has low agricultural production

Inspite of the theoretically high potential for conversion of solar energy into biomass, agricultural production in the tropics is low.

Duckham, et al. (1976) estimated that the food produced per cropped hectare in the tropics is only about half of what is produced in temperate areas. This happens inspite of the more ample supply of solar energy in the tropics.

Food Production: Temperate vs. Tropics

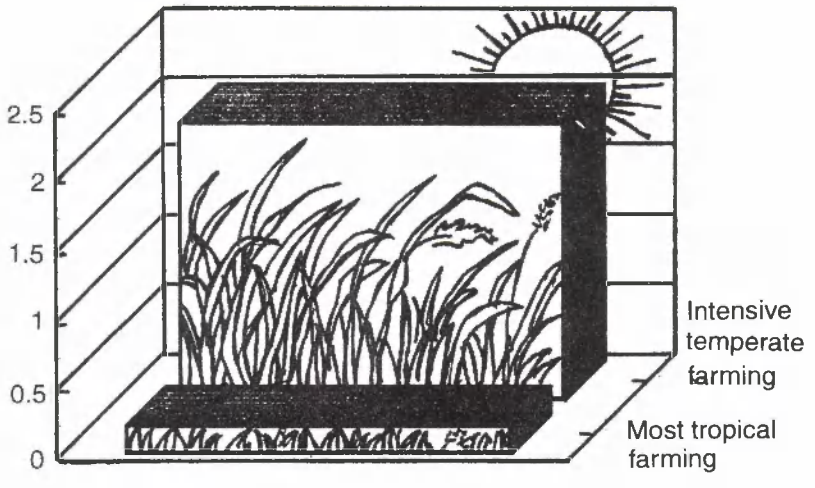


(Duckham, et al., 1976)

What about conversion to edible food? In intensive temperate farming, the edible proportion amounts to 30-56% compared to the usually not more than 5-35% attained by traditional tropical farming (Holiday, 1976; Kassam, 1977).

Intensive farming in temperate climate achieves conversion rates of solar energy to dry matter of about 2%. In most tropical farming not more than 0.2% is achieved.

Conversion of Solar Energy Into Dry Matter



(Holiday, 1976)

1.4 What are the reasons for the low conversion rate of solar energy to dry matter (or simply, low agricultural yield) in the tropics?

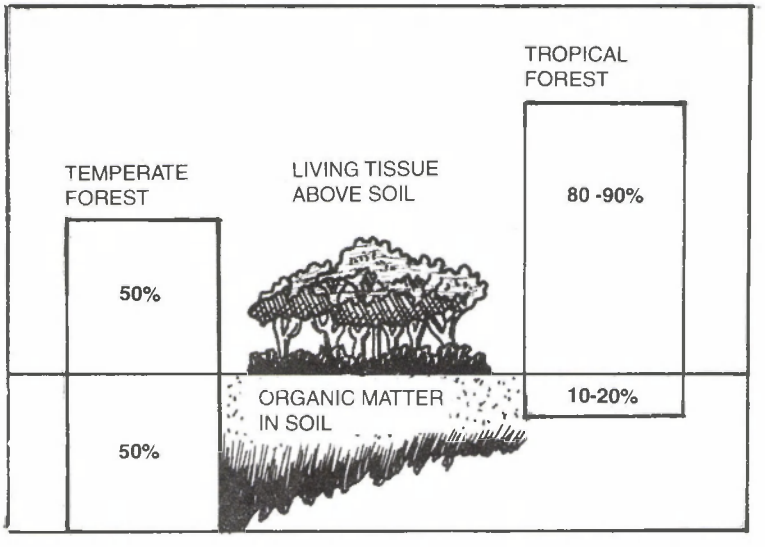
In the natural state (i.e. forests), the tropics is twice more productive than the temperate zones. In agricultural production, it is twice less productive. Why is this so? What are the environmental difficulties related to tropical agriculture?

a. Most of the nutrients are tied up in the plants not in the soil

In the temperate zones, 50-80% of the nutrients is in the soil. This is in sharp contrast to the tropics where 80-90% of the nutrients is in the living tissues.

When trees are cut to make clearing for agriculture, the bulk of the nutrients are taken away from the system. If the biomass are burned or left to rot in the soil, it will give good crop yield. But the effect lasts only for a very short period as experienced by swidden farmers or "kaingineros". When heavy monsoon rain comes, the exposed soil is eroded. The top soil which contain most of the nutrients is washed away. Erosion by surface water is a widespread reality and a constant danger in unvegetated areas. The intensity of tropical storms and the impermeability of the soil (particularly after the rains), aggravates the problem. A heavy rainfall could also leach the nutrients down into the subsoil making them unavailable to the plants. The sudden and heavy rainstorms usually lead to extensive leaching, with the most soluble plant nutrients carried below the root zone. Consequently, many soils, particularly in the humid areas, have low natural fertility. Phosphates and nitrogen are commonly deficient. Large portions of the valuable nutrients in the crop zone are contained in the vegetative material (Williams and Joseph, 1973; Spedding, 1975).

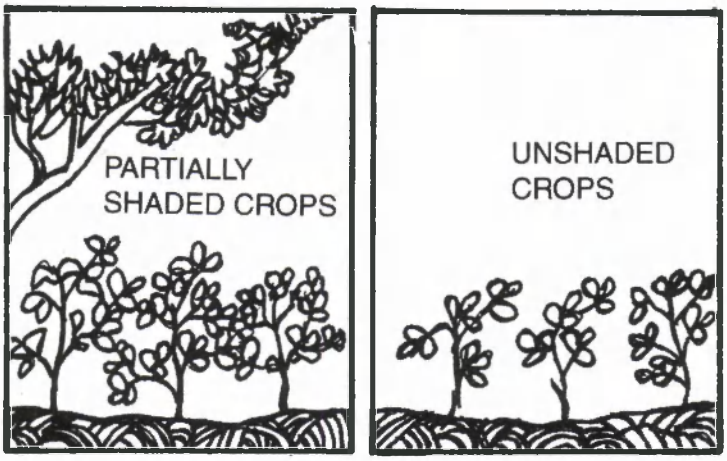
Morever, the downward movement of soil minerals can lead to the formation of hard pans which commonly impede drainage and root growth.



Nutrient Allocation *(Murakami, 1991)*

The exposed soil is also adversely affected by the scorching sun reaching its peak during the dry season. The extreme heat is destructive to the microbial population that aids in maintaining the fertility of the soil. The results of the experiment below shows that partial shading results to higher nitrogen content in the plant tissues. Partial shading surely has something to do with the activity of the microorganisms and moisture conservation.

Yield of Partially Shaded vs. Unshaded Crop



(Source: Ag Sieve Magazine)

Due to the harsh environmental conditions in the tropics, devegetation is usually followed by a very fast rate of soil degradation. This is the reason why the swidden farms or kaingins are abandoned after only a few years. In contrast, similar steep slopes in the alpine region in Europe have long been farmed, but with very slow soil degradation.

b. Tropical soil is low in organic matter

The warm temperature and high humidity in the tropics favor quick breakdown of organic matter. Nutrients then become more available to plants sooner. But they also disappear faster. There is rapid but short term release of nutrients. Hence, at the onset of the cropping period which falls during the early part of the rainy season, nutrient is adequate. This becomes severely limiting at midcrop stage.

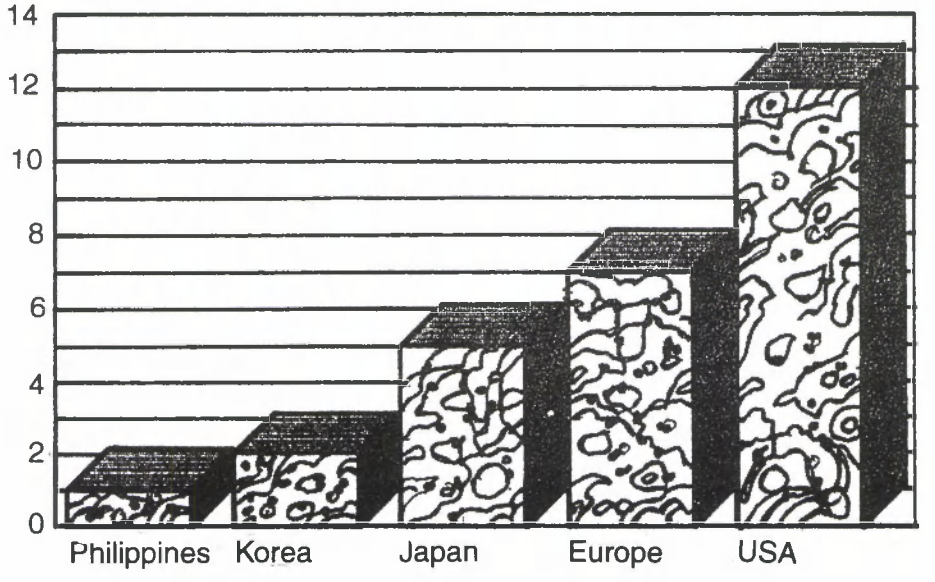
The warmer and more humid it is:

- the speedier are the biological processes;
- the quicker is the organic matter decom posed;
- the more quickly is the fertility consumed;
- the faster nutrients are leached.

Hence, farmers need to exert a greater effort to maintain fertility so that the tendency of faster deterioration is slowed down. Without soil cover and with heavy rainfall, soil nutrient loss becomes faster. Both soil regeneration and degradation can occur very quickly.

The temperate zone has slow decomposition rate as a function of low temperature and low humidity. This allows higher organic matter build up in the soil.

Organic Matter Content of Soils in Different Climates

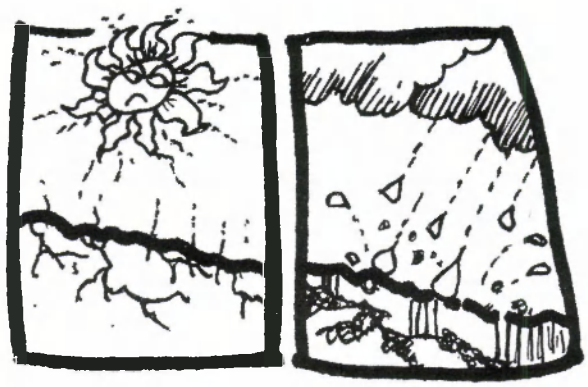


c. Extreme rainfall and scorching sun work against exposed soils

The forest benefits from extreme climatic conditions. Its thick litter, high organic matter, high moisture, and vegetative protection from direct sunlight favor microbial activity.

In the normal or undisturbed soil, there is high biological activity especially on the surface. Biological activity decreases as one goes deeper into the subsoil. In cultivated soil, there is low biological activity from surface to subsoil. The situation is aggravated as the beating effect of rain and scorching heat of the sun are detrimental to microorganisms in the exposed soil.

Moreover, draught animals as well as people find it very uncomfortable to work under extreme heat.



Extreme rainfall & scorching sun work against exposed soils

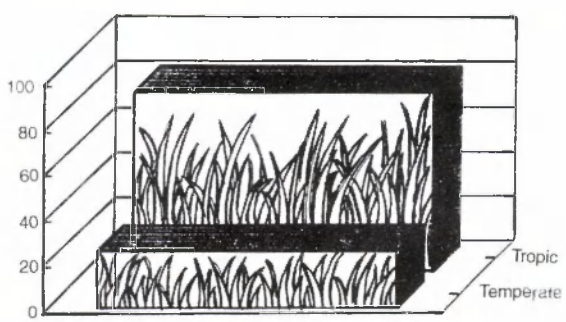
d. Low effective rainfall

The tropics, with distinct dry and wet seasons, have high rainfall but actually there is low effective rainfall. Effective rainfall is the water retained for crop and animal production. Due to erosion and low organic matter content, the water holding capacity of the soil is often low. Given the high rates of evapotranspiration on cloudless days in the tropics, dry spells of only a few days could cause heavy losses.

The evenly distributed rainfall and the high organic matter in the temperate zone is ideal for agricultural crops. Here, most farming lead to dry matter production per hectare similar to that of the natural vegetation (Snaydon and Elston, 1976). In traditional tropical production it is no more than 20-50% of the dry matter production of the natural vegetation. The discrepancy between potential and realized outputs is much greater in tropical farming than in traditional temperate agriculture.

The study of Cooper (1970), demonstrates the potential of the tropical environment provided that water and nutrients are not limiting. He demonstrated that the yields of well-fertilized and irrigated fodder grasses which are photosynthetically fully active throughout the year are two to three times higher than that of the temperate yield.

Yields of Well-Fertilized and Irrigated Fodder Grasses Which Were Photosynthetically Fully Active Throughout the Year.



PART II

How Nature Works and How To Let It Work For You

"All problems of existence are essentially problems of harmony."

-Sri Aurobindo

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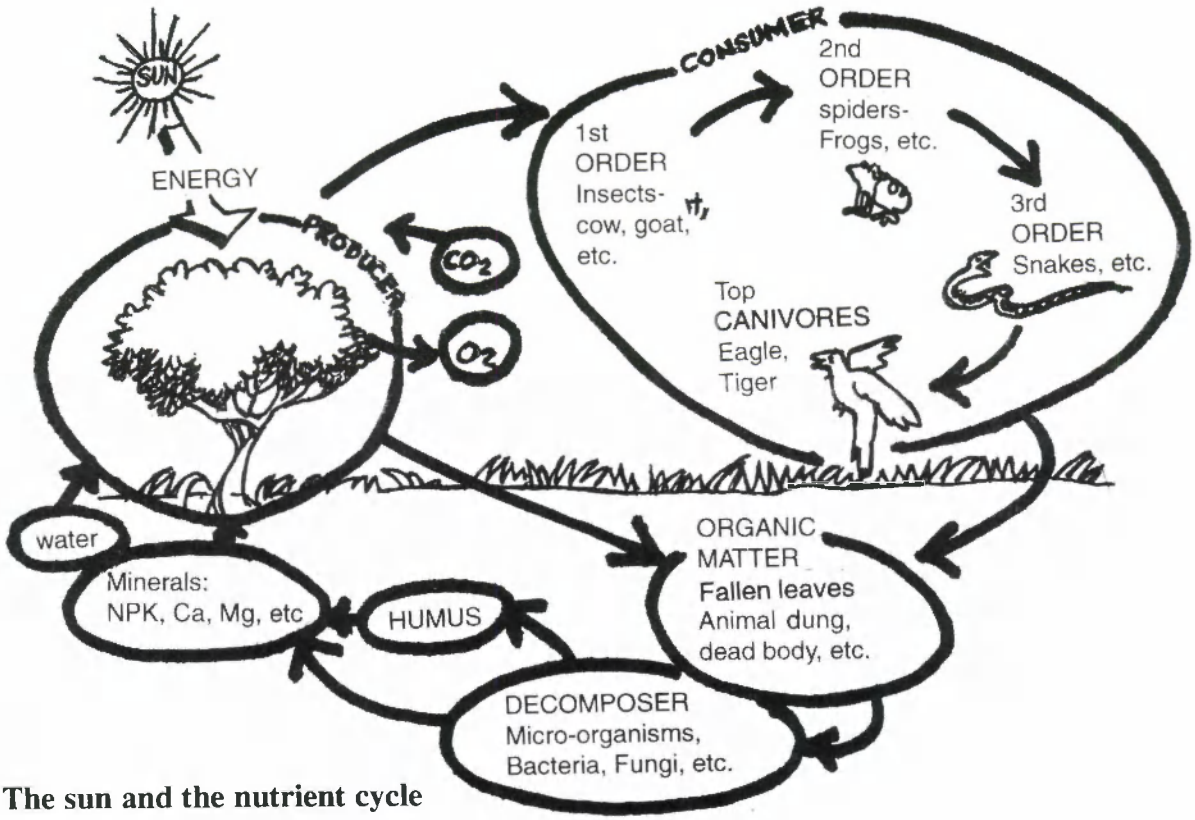
2 How Nature Works and How To Let It Work For You

2.1 How Nature Works

2.1.1 The Nutrient Cycle

How then does nature work? Are there guidelines for us so that farmers can optimize the benefits from nature?

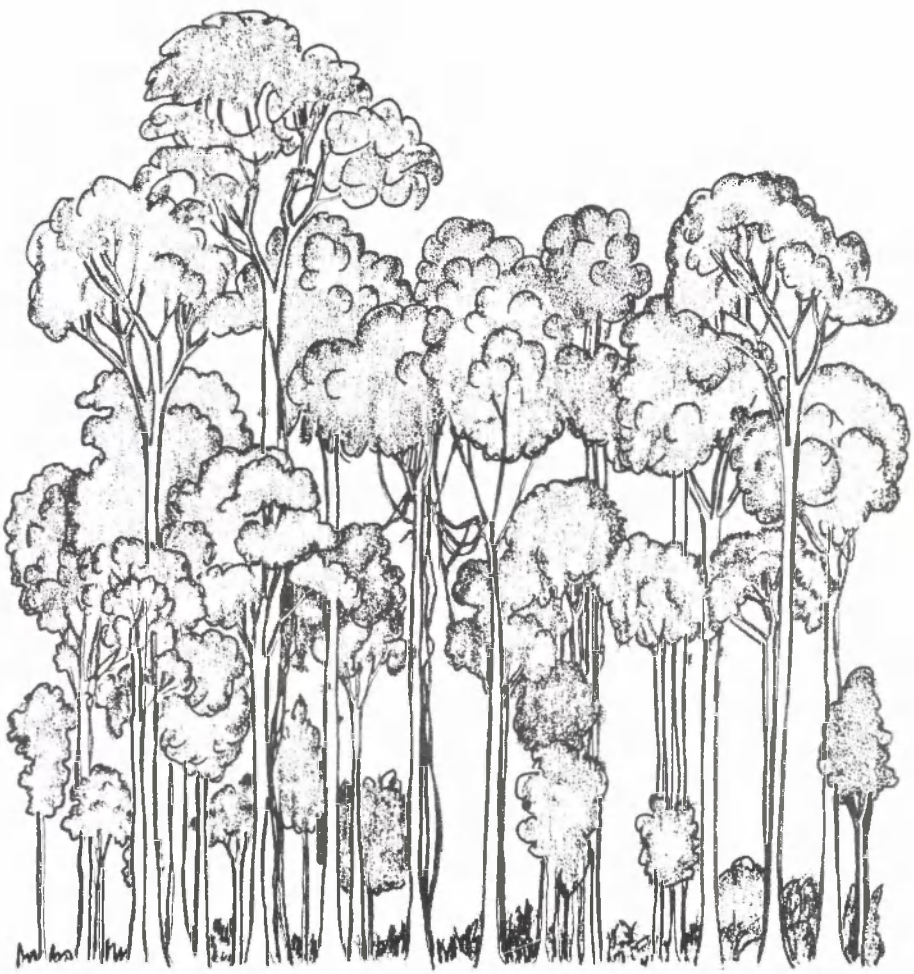
One Permaculture designer once said, "Observe cycles and patterns in nature". This brings us to the nutrient cycle diagram. In the illustration we could identify three main actors: the producers, the consumers, and the decomposers. They are closely inter-related and inter-dependent.



The sun and the nutrient cycle

The Producers

The first group of actors are the plants. Only plants can convert carbon dioxide and water into starch (food) with the aid of the sun as its energy source. As discussed in the preceeding section, the tropical forest is very productive but tropical agriculture has not been so. Even with the extreme tropical climate, the forest has not been negatively affected. How come? The fallen leaves and branches assure continuous supply of organic matter. The forest litter and the organic matter act as sponge to preserve moisture. The multi-storey vegetation controls water evaporation, soil erosion and protects the microorganisms in the soil against the scorching sunlight. This makes a perfect nutrient recycling system. Thus, the forest is a self-renewing and self-perpetuating system. With more plants, more food is manufactured, more food is available for animals, more litter for microorganisms to decompose, hence, more nutrients for plants.



Source: Essential Learning in Environmental Education

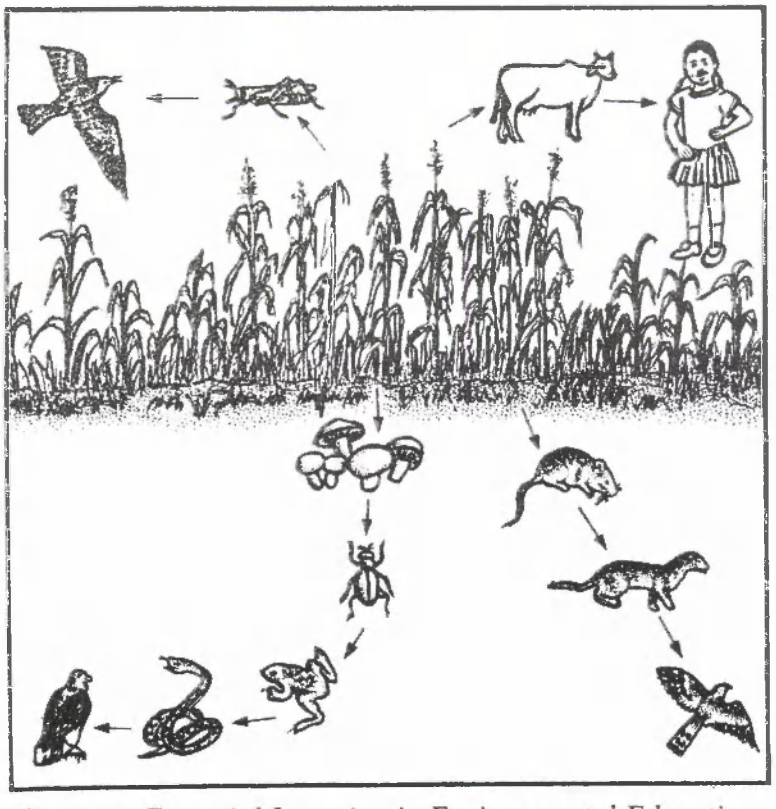
The Consumers

Another group is composed of consumers. There are four orders of consumers. The relationship among them makes for the balance in nature. Nature works constantly to maintain a balance.

In the mid' 1970s, a campaign to plant giant ipil-ipil was launched in the Philippines. Psyllid infestation occurred in the early 1980s. The infestation was so massive that many scientists were alarmed. Much efforts were done to control it but to no avail. One of this author's teachers, an ecologist, said that the psyllid's population will naturally go down. True enough, the very high population of psyllid eventually led to the defoliation of ipil-ipil throughout the country. Psyllids ran out of food. And as predicted, the psyllid population was eventually checked and controlled. People learned the lesson and they diversified to other tree species.

Fukuoka, the Japanese farmer who wrote the book "Natural Farming" once said, "All phenomena associated with living organisms work tirelessly to maintain a state of equilibrium. Animals live by adapting to their environment. The forces of cancellation act to negate the forces of compensation, by which mechanism nature seeks to maintain a balance". When rice is planted densely, i.e. many seedlings per hill, just like what Filipino farmers do in the lowlands, the plants send out fewer tillers. When it is planted singly like what they do in the rice terraces in the Cordillera, a great number of stalks grow from each plant.

The diadegma wasp, a friendly insect laying eggs on the diamond backmoth larvae of cabbage, illustrates the same principle. As diamond backmoth population increases, more food is available for the young diadegma. Consequently, the number of diadegma wasps increases. Left on their own, the diamond backmoth population is controlled by the growing diadegma population. But once pesticide spraying is done, the whole balance is disturbed.

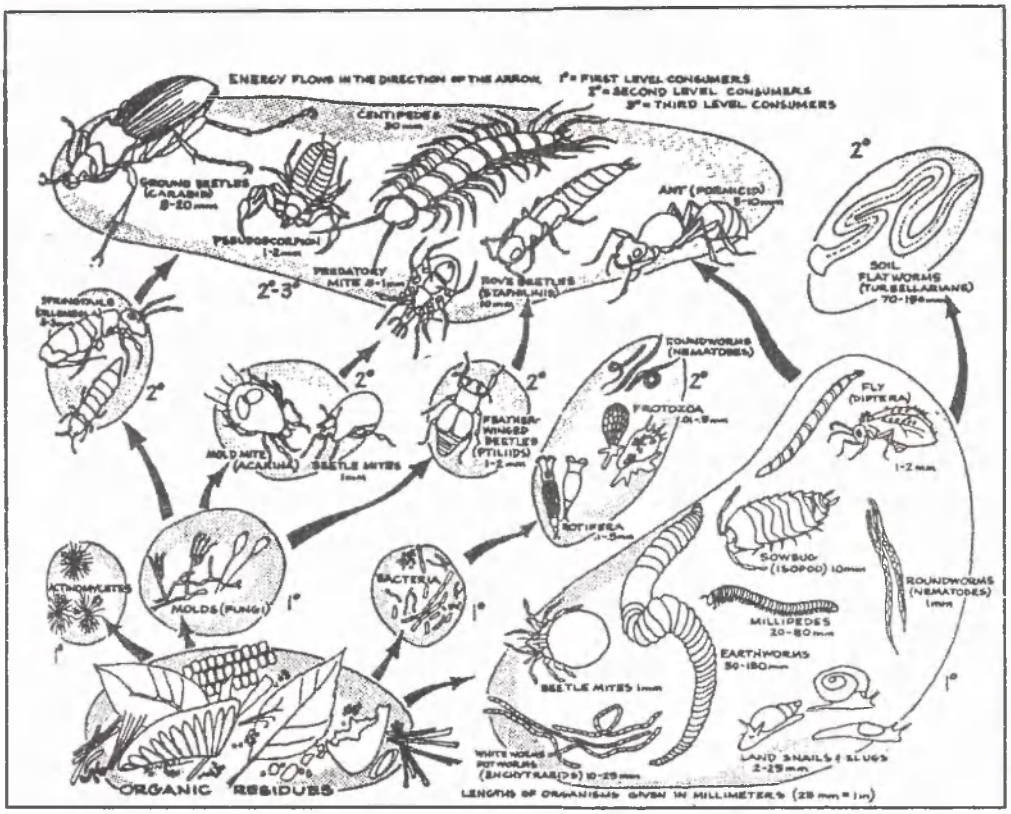


Source: Essential Learning in Environmental Education

The diversity of different organisms eating each other in a food web maintains the balance. This is nature at work. According to some tribal folks in Mindoro, when people started to eat wild cat, rat infestation followed.

Higher order consumers are bigger but fewer. There is also a decrease in efficiency from one consumer to the next. Thus, many vegetarians say that it is more efficient to eat the grain and the soya rather than feed it to the livestock and take the protein from the animal source. In a sense this is true.

The Decomposers



The third and most often overlooked working group is the decomposers. The decomposers are mainly micro-organisms. One gram of fertile soil can contain up to more than 100 million microbes. Without them the nutrient cycle will not proceed. They decompose organic matter into humus which gives nutrient for the plants. With more microbes, more nutrients are made available for the plants.

Most organic farmers look at the soil as a living organism - the soil alive with an army of microorganisms. In contrast, conventional farmers see the soil as simply a medium to grow plants. Some scientists equate it with its chemical make up. Hence, expect a usual soil analysis to include only the macro elements (N, P, K), and maybe other nutrient deficiencies as parameters.

Today, more and more soil scientists are appreciating the role of microbes in maintaining soil fertility unlike in previous years when the soil was seen only as a storage of chemical nutrients for the plant. One IRRI study used labeled Nitrogen to trace the efficiency of rice plants in getting nutrients from the chemical fertilizer that was applied. The data showed that only 30% of the nutrients absorbed by the rice plant came from the chemical fertilizer and 70% was attributed to soil mineralization. What does this mean? It means that in soil fertility management, the main arena of soil fertility enhancement lies in increasing the capacity of the soil, through its living microorganisms, to generate its own nutrients. The study of Claude Bourguinon using the patented LAMS method of Soil Analysis, the Spade method by Ulrich Hampl, and the microbial population count method by Rusch, all point out that the microbial population plus physical analysis is a better way of predicting yield than the usual chemical analysis alone.

2.1.2 Effective Rainfall

This author's father once said, "What matters is not how much you earn but how much you save". The saying holds true for rain water.

If rainfall is small but evenly distributed throughout the year, effective rainfall is high. (As stated earlier, effective rainfall is the water retained for crop and animal production.) If it is heavy but comes only during the rainy season, like in most areas in the Philippines, there is a need to do intervention to increase effective rainfall. Bill Mollison, the father of Permaculture, said that the most efficient way to get water is to catch the rain. It is manna from heaven. No matter how efficient your pump machine is in getting water from underground, it is still inefficient in the long run.

The soil and the living plants are the best places to store water. Trees (biological storage), organic matter in the soil (physical storage), soil cover through mulching and cover crops, terracing, and water impoundment systems increase effective rainfall. For example, the rice pond culture in Japan stores a lot of water, much, much water than their hydroelectric dams. This makes their rice culture significant to their ecology.

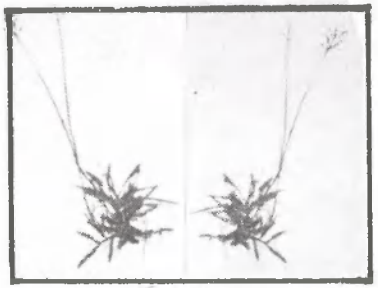
Agricultural strategies should therefore be focused on how to retain moisture and nutrients within the system, how to protect the soil from erosion due to high rainfall and how to protect the micro-organisms from extreme heat.

2.1.3 Plant Succession

Plant succession refers tc the process of changes in the vegetation of a certain place, from few, uniform plant species into a more diverse and complex plant community. For example, after the forest is cleared extensively, the exposed soil is inhabited by creeping grasses like amorseco and cogon (Imperata cylindrica). When sufficient moisture and organic matter is reached, the cogon-dominated grassland will eventually be habitated by the more woody Miscanthus sp. (broom type grass). A thick and dense growth of Miscanthus will provide more litter and more moisture. This will then pave the way for savannah type of trees. When the vegetation reaches this stage, it is an indicator by swidden farmers that they could again clear the area. This means the system has regenerated. Sometimes, these trees come in as early as the Miscanthus stage. When left further undisturbed, more broadleaf forest trees could grow until the place reaches a climax vegetation, a self-perpetuating and self-regulating ecosystem.

However, when disturbance occurs, such as when there is burning of the cogonal grassland to have fresh grass shoots for grazing, the area remains a grassland which has poor capacity to protect the soil from adverse conditions. Cogon could easily recover from fire because 60% of its dry matter is in its underground rhizomes. If overgrazed, then the system will deteriorate into an amorseco creeping grass population. This has lower biomass production and hence, less organic matter. An amorseco dominated grassland indicates overgrazing.

Plant successional Relationship in the Cordillera, Philippines.



Amorseco *(Andropogon aciculatus)* dominated grassland

overgrazing

rest from grazing

Cogon *(Imperata cylindrica)* dominated grassland

minimal burning

too much burning

absence of fire

kaingin *(swidden farming)*

Miscanthus sp. dominated grassland

Pine Forest *(usually with grasses underneath)*

absence of fire

burning

absence of fire

forest clearing

Savannah type secondary forest tree species with grasses

kaingin

absence of fire

Broodleaf Fores

Plant succession can also be illustrated in a pine forest. The pine tree is a very good regenerative species in the Mountain Provinces of Northern Luzon. The pine is the first tree to grow in open, dry forest clearings. This is so because it only germinates in open sunlight and is very resistant to drought. It acts as scab in healing the wounds of the forest. Pine trees grow until they partially cover the pine forest floor. This then paves the way for broadleaf tree species to grow. But in the Cordillera, this does not happen. The pine forest undergrowth in the Cordillera is periodically subjected to fire to maintain the cogon grass associated with the pine tree. This grass is used for cattle grazing. The pine tree is not so much affected because once it is 8 years old, it becomes resistant to fire. Thus, instead of the plant succession proceeding to the more complex and diverse montane forest, the pine forest is maintained as a climax vegetation. The pine forest (due to the pine trees' needle type leaves) is inferior in controlling erosion compared to the broadleaf trees of montane forests. Thus, if one visits a pine forest in the Cordillera, he or she will observe gullies which are indicators of soil erosion.

There is great value in knowing plant successional relationships. It could provide sound ideas regarding natural resource management—for instance, a reforestation strategy. It is better and cheaper to control fire and let the grassland regenerate by itself rather than to launch a reforestation project which requires more resources and a higher level of seedling care and management. Without these requirements, seedling survival rate becomes very low as in most reforestation projects. This spells failure for the project.

Planting near existing clumps of secondary vegetation and radiating from there is a good way of attaining a higher survival percentage for reforested tree seedlings. These clumps of trees offer more favorable climatic conditions (e.g. temperature, humidity) and soil conditions for the newly planted seedlings.

Using pioneer species as nurse crop to protect your main crop is another method of utilizing the principle of plant succession. This author's experience in growing rambutan showed this. Initially, his attempts at growing rambutan was a failure because the seedlings died during the dry season inspite of constant watering. Rambutan is very sensitive to drought and extreme heat. It loves very humid and wet conditions. It was only when rambutan seedlings were planted under the drought resistant Gmelina and Gliricidia sepium (madre de cacao) that the rambutans were grown successfully.

How about using leguminous cover crops to control cogon? It is common knowledge that cogon is one of the most difficult weeds to control mechanically. But when kudzu, velvet bean or lima bean is grown to smoother over cogon, then it becomes relatively easy to control cogon. This grass is sensitive to shading. It utilizes all its underground reserves to compete for sunlight until these reserves are depleted.

2.2 Letting Nature Work For You: The Principles

As discussed in the preceeding sections, the natural forest shows the natural and ideal system. For one, its multi-storey structure maximizes sunlight.

Multistorey Structure

Moreover, the different layers of leaves reduce the beating effect of rain. Also, the thick litter conserves the moisture and protects the soil against erosion. The high amount of organic matter under the trees is very conducive to the soil microorganisms resulting to an ideal nutrient recycling system. As a result, the forest is a productive, stable, and self-sustaining ecosystem.

Ecological farming then should try to mimic the natural forest - the very source of the following ecological farming principles.

2.2.1 Nutrient Flow Pattern and Waste Recycling System

This principle could be exemplified by the Maya Farms experience. Pig and cattle waste goes into the biogas digester. The methane gas derived is used mainly to run the engines for light, water pumping, etc. and for cooking. The liquid portion of the waste called slurry is mixed with the irrigation water as fertilizer for the forage plants. The solid portion is sold as organic fertilizer. As you read on, you will see how other farmers apply this principle or how the by-product of one component becomes an input in another component of their farming system.

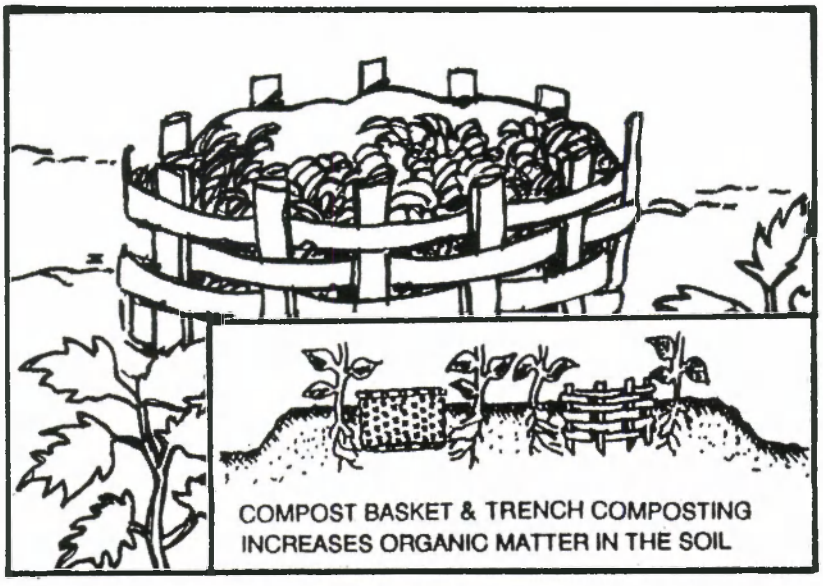
2.2.2 Soil Life and Soil Fertility Management

It is a truism that healthy soil produces healthy plants. Increasing the organic matter of the soil provides more food for microorganisms. More microbes mean more nutrients for the plants. Such principle is best exemplified by basket composting. This technique mimics how the litter functions in the forest floor. While the inner organic materials are decomposing, new biodegradable ones are added on top.

Speed of Decomposition in Different Climate Zones

Place	Average Temp (C)	Decomposition (years)	
		Half	Complete
Tropical Rain Forest	27.2	2.8	11.9
Temperate Evergreen Forest	13.7	13.9	60.3
Sub-frigid Forest	5.6	35.9	155.3

T. KIRA (Ecology and Nature) 1971 as cited in Murakami (1991)

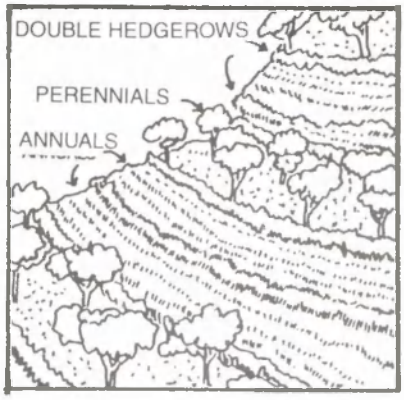


A healthy soil is a healthy plant

Basket Compost

The hedgerow intercropping used in the Sloping Agriculture Land Technology (SALT) is actually a compromise between the stability of the forest and intensive cropping to maintain high agricultural yields. The hedgerow plants take nutrients from lower layer of the soil. They are then regularly cut and then used as green manure. This makes nutrients available to the shallow rooted plants.

SALT



2.2.3 Functional Diversity and Alternative Pest Management

It is not the number of species nor number of components a farm has that matters. It is how synergistic the different farm components are. Viewed this way, the farm becomes a whole organism with the different components of the system complementing each other. Permaculture concept recommends that one component should at least serve three functions and each function be served by different components. In monocropping, the rice crop is seen only as source of food and/or cash. But the rice crop could take on many functions such as animal feed source, rice straw as fodder for cattle, litter for chicken, maybe bedding for mushrooms, or material for composting, and the ricefield as a place to culture gabi and fish. The gabi, fish snails and mushroom could then become additional sources of food. By creating an integrated farming system, stability is more likely to be achieved. This principle of diversity could also be applied in pest management. There is actually wisdom in the saying, "In diversity, there is stability; in uniformity, there is vulnerability". Rice varieties that have narrow genetic base are actually more susceptible to diseases. By creating an environment conducive to the proliferation of a diverse species of insects and microorganisms, pest outbreaks are minimized.

KASAKALIKASAN's integrated pest management program in rice and crucifers has successfully demonstrated the utilization of friendly insects to control the population of harmful insects. One farmer who used to be a heavy user of pesticides in rice but has since stopped using any said, "What happened was very ironic, the agricultural technicians who introduced to me the use of pesticides are now urging me not to use any". The use of diadegma wasp to control diamond backmoth, discussed earlier, is another success story.

Excessive use of nitrogen fertilizer promotes pest attack. Nitrogen is taken by plants in the form of salt. To maintain osmotic balance the plants have to take in water. Thus, it can be observed that plants fertilized with high levels of inorganic nitrogen are more susceptible to water stress. When plants take in water, their tissues become more succulent and hence, more susceptible to pest attacks.

2.2.4 *Multi-storey Cropping and Agroforestry*

The traditional multi-storey cropping system practiced in Cavite and Batangas is so far the farming system closest to that of the natural forest. On the top layer are the coconut trees. Fruit trees like santol, avocado, kaimito, jack fruit, lanzones, rambutan and mango occupy the second layer. The lower layers are either papaya, cassava, banana and/or coffee. Pineapple, taro, ginger and sweet potatoes could be found under the coffee trees. In addition are climbing plants like yams.

The SALT also demonstrates this principle. The hedgerows which are Nitrogen Fixing Trees (NFTs) take nutrients from the sub soil. When cut and used as green manure for crops in between the hedgerows, nutrients become available to the shallow rooted plants. Some of the strips are planted with annual crops. Other strips are planted with permanent fruit trees. It is one of the most ecologically designed farming system.

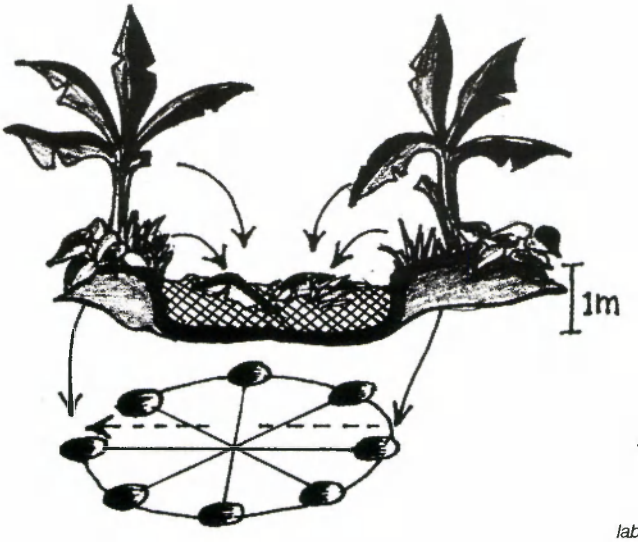
2.2.5 *Increasing Effective Rainfall*

This principle is being followed by Domeng Martinez's integrated farm in Aglipay, Quirino province. His experience is told on page 38 - How Domeng Martinez Solved His Water Shortage and Soil Erosion Problem").

Ilang paalaala sa pagtatanim ng halaman:

• *Hukay sa paanan ng halaman*

• **Magtanim ng maraming saging**



Sa pabilog na pagtatanim ng mga saging nagiging mas matibay ang mga ito laban sa malakas na hangin at lalo nitong napapataba ang lupa sa paligid.

Ang mga hukay ay nagsisilbing punduhan ng tubig, nagpapabagal ng daloy ng tubig at lupa at nagbibigay ng magandang kondisyon para sa pag-usbong ng iba't ibang klaseng halaman.

Dahil natatabunan ng mga dumi at pinagdamuhan ang maliit na hukay sa gitna ng mga puno ng saging, mas matagal bago umangat ang mga suhi nito

Masanobu Fukuoka's Four Principles of Natural Farming

Masanobu Fukuoka is a Japanese farmer who has inspired a number of followers from his unconventional way of farming. He authored the books "**The Natural Way of Farming**" and "**The One-Straw Revolution**". As a plant pathologist, he worked with the Japanese Government's Plant Quarantine Department. Later on, he quit his job in favor of the experimentations he undertook for over forty years to establish what he calls "natural farming". According to him, natural farming is based on nature that is free from human meddling and intervention. Following the Buddhist way, his farming originates in the philosophy of "Mu" or nothingness, and returns to a "do-nothing" nature. He demonstrated the validity of four major farming principles: **no tillage, no fertilizer, no pesticides,** and **no weeding.**

"The young people living in my orchard carry with them the hope of someday resolving the great problems of our world that cannot be solved by science and reason. Mere dreams perhaps, but these hold the key to the future."

For example in his rice production technique, he sows rice seeds together with clover over a standing crop of barley which is about to be harvested. The seeds are clay-pelleted as protection against birds and rats. Of course, when the barley is harvested, the sprouting rice seedlings are also trampled upon. But it is not harmful as the rice seedlings comes up the next day.

The rice seedlings are then mulched with the barley straw. Clover then grows together with rice. In the beginning the clover seems to dominate the rice seedlings. To weaken the clover, he floods the field for 4 - 5 days. The waterlogged clover dies, giving way to the rice crop and acts as green manure. He calls the technique "The Clover Revolution".

Then he sows the barley seeds in the field when the rice is about to be harvested and repeats the process.

The Natural Way of Farming

by Masanobu Fukuoka

"It is to allay this feeling of unease that I recount my own experiences. Today, my method of natural farming has approached the point of "doing nothing". I will admit that I have had my share of failures during the forty years that I have been at it. But because I was headed in basically the right direction, I now have yields that are at least equal to or better than those of crops grown scientifically in every respect. And most importantly: 1) my method succeeds at only a tiny fraction of the labor and costs of scientific farming, and my goal is to bring this down to zero; 2) at no point in the process of cultivation or in my crops is there any element that generates the slightest pollution, in addition to which my soil remains eternally fertile."

"There can be no mistaking these results, as I have achieved them now for a good many years. Moreover, I guarantee that anyone can farm this way". This method of "do-nothing" farming is based on four major principles:

1. **No cultivation**
2. **No fertilizer**
3. **No weeding**
4. **No pesticides**

Fukuoka's Rice Production Technique in Brief Direct-seeding, No-Tillage , Barley/Rice Succession with Green Manure Cover

This is a method for the companion cropping of leguminous green manure plants with rice and barley or wheat, all members of the grass family.

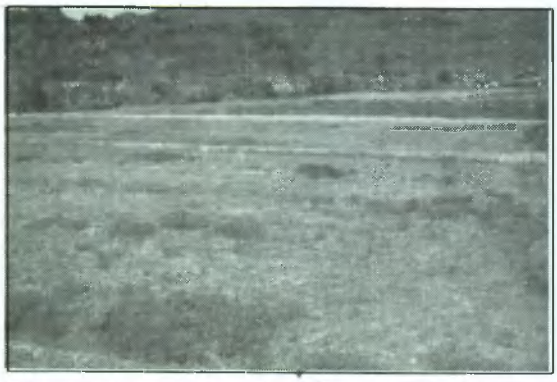
Cultivation Method: "In early or mid-October, I sow clover seeds over the standing heads of rice, then about two weeks before harvesting the rice, I sow barley seed. I harvest the rice while treading over the young barley seedlings, and either dry the cut grain on the ground or on racks. After threshing and cleaning the dried grain, I immediately scatter the straw uncut over the entire field and apply chicken manure or decomposed organic matter. If I wish to overwinter my rice, I enclose rice seed in clay pellets and scatter these over the field in mid-November or later. This completes the sowing of rice and barley for the coming year. In the spring, a thick layer of clover grows at the foot of the maturing barley, and beneath the clover, rice seedlings begin to emerge.

When I cut the barley in late May, the rice seedlings are perhaps an inch or two high. The clover is cut together with the barley, but this does not interfere with the harvesting work. After leaving the barley on the ground to dry for three days, I gather it into bundles, then thresh and clean it. I scatter the barley straw uncut over the entire field, and spread over this a layer of chicken manure. The trampled rice seedlings emerge through this barley straw and the clover grows back also.

In early June, when the rich growth of clover appears about to choke our young rice seedlings, I plaster the levees around the field with mud and hold water in the field for four to seven days to weaken the clover. After this, I surface-drain the field in order to grow as hardy plants as possible. During the first half of the rice growing season, irrigation is not strictly necessary, but depending on how the plants are growing, water may be passed briefly over the field once every week to ten days. I continue to irrigate intermittently during the heading stage, but make it a point not to hold water for more than five days at a stretch. A soil moisture level of eighty percent is adequate.

During the first half of its growing season, the rice does well under conditions similar to those in upland rice cultivation, but in the second half of the season irrigation should be increased with plant growth. After heading, the rice requires lots of water and without careful attention could become dehydrated. For yields of about one ton per quarter-acre, I do not make use of standing water, but careful water management is a must."

Source: The Natural Way of Farming: The Theory and Practice of Green Philosophy - pages 103, 174, 175.

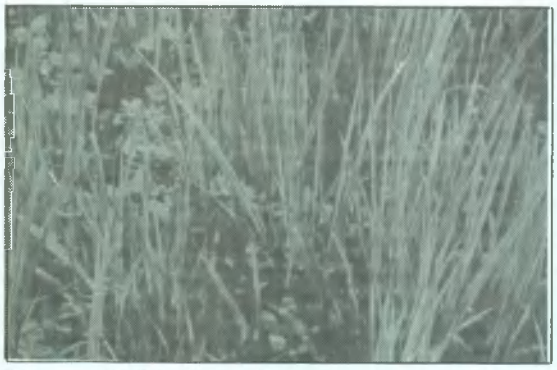


Rice seedlings covered with a mulch of barley straw (late May).

Rice seedlings growing in a ground cover of bur clover after the barley harvest.

Early June

Rice in a ground cover of clover (mid-June).



Rice amid the clover (July).

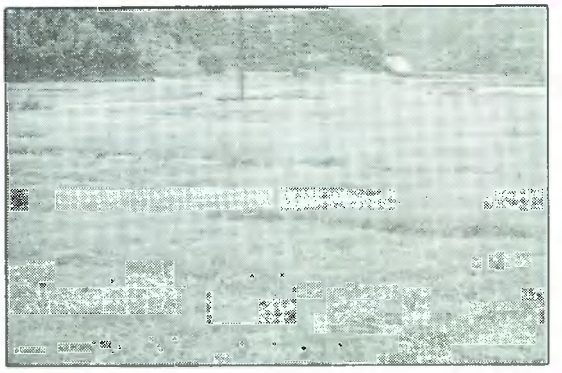
Rice at tillering stage (early August).

Head of grain fully extended (early September).

Mature rice ready for harvesting (October).

Source: The Natural Way of Farming: The Theory and Practice of Green Philosophy - page 145.

Spreading of rice straw over barley shoots.



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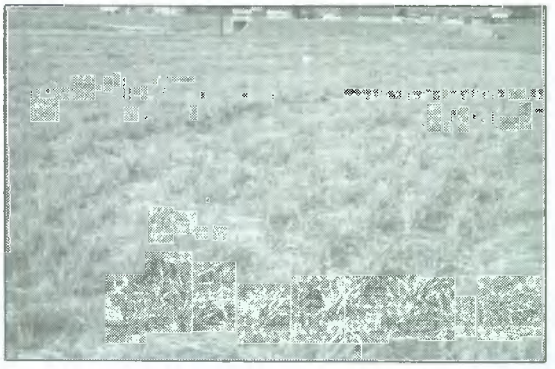
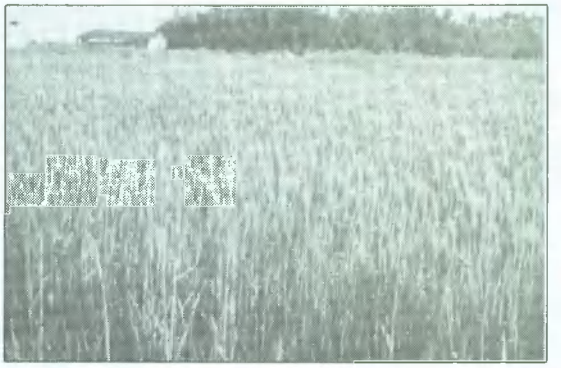


Barley at the tillering stage, in a mulch of rice straw (late January).

Barley growing among the clover.

Barley heads just emerging (April).



Barley heads fully extended (April).

Barley ready to be harvested (May).

Preparing clay pellets for sowing rice before the barley harvest.

Source: The Natural Way of Farming: The Theory and Practice of Green Philosophy - page 146.

Principles of agriculture for the humid tropics

An Odyssey of Discovery

Roland Bunch

Our odyssey started in 1982, the day Conrado, a Honduran villager, sheepishly showed us his experiment. Sceptical about the value of the organic matter we had recommended, he had piled a huge quantity of compost into several rows of his maize field. The last two rows he left as a control, untilled and unfertilized. There, before our eyes, stood a field of maize 2.5 meters tall, with a last row reaching not even 40 cms. That was the day we began to realize the incredible degree to which organic matter can restore degraded soils.

Compost is Good But Not Economical

Little by little, work in a dozen countries has convinced us that the vast majority of soils can be made highly fertile. How? By using our first principle: **maximize organic matter production.** Conrado's particular approach, however was anti-economic. The cost of using compost on basic grains exceeds the benefit. But intercropped green manure/cover crops (gm/cc's) can produce from 50 to 140 t/ha (green weight) of organic matter with very little work: no transporting of material and no cutting up or layering or turning over of compost heaps. In fact, sometimes, because of the gm/cc's control of weeds, net labour costs decrease, and soil quality often improves visibly each year.

Peasants in Honduras are incorporating velvet beans (Mucuna pruriens) as a green manure and cover crop in maize. (Flores Milton)

Value of Soil Cover

Village farmers from Veracruz State in Mexico through Guatemala, El Salvador, and Honduras are intercropping velvet beans *(Mucuna ensiformis)* with their maize and sorghum. To our amazement, these systems, virtually all of them in the supposedly infertile humid tropics, allow farmers to plant maize every year for decades with productivity increasing over time up to 4 t/ha (Duron, 1990). In other words, these farmers have found an answer to slash-and-burn agriculture.

Migratory agriculture is most frequently motivated by decreasing fertility, increased weed problems, or both. In the Mesoamerican gm/cc systems, nitrogen fixation and biomass recycling maintain soil fertility. Mulches of crop residues and fast-growing gm/cc's drastically reduce the weed problem. We had learned a second principle: **keep the soil covered.**

Gm/cc mulches provide a whole series of additional benefits. They protect the soil from irradiation and the heat of the tropical sun, thereby also reducing organic matter burn-out. They save a tremendous amount of work; incorporating gm/cc's is virtually impossible for farmers using hand hoes. They keep the excess nitrogen from acidifying the upper soil horizons (Triomphe, 1994). And they largely prevent soil erosion, even on slopes of 40%.

Zero Tillage

In the meantime, we had been reading Fukuoka's book, "The One Straw Revolution" (Fukuoka, 1978). However, his recommendation of zero tillage failed to convince us. After all, most of the traditional agriculture in Latin America uses zero tillage, yet is far from productive.

In mid-1993, I visited the work of EPAGRI in southern Brazil. Having visited over 160 agricultural development programmes through the years, I found this largely unpublicized effort to be the finest of its size I had seen in Latin America. Literally, tens of thousands of animal traction farmers were producing harvests approaching those in the USA, with gm/cc's and zero tillage (Bunch, nd). Valdemar de Freitas, EPAGRI's manager, showed us that the secret to achieving zero tillage is applying massive amounts of organic matter to the soil. Brazilian farmers, after some four years of applying gm/cc's to the soil, are able to quit ploughing. The advantages, in terms of better soil structure, reduced soil compaction, higher fertility and decreased cost, are impressive. Interestingly, farmers often use non-leguminous gm/cc's to increase biomass in order to quit ploughing sooner.

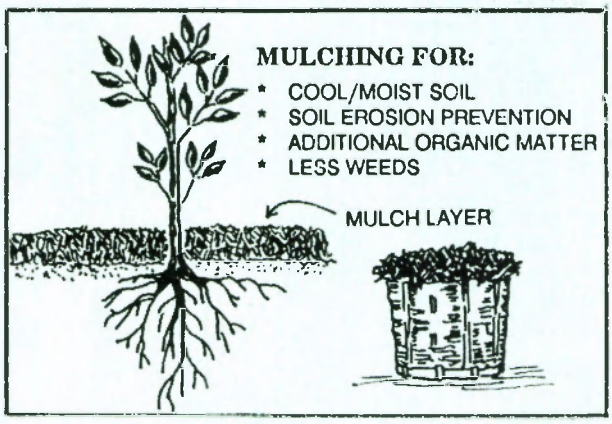
The Brazilians' discovery explains why the zero tillage gm/cc systems of northern Honduras, and Fukuoka's, produce so well, while many traditional zero tillage systems do not. This we added a third principle: **use zero tillage.**

Diversity

EPAGRI's investigation and dissemination of over 60 species of gm/cc's, partly to avoid diseases and insect pests, confirmed another, more widely known principle: **maintain biological diversity.**

Feeding Plants with Mulch

Plants tend to develop a heavy mass of feeder roots immediately under thick mulches (Rattan Lal, 1989; Vitousek and Sanford, 1986). It makes simple sense: when soils are as hostile to plant growth as are the humid tropic's acid soils, feeding plants through a mulch would seem a much more promising alternative. The fifth principle is undoubtedly the most unconventional: **feed plants through the mulch.**



Imitating Nature

These five principles enjoy a nice synergy. For example, if we are going to feed our plants through a mulch, we certainly cannot plough our fields. Nevertheless, the most important relation between these principles is precisely the one that took us the longest to figure out: they describe quite well the way a humid tropical forest functions. That is, all we discovered in our 12 year odyssey is something we should have guessed all along. In order for humid tropical agriculture to be both highly productive and sustainable, **it must imitate the highly productive, millions-of-years-old humid tropical forest.**

Three months ago, I searched the computerized agricultural data system in the United States for information on the nutrient dynamic in mulches and the feeding of crops through a mulch. I found virtually nothing. The above principles mean we are going to have to develop agricultural systems totally different from those agronomists have tried, for so many years, to "transfer" from the temperate nations. Yet the possibilities are enormous. A study from northern Honduras shows that the gm/cc maize system is 30% more profitable than the high-input maize system nearby (Milton Flores, 1992). It may well be we are just beginning to fathom the full potential of low-input agriculture in the humid tropics.

Roland Bunch, COSECHA, Apartado 3586,
Tegucigalpa, Honduras.

Adapted from
ILEIA NEWSLETTER - **October 1995**

Part III

Farmer - Proven Ecological Farming Techniques

"If you plan for one year, plant rice;
if you plan for ten years, plant trees;
if you plan for hundred years, educate mankind."

- Kuan Tzu

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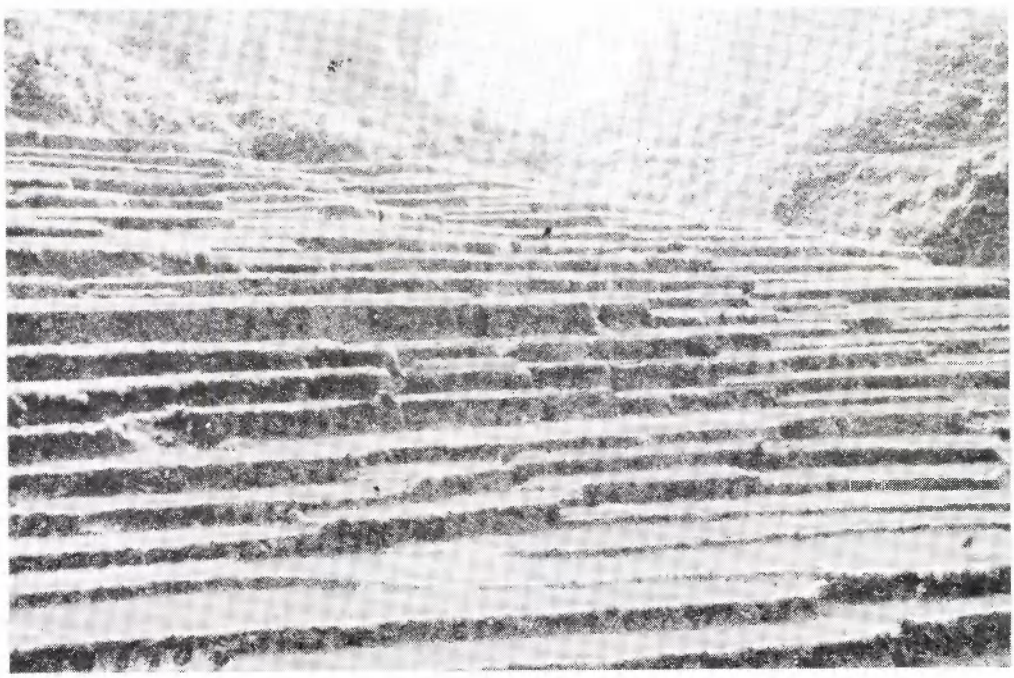
3 Farmer - Proven Ecological Farming Techniques

3.1 Luzon Practitioners

3.1.1 Bontoc Rice Terraces: Epitome of Nutrient Recycling

The rice terraces in the Cordillera is one of the wonders of the world. Using only simple tools, the Igorots carved the steep rocky mountains and transformed them into productive ricefields. These terraces are like stairways to the sky. They are so designed to retain soil and water in the uplands. Just imagine the amount of water impounded in the rice pond which is slowly released into the rivers. It is not only significant to them but, also to the people of the lowlands. The synergy between the forest as water source and the rice terraces indicates the intricate agro-ecosystem relationship.

It is a wonder too, that one of these terrace systems - in Maligcong, Bontoc, at an altitude over 1,600 meters - has maintained high yields through time under (very difficult situation) changing environmental conditions. Omengan (1981) reported that the Maligcong rice paddies yield 6.2 tons/ha without the use of modern rice varieties, chemical fertilizers and pesticides. This is more than 140 cavans if we take the usual 42 kg. palay content of 1 sack. Herder (1990), a Dutch agricultural consultant who stayed for a long time in Bontoc, reported an average yield of more than 5,000 kg/ha.



The sophisticated Bontoc terraces, like a stairway to the sky, were terraced with river stones using only simple tools.

What is the Secret to their High and Stable Yields After So Many Centuries?

- ***Rice production is given utmost importance and care.***

The economic, social, and religious life of the Bontocs revolve around the agricultural cycle. Food security is a primary consideration. Within the cycle, rice production is the most important activity. Rice is the main dish on all festive occasions. It is also made into wine, which is highly valued for rituals. To have abundant supply of rice is a status symbol. Rice cultivation therefore, is given a high level of management attention. Farmers are very particular about weeds and the cleanliness of terrace dikes and walls.

- ***Synchronized planting reduces pest damage.***

Seeding is done simultaneously in every community. It starts when "kiling", la migratory black bird appears in the locality. All rice is planted within a period of 3-4 weeks. Damage by pest and diseases is therefore spread over all fields. As a consequence, the level of damage per field is low.

With synchronized planting, there are periods when there is no rice plant at all. This considerably reduces the insect and disease population for the next cropping season.

The strong respect given by the Bontocs for their council of elders, called "ato", makes the coordination of planting easier. The Ato acts as priests during rituals. It is the seat of all major decisions in the community.

In the lowlands, attempts at synchronized rice planting failed.

- ***Soil fertility is maintained through an intricate nutrient recycling system.***

The terrace structure prevents erosion of the soil. Land preparation is basically done with the feet. During puddling, or what they call "darnek", weeds gathered from the surrounding areas and partially decomposed rice straws (from the previous cropping season) are incorporated into the soil. Compost, decaying litter from the nearby forest, floating azollas, and blue green algae are also treaded deep into the mud.

An old woman incorporating weeds, compost, and azolla during land preparation. Simultaneously, she gathers yo-yo (an eel-like fish with the size of a pencil) and snails for food.

Composting is done under the "management" of the pigs in the village households. Half of the pig pen is excavated to about 1 foot. It is here where the decomposable materials like rice hull, straw panicle, kitchen refuse and grass clippings from nearby grasslands are dumped. The decaying litter enriched with pig manure and urine are regularly collected and replaced. The compost is then brought to the

field during land preparation. Omengan (1981) inferred that the compost is the main source of phosphorus for the rice paddies. She attributed it to the grasses that are used in the compost since grasslands are phosphorus-rich.

When the field is ready for transplanting, wild sunflower (Tithonia diversifolia) and Acalypha argatensis are scattered all over the paddy. These are believed to drive away large worms called "tuwing" that would have caused seepage in the paddy. Unknowingly, these are very good green manures.

Sunflowers lying in the paddy.

"Lamud", a weathered rock material, is powdered and applied to the ricefield. Jokingly referred to as "mountain urea", it is reported to increase yields. "Lamud" is probably rich in trace elements, especially zinc, since it has positive effect in continuously flooded soils which are prone to zinc deficiency.

"Lisao", a physiological disorder manifested by red tops and rotten roots, could be due to zinc deficiency brought about by continuous flooding. Soil drying which they call "bangkag" prevents the occurrence of "lisao". It also enhances the rooting of seedlings. Various scientific reports suggest that soil drying could enhance soil fertility by releasing some nutrients tied up in the soil organic complex.

- ***Careful seed selection and use of diverse varieties.***

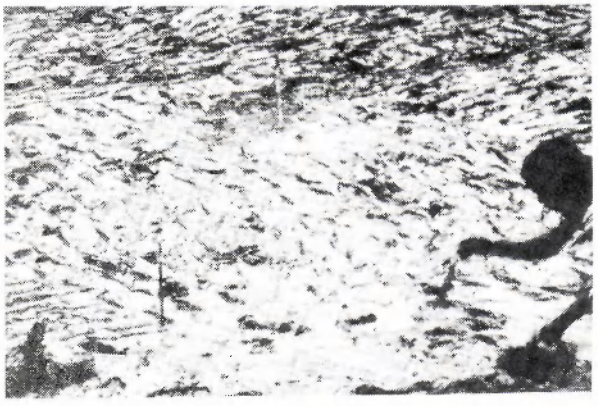
Weeding is mainly done by women. During this time women work in many fields and become familiar with the soil conditions in each parcel and the agronomic responses of the different varieties grown. They start to select seeds during harvesting by skillfully separating the panicles intended for seeds in between some of the fingers. Harvesting is done by panicle.

Harvesting is done by panicle. During harvesting, the panicles intended for seeds are automatically separated in between the fingers.

There are also times when nobody is allowed to go to the field. This holiday is called "tengao". The occasion is most often used to select seeds for the incoming cropping season.

The 3rd stage of selection is done in the seedbed. The seeding is done by using whole, unthreshed rice panicles which are laid parallel to each other in the seedbed. Seedlings are transplanted singly. During pulling, only the seedlings at the middle portion of the panicle are taken. The seedlings growing from the lower and upper parts of the panicle are left in the seedbed. Actually, the middle portion of the panicle contains most of the

high density grains. Hence, it is highly probable that seed selection within the panicle contributes to the high yields. Little is known of the significance of this practice.



The whole panicle is laid on the seedbed.

A new approach to raise the yield potential of rice is manipulating the weight of single grains (Vergara, 1987). Increasing the number of high density grains increases yield, milling recovery, and head rice recovery. Within a panicle, certain spikelets invariably develop into high density grains. Most spikelets on the primary branches are high density grains. Biodynamic farmers in Europe likewise, get their seeds from the middle portion. They claim that this is where balance is achieved, compared to the upper and lower portions which invariably receive the cosmic and terrestial effect, respectively.

Two to 5 rice varieties are planted in a medium to large field. The planting of several varieties is known to deter pest. Indeed, the saying "diversity is stability and uniformity is vulnerability" holds true.

- ***The long and narrow perimeter of the terrace increases utilization of solar energy.***

A unique feature of the Bontoc rice terraces is their long and narrow perimeter. In other areas, they have generally wide terraces. Based on observations, the borders (paddy edges) produce more tillers and filled grains. This could be explained by the fact that more sun is received by the borders or what is termed as the edge effect. Thus, in rice experiments they take out the border effect in data sampling. The long perimeters of the Bontoc terraces increases the edge effect.

The use of smooth river stones (other terraces use angular stones) in terrace wall construction is claimed to produce better yields. The river stone linings are said to conserve heat, and may indirectly influence nutrient cycling by crop uptake (Omengan, 1981) or the activity of microorganisms.

The rice terraces, a national heritage, embody invaluable knowledge which is in danger of being lost under the pressure of "modernization". Gaining insights into the wisdom of this traditional system could help us rethink current agricultural policies and learn about ecologically-oriented and productive farming.

3.1.2 Maya Farm's Biogas Runs Machineries

When you have large volumes of animal manure, what do most people think of? Air and water pollution, certainly. Maya Farms thinks otherwise. True to its nature as a large agribusiness venture, it sees profit but this time, making profit while protecting the environment.

Owned by Liberty Flour Mills Corporation, Maya Farms was established in 1972 in a 400-hectare lot in Angono, Rizal. The vision for Maya Farms is clear: to make an integrated crop-livestock-fish-meat processing-canning enterprise.

Towards such vision, continuous research and experimentations under actual farm conditions have been conducted to discover more efficient methods of operation. Today, Maya Farms could boast of its biogas, i.e. the working combination of a biogas plant and a sludge conditioning plant in one area as the biggest in the entire world. Other countries have numerous biogas but these are small and/or scattered in several locations.

Engr. Levi Tandug of Maya Farms

Benefits of Biogas

According to Mr. Tandug, Assistant Vice President of Maya Farms, the benefits derived from the biogas are the following:

a) Pollution control

Waste recycling with the biogas system limits both air and water pollution. The smell emitted by the fresh animal manure can not be totally eliminated but through the biogaswork, this has been checked and put into tolerable level. Without these facilities, people residing several kilometers away from the farm would surely demand for the closure of Maya Farms given the 60,000 level of hogs being maintained in the farm. Tons of fertilizer-irrigation water produced daily from the biogasworks which are recycled penwashing, animal urine, and solid manure are less polutive. In fact, nearby farmers enjoy the benefit of a free and continuous flow of fertilizer-irrigation water from the system for their crops.

b) Decreased dependence on oil and a step towards total self-reliance in power source.

Biogas supplies 100% of the energy needs of the farm and 60% of the power requirement of the industrial operations. According to Mr. Tandug, from 1983 to 1989, Maya Farms operated without any help from Meralco. With the expansion in business operations, energy from external source has to be employed. He estimates that 80% of the energy

needs of the entire operation of the Maya Farms is supplied by the biogas plant.

*c) **Substantial savings in feed, fertilizer and fuel.***

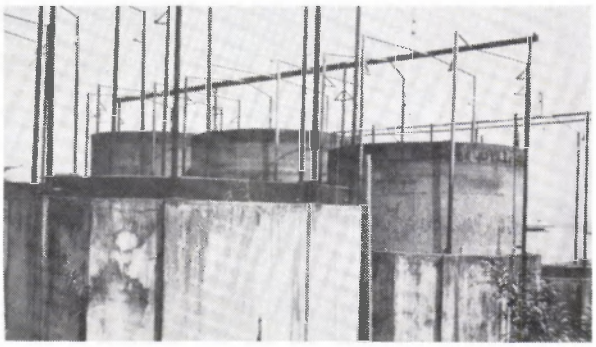
Maya Farms has recorded production of some 1,200 tons of feeds through its fertilizer-irrigation water and 660,000 tons cubic meters of fuel gas.

The sludge conditioning component plant produces tons of solid organic fertilizer aside from the fertilizer-irrigation water. Such fertilizer has been field tested and was found to perform fairly well particularly on rice and corn. The use as well as sales of fertilizer products contribute to substantial savings, not to mention income generated by the farm.

The biogas plant provides continuous supply of cooking gas for the Maya Farms Canteen, energy to run the water system (2 water pumps are powered by biogas yielding 405 gallons per minute from a 400 feet deep well running 15 hours per day), supplementary energy for the feedmill, and energy to run the brooding and lighting.

How Does the System of Biogas Operates?

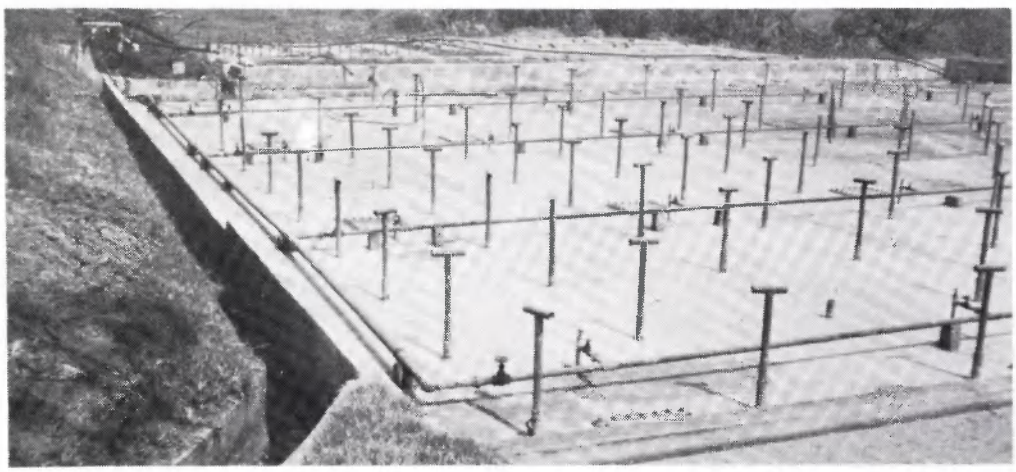
As mentioned, the biogasworks is the combination of the biogas and sludge conditioning plant. The biogas plant has 2 parts, namely: the digester and the gas holder.



Gas holders

Fresh manure and pen washings (manure slurry) from pigpens and cattle barns are collected and passed into a continuous-fed digester. Within the digester, the fresh slurry undergo an anaerobic decomposition process which produces biogas. Methane-producing bacteria could be introduced into the digester to serve as starter. The charge is stirred regularly to break the scum. The gas produced flows into the gas holder and is ready for use.

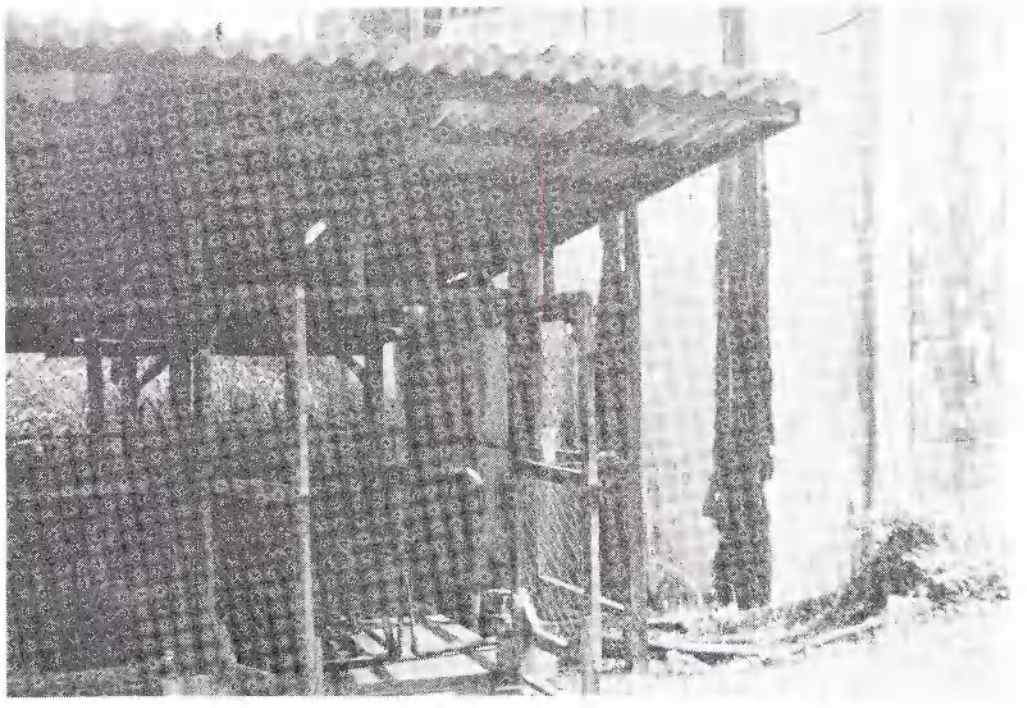
The gas holder rises as the gas increases in volume when not in use. Rubber tubings with gate valves serve as distribution channel of the biogas from the gas holder to the power plant, water pump, kitchen, and other facilities.



8 - Rows Biogas Digester

Same volume of sludge (solid and liquid by-product of the biogas plant) is continuously discharged as fresh slurry is continuously fed into the digester.

From the biogas plant, the sludge passes into the sludge conditioning plant. The sludge conditioning plant is composed of a settling basin (precipitation canal) and a series of ponds. The sludge discharged from the biogas digester passes to a hair screen to the settling basin. The solid by-product (grass filter waste and feed materials) are collected and air dried. The grass filter waste are processed into organic fertilizer. Meanwhile, the feed material goes into the feedmill.



Gas pipe distribution line from gas holder to motorized pump.

3.1.3 How Domeng Martinez Solved His Water Shortage and Soil Erosion Problem

A Pastor and a Farmer

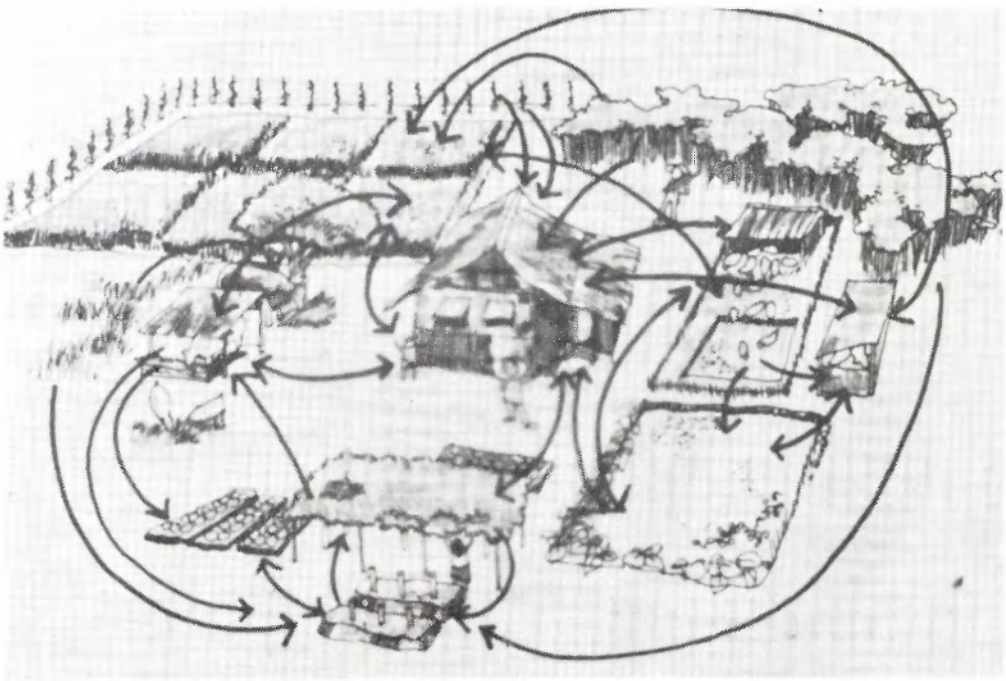
Soil erosion and water shortage especially during dry season results to low agricultural productivity in the uplands.

There is severe drought in the dry season, yet, there is so much rain in the rainy season. If the soil is left uncovered, the rain washes away most of the most valuable resource - the top soil.

How about conserving the rainwater and also the soil? Actually, this was the first question asked by Domeng Martinez way back in 1985, when he started the farm.

According to Domeng, "God's will for man is bountiful life on earth. With my farm, I could concretely show others how to develop a bountiful spiritual life."

In 1984, straight from the Union Theological Seminary, he decided to go back to Aglipay, Quirino to start farming. He envisioned a farm with minimal outside inputs by maximizing the recycling of nutrients within it. Thus, before developing his farm, he designed this nutrient flow pattern in 1985.



Nutrient flow pattern of the farm.

A workshop sponsored by the International Institute for Rural Reconstruction brought us together. The product of the workshop was IIRR's Regenerative Agriculture Kit. As my roommate, we discussed all these bioresource flows. I thought then it was only an ordinary intellectual exercise. But 6 years later, when I met him again, he did exactly what was on his plan. The house, woodlot, livestock, fishpond, ricefield, compost, and bio-intensive garden were the main components of his farm.

The 4-hectare land then was like any other farm in the neighborhood. It was dry, eroded, and unproductive. Only grasses grew which could hardly support a few cattle. Six years later, a green and productive farmlot is a sight to behold! There is minimal soil erosion and no major water problem, only bountiful food for the family.

Domeng's Agricultural Techniques and Their Effects

Fish Pond w/ Ducks

His secret? He constructed a series of rainwater impoundment ponds around his house. With the use of an A-frame, he was able to contour the farms' hillsides and effectively setup water catchment areas. Aglipay, Quirino gets approximately 1,380 mm of rain from June-November. The trees around has also generated more spring water for the farm which sustains it through the dry season. The spring water dried up before. But when the nearby trees grew, it was revived.

Dikes with vegetables.

Most of the dikes are 2-4 meters wide. Around he plants vegetables like stringbeans. The embankments are also planted with taro (gabi). These are sold and some extras are cooked as feed for the pigs and ducks. Watering is minimal as the roots of the vegetables could readily tap water seeping from the ponds. This technique is very similar to "chinampas" of Mexican Indians in ancient times. Maximizing edge effect, a principle very popular among permaculturists is also applied in this sense.

The waste from the pigpen and ducks goes into the ponds as fertilizer and feed for fish. He gives supplement feeds - a mix of rice bran and commercial feeds - to his livestock and fish. The golden snails are likewise fed to the ducks and pigs.

The clams and native snails which abound in his farm are sold in the market, after getting enough for the family's dining table.

Some of the fishponds are periodically drained for fish harvesting for planting rice. There is no tillage. Upon drainage, the soil is already soft that there is no need for cultivation. The soil is fertilized by the wastes of the fish, ducks, and pigs that go into the pond. So he sees no need for commercial fertilizers and pesticides. He once said, "Farming is a hard job and you must think of something to reduce the labor. There should also be retirement from farmwork. This system of rice farming is one way."

Domeng integrates a few livestocks into his farming system with ease and beams at his success.

Kitchen refuse, bananas, and corn go into his upgraded native chickens. He supplements this with commercial feeds and keep his flock healthy with fresh and clean water everyday. He butchers and changes his cockerels every 4-6 months. This is to avoid in-breeding. He gets around 20-25 eggs daily which is sold in the market. Most people buy the eggs not for consumption but for hatching. They want to have stocks of his improved breed.

He also has 2 cows and 2 carabaos. One cow is milking, giving an average of 1 liter of milk per day for around 7 months already. The milk is processed into "pastillas" candies which are sold for additional income. Goats and turkeys graze in the small pasture area, in the lands under fallow, and in the woodlots.

The hillsides are contoured and planted with nitrogen-fixing tree hedgerows. Under the hedgerows are the pineapples. The pineapples are processed by his wife into vinegar.

Domeng was awarded in 1992 by the Department of Agriculture as one of the Most Outstanding Farmers in Region 2.

Fishponds used as ricefields

3.1.4 Rice Hull as Mulch for Onions and Other Vegetables

Carlito Nieveras of Caurdanetaan, Umingan, Pangasinan has a practice of covering his field with rice hull and then burning the rice hull. This will kill the weeds and partially sterilize the soil. Then he tills in the rice hull ash. This practice makes the soil very friable. After planting his onion and radish, he mulches it with another layer of rice hull. According to him, rice hull will serve as protection of his crop from the heat of the sun. Weeds will also be minimized and hence, lower weeding labor. This is a widely adopted practice by farmers in Nueva Ecija, a place where rice hull disposal is a big problem.

Another farmer, Tomas Cordero, from Aparista, Lupao, Nueva Ecija also uses the same technique but with rice straw as a mulch for his onion plants. He plants onion seedlings in an area covered with rice straw. "In addition to reduced weed growth, I could save a lot from irrigation expenses as moisture is conserved. It also protects my plants and probably soil microorganisms from the scorching heat of the sun", Tomas said.

Another farmer, Danny Salva of Barangay Bagong Flores, Lupao, Nueva Ecija uses the same technique. He burns rice hull within the plots, tills in the rice hull ash, sows his seeds and then covers it with rice hull, around 2 inches in depth, as mulch. The difference is that he has an admirable cropping system. He sows the radish seeds together with seeds of singkamas (a legume rootcrop whose young pod is also used as vegetable). The radish seeds will germinate earlier and grow very fast. When the radish is ready for harvest, the sinkamas is at 6-7 leaf stage. The singkamas will then grow profusely like a cover crop blanketing the whole field. This technique of keeping the soil covered with rice hull and thick cover crop tremendously improves soil quality. The moisture retention is also improved. Hence, he reduces his irrigation expenses. The rice hull mulch also increases germination rate. The singkamas' ability to fix nitrogen further adds to the soil fertility. For his 3,000 square meters, Danny Salva gets around P40,000 (wholesale price/ "pakyaw" basis) from the radish alone. Instead of radish, his neighbors plant pechay together with singkamas.

Danny Salva in his radish field

Radish plants growing in a bed of rice hulls

Singkamas growing with radish

Singkamas about to cover the ready to harvest radish

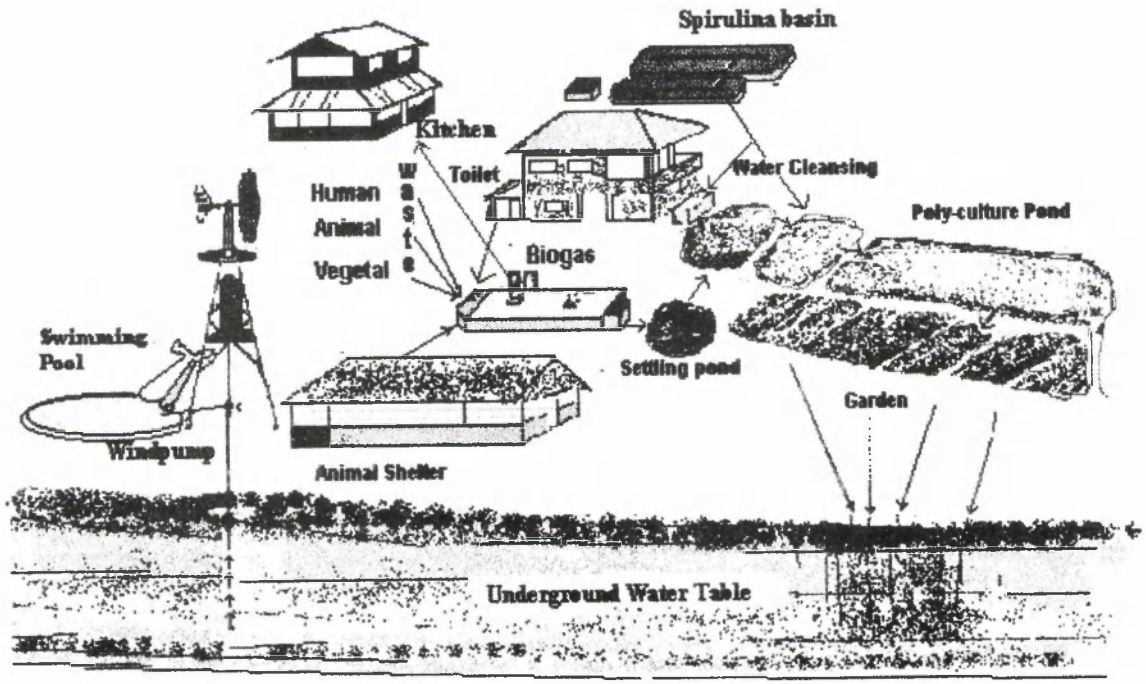
Singkamas becomes a cover crop

3.1.5 GEO Farm's Integrated Farming System

"Geo" means earth. It also stands for Global Ecology Organization. Geo Farm, located at Mangayao, Bayambang, Pangasinan, is owned by the Guevara family. According to Mr. Edgard Guevara, the farm is not just a place to showcase ecological farming techniques but also a means to practice a way of life that is more harmonious with nature. By showing examples and learning by experience, they encourage people to avail of their 3-day trainings, or 1 week nature camp activities.

Geo farm features a well-planned integrated farming system flow.

Geo Farm's Integrated System Flow



Water Recycling

A windmill pumps water that goes into a reservoir cum swimming pool. At one end of the pool is a slide shaped like a whale's tail. Water passes and lubricates the slide before flowing to the swimming pool.

The water is not treated with chlorine or any other chemical. After 3 - 4 days, the pool is drained to irrigate the fields and fill the fishponds. Recreation then becomes a part of the irrigation work.

Waste and Nutrient Recycling

Human, animal and kitchen waste flows into the biogas digester. The biogas digester was designed by Mr. Levi Tandug of Maya farms. According to Ed, anaerobic fermentation in the biogas tank kills up to 90% of the pathogenic bacteria. The remaining 10% surviving pathogens are destroyed upon sudden exposure to oxygen on the outflow of the biogas digester.

In the digester, methane bacteria produce biogas (60% methane, 38% carbon dioxide, and about 2% hydro-sulfide and trace elements) as their waste product. The biogas is used for cooking and refrigeration.

The solid separates from the liquid effluent by gravity in the oxidation/settling pond. The solid waste is used as compost fertilizer. The liquid part overflows to the water cleansing pond where impurities and pollutants are absorbed by aquatic plants like water lily, azolla, duckweed, kangkong, and water hyacinth. These aquatic plants are capable of absorbing heavy metals, nitrates and nitrites in the water. Then, the water flows into the fishpond where several species of fish live. This is an indicator that the water is already clean. Ed calls the biological waste water treatment as the "Chanoxy" method. Gardens around the pond are also irrigated through the water seepage from the ponds.

Spirulina Culture

Geo Farm also cultures spirulina. Spirulina is a 3.5 billion years old microscopic algae. It is a descendant of the first photo-synthetic life form on earth. They produced oxygen so other life forms could evolve. Since that time, these microscopic algae have helped regulate the planet's biosphere.

Ed cultures spirulina in shallow concrete basins with brackish water as the growing medium. When the spirulina have reproduced, he allows the pond to evaporate with algal cakes as the residue.

The spirulina is sold as tablets. They also mix it in fruit juices, pasta and soups. Spirulina is claimed to be nature's richest and most complete source of good quality and easily digestible vegetable protein. It consists of 8 essential amino acids needed by the human body and brain. Ed said that spirulina has no contra-indications and no overdose.

SPIRULIFE

GENERIC NAME - Spirulina
BRAND NAME - Spirulife
MAJOR FUNCTION - Abundant source of Protein essential for tissue and muscle repair. Vitamins for growth and increased resistance to diseases and minerals for proper absorption of nutrients.

DESCRIPTION Spirulina is a microscopic form of blue green algae which is able to convert inorganic compounds with Oxygen and water in the presence of Chlorophyll into Proteins, Carbohydrates, Fats and Vitamins in the process known as Photosynthesis. Scientifically it is referred to as "Phytoplankton". The name *Spirulina* means "little spiral" as its cell form the shape of a coiled spring.

Spirulina is the superfood of the future. It is nature's richest and most complete source of good quality easily digestible vegetable proteins (60 - 70%) consisting of 8 essential amino acids needed by the human body and brain. It also contains 20 to 25 times more beta carotene (Provitamin A) than raw Carrots, 2 to 6 times more B12 than raw Liver, 58 times more Iron than raw Spinach and essential fatty acids such as Gamma Linolenic Acid (GLA). Spirulina will increase ones energy level, stamina and endurance. Thus it is used by athletes for improved training in preparation for highly physical competitions.

- ***Promotes Insulin Production***
- ***Appetite Suppressant***
- ***Muscle Build-up***
- ***Vegetablet***

BENEFITS

Promotes Insulin production

Japanese research shows that it stimulates the production of natural insulin by the pancreas. Thus helping prevent Diabetes.

Appetite Suppressant

It is ideal for diet control since it provides nutrients to satisfy hunger. It helps prevent the build up of too much fat in the blood that predispose an individual to obesity and cardiovascular diseases. It is also a rich source of phenylalanine which is important in weight control.

Muscle Build-up

Its richness in protein provides the framework for muscles and tendons and is essential for tissue repair. Together with Vitamin C it helps promote fast wound healing.

Anti-Anemia

Due to its richness in iron it helps in the alleviation of anemia. It promotes the production of hemoglobin, the red Oxygen carrying pigment of the blood. Its high Vitamin C helps in faster absorption of Iron.

3.1.6 Lorenzo Jose: Originator of the MASIPAG Rice Production Technology

The late Lorenzo "Ka Toti" Jose was a farmer from Floridablanca, Pampanga. He developed an unusual way of producing rice, now promoted by MASIPAG. Rice straw is his only fertilizer. Five kilograms of seeds is enough to plant a hectare of rice while conventional farmers use 2 to 2.5 sacks of seeds (40-45 kg/sack). Yet, Ka Toti got good yields, around 90 - 100 cavans per hectare per cropping. In a given area, he plants 3.5 times a year. Yes, almost four croppings in 365 days. How did he do it?

Continuous Rice Gardening

He divided his 4 hectare rice farm into 13 plots. This enabled him to plant 1 plot weekly and harvest another plot weekly. He continuously did this throughout the year. In this way he had 4 croppings for every plot. With this method, labor and income is distributed throughout the year. Risk of crop failure is also minimized, since not all the crops are affected in case of typhoons. Since he harvested only a small area at a time, he did his own threshing with his pedal thresher. This reduced another labor cost. These are the variety of ways he devised to reduce production cost and thereby, increase his net income.

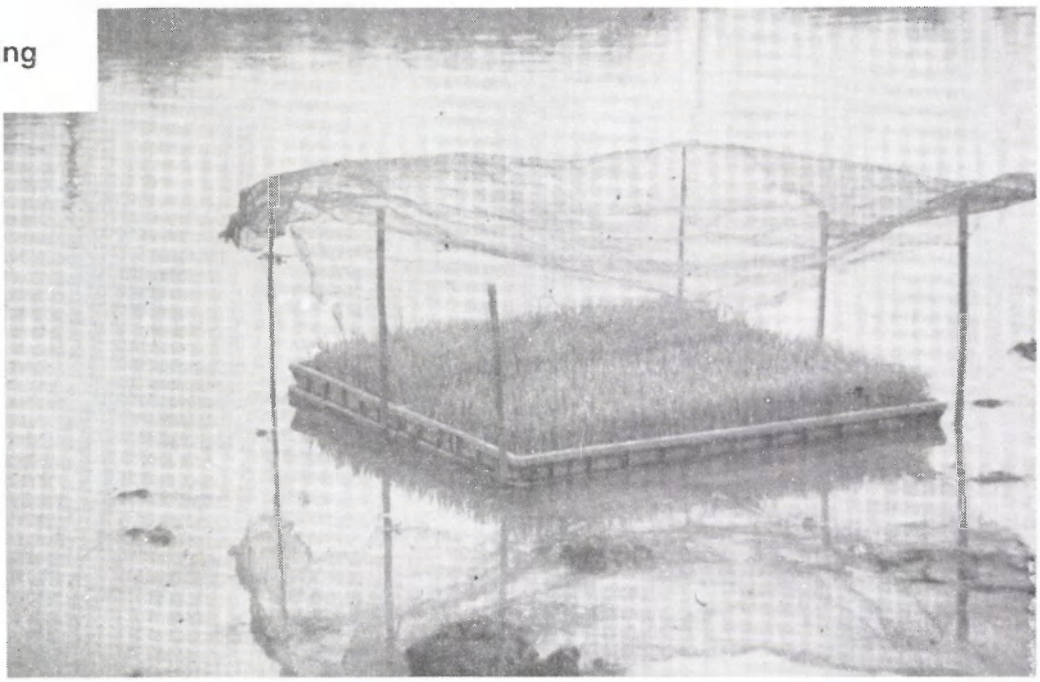
Recycling of Rice Straw

Ka Toti didn't use any chemical fertilizer and pesticide. Formerly, he was a chemical farmer. But in the late seventies he decided to go organic. According to him, he incurred lots of debt as a chemical farmer.

Ka Toti recycled rice straw for fertilizer. Within few days after harvesting the rice, he put back the rice straw. Then he flooded the field for faster decomposition of the straws. Labor in scattering the rice straw is minimal because threshing is done within the plot. The thresher also followed the cycle set by the plots.

Is rice straw as fertilizer enough? He said that his 90-100 cavans yield per hectare is good enough for him, because he gets a higher net income compared to yields with additional bought fertilizers. He also claimed that in putting back the rice straw, it is not a 'ten minus four' thing when he takes away the grains from the system. "The rice straw increases the organic matter through the years, and hence, increases the acitivity of microorganisms that add fertility to the soil." After all, he estimated that around 75% of soil fertility is a function of soil mineralization through the activity of microorganisms. Nitrogen fixation by microbes compensated for the palay he took out from his fields. Besides, adding urea as fertilizer made his plants susceptible to pest. In land preparation, he didn't turn over the soil during plowing. He had a special plow that only scarified the soil. According to him, this minimal tillage technique helped in improving the soil structure.

Seeding



In seeding, he used only 5 kg. of seeds per hectare compared to the 2 cavans usually used by other farmers. He would rather save the rest for his family's consumption. A small perforated plastic tray served as seedbed which again, saved him the cost of preparing the seedbed and pulling the seedlings. He lined the tray with a layer of newspaper, and then thinly spreaded his seeds. Then he embedded the tray partly into the mud.

Single-Planting and Wide-Planting Distance

Ka Toti transplanted the seedlings at 7 - 10 days old. The early transplanting technique results to a very high tillering which compensates the low seeding rate. The seedlings are planted singly and spaced at 40 cm between rows and 5 -7 cm between hills. The wide row spacing minimizes pest as sunlight is able to penetrate the base of the riceplant. Air flow within the row is also better. This results to lower humidity which isn't favorable for pest development. The wide row spacing also induces higher tillering rate and more sturdy plants because of the exposure of the plant base to sunlight. The rows are situated in an east-west orientation to enable more efficient utilization of sunlight.

When the seedlings are still young he didn't continuously flood the field resulting to more hardy plants. It was reported by Masanobu Fukuoka, the Japanese natural farmer who was the idol of Ka Toti, that sunlight hitting the base of the rice plant results to shorter primary nodes. The short primary nodes, according to Fukuoka, has a function in increasing yield.

MASIPAG Program Adopted Ka Toti's Rice Production Techniques

MASIPAG which stands for Magsasaka at Siyentipiko sa Pag-unlad ng Agrikultura, is a farmer-scientist partnership in rice breeding for low external-input rice varieties. Many of their rice varieties, which are usually traditional or improved traditional varieties, have been widely adopted throughout the Philippines. They encourage the planting of 3 - 5 varieties per hectare for diversity purposes.

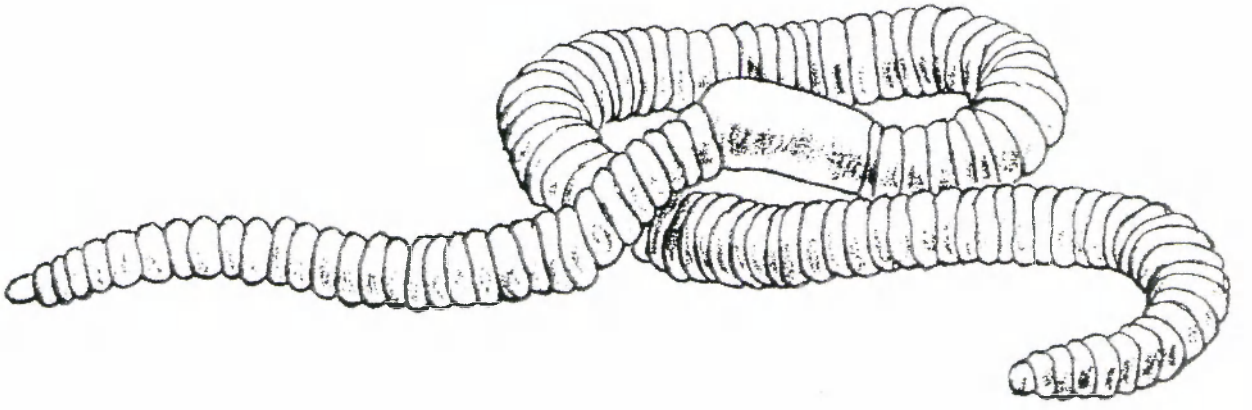
MASIPAG has been promoting the rice straw fertilization, the single planting, and the wide row spacing oriented in an east-west direction technique of Ka Toti.

Agtalon farmer cooperators have also successfully adopted the said techniques.

Ka Santi Andrada of Pangil, Laguna is another farmer who finds Lorenzo Jose's farming technique useful to his needs. He also tried integrating fish with rice production giving good results. His fish is safe because he doesn't use any pesticides and chemical fertilizers. Morever, the fish helps in fertilizing his fields.

Ka Toti's innovations have gone a long way. The Mt. Pinatubo eruption which covered his fields with lahar resulted to too much frustrations that led to his early demise. Before he died, he gave me his treasured book, **The Natural Way of Farming** by Masanobu Fukuoka, his mentor.

3.1.7 Earthworms Reduce Unpleasant Odors and Give Compost



Francisco "Appang" Esteves, Carmen Abad's family, and other small farmers in Manaoag, Pangasinan save their back and let the worms do the composting. The pig waste, cattle manure, kitchen refuse and yard sweepings all go to the worm composting pit. The farmers are members of the AGTALON Bankoop who are into small scale backyard pig raising. From the inefficient 1-2 heads raised per family they increased the number of stocks to 8-12 heads. Feeding management was also improved. The more than 100 cooperators were then integrated to come up with an economy of scale that makes feed purchase lower and higher market price for their pigs. Pollution from pig waste then became a problem especially aggravated with the situation that farmers' houses were very close to each other. Earthworm rearing was the answer.

People in Pangasinan usually sweep their yards every morning. The sweepings are burned. Now, for those who adopted vermicomposting, the sweepings minus the biodegradable wastes go into the compost pit together with the manure from their pigs and cattle. The pig pen washing is also scooped and used for watering the compost - a perfect combination! Users expressed surprise on how the 'air pollution' has been reduced.

The compost are then used in ricefields to produce organic and pesticide-free rice by cooperators who market these through AGTALON. Extra vermicompost are then sold to AGTALON. These are then reformulated (enhanced with micro-nutrients and nitrogen-fixing microorganisms) and sold as organic fertilizers or potting medium.

Farmers who are using a combination of inorganic and organic fertilizers, replacing 3 bags of chemical fertilizers (from their usual 5-6 bags inorganic fertilizer per hectare) with 5 bags of vermicompost registered higher yields than the conventional pure inorganic fertilized fields. This means lots of savings if one makes his own compost. They also noticed that their soils are improving every year.

How did they do it?

Composting Bin Construction Materials. Everybody used to think of wooden or cement boxes as composting bins, compiete with composting bin shed. So, farmers were hesitant to invest. Instead, banana stem, bamboo slats or wood trunks were used as bin dividers. The bottom was just plain earth. According to literatures, a cemented flooring prevents the worms from escaping. But based on farmers' experience, plain earth wouid suffice. Instead of shed, the compost is covered with banana leaves, as mulch, to protect it from direct sunlight. Some grow a trellis of squash or upo. Some cover their compost bin with a net or netted bamboo slats to protect it from chickens. Chopped banana,trunks mixed into the compost bin, act as moisture source when one forgets to water the bed. The size of the bed depends on the compost needs or amount of waste that should be recycled.

Composting Materials. The ideal proportion of composting materials is 70% plant residues and 30% animal manure. Appang's is almost 90% manure. Ashes could also be added but should be minimal because the earthworms hate it.

Care and Management. A dry compost bed drives away worms. Therefore, the bed should be watered regularly during dry periods. Too much water during the rainy season could leach the soil nutrients. Appang's worms survived the rainy season without a shed to cover his bins. As long as they have food and are not flooded, the worms will not go away. Like Appang's open type of vermicompost pit, the Abad's, a neighbor, use sacks and banana leaves for cover. The bedding should be damp, not wringing wet.

They divide the bin into two. One side is filled with animal manure (60 - 70%) and plant materials (30 - 40%). Leaves from leguminous plants like ipil-ipil improves the compost quality. After 2 weeks, when the compost temperature has gone down, the worms are introduced. The other side of the bin is then filled. When the first side is ready for harvesting, the division in the middle is removed. The worms will transfer to the new bedding. It takes around 60 days for the compost material to completely decompose. They then separate the worms from the castings with the use of a screen siever. The harvested worms are transferred to the new bedding. Some farmers no longer make any divisions. They just add and continue to add organic material to their old bedding and only harvest after 4-5 months. The heat generated from the raw material will not greatly affect the worms because they can find refuge in the lower layers of decomposed materials. After partial decomposition, when the bedding has cooled, the worms slowly climb up to work on this. If the new compost material is added daily, the given volume does not heat up intensely. When they have to harvest, they start on one side of the pit and refill this with partially decomposed material or they construct an adjacent bed. Most of the worms, on their own will move to the new bedding. With this technique the farmers save on labor.

Some Basic Informations

* 1 ton (1,000 kgs) of compost materials will generate 550-600 kgs of vermicompost
* 1 kg. of worm will become 18 kgs. in 1 month provided the food is adequate
* The red earthworm (Eisenia foetida) is used because they are soil surface eaters; they feed on mulch above the soil; they are 3-4 inches in length and just a little bit stouter than a match stick.
* Earthworms contain:

crude protein (dry weight basis)	- 64.7%
fat	- 14%
carbohydrates	- 13.9%
moisture	- 4.2%
ash	- 3.2%

* Earthworm's crude protein and essential amino acids are higher than meat or fish meal.

Believe it or not

Pig shit can be converted to chicken. How? The pig's waste is fed to the earthworms. The earthworms are then fed to the native chickens and ducks by chopping it fresh and mixing 40% of rice bran and corn.

Appang, Manang Carmen, and other Agtalon Bankoop members learned the low cost method of vermicomposting from Agtalon who also learned from the Sakwaten's of Asin Road, Baguio City (please see Father Sakwaten's Underground Private Army on page 53).

For more details or if you need earthworm starters and a compilation of reading materials on earthworms, you could contact Francisco Esteves or Carmen Abad in Matulong, or AGTALON in Nalsian, Manaoag, Pangasinan.

3.1.8 Father Sakwaten's "Underground Private Army"

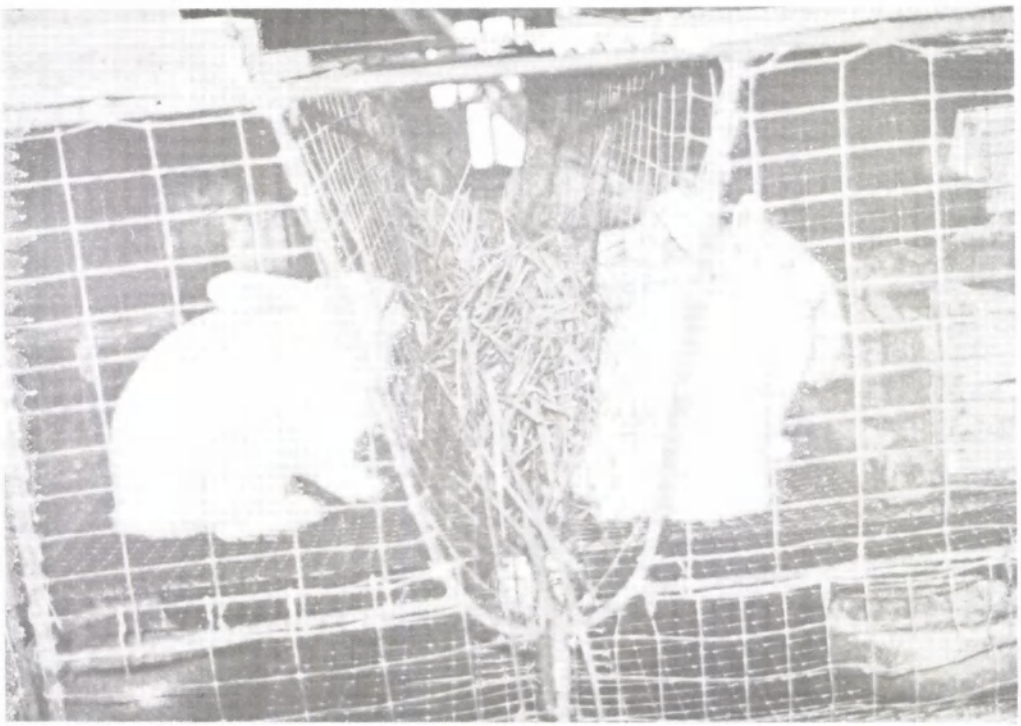
It was while looking for rabbits as a birthday gift for my kid, that the meeting with Father Sakwaten's "underground private army" took place by coincidence. A major rabbit producer in Northern Luzon, Father Sakwaten also sells German Shepherds, vegetables, anthuriums and oranges. His wife also runs a women's cooperative engaged in blanket weaving. The weaving house is in their basement. They live in Asin Road, Baguio City, near the wood carving shops. He is an Aglipayan/Episcopal priest.

Under Father Sakwaten's sayote trellis came a fermented grass like smell. He pointed out the heap of rabbit manure and forage waste that was responsible for the smell. When the heap was dug, tangles of small, red earthworms appeared. Mrs. Sakwaten then showed what was under the mulch in the ornamental plants, the anthuriums, and citrus trees - a black soil also teeming with earthworms.

Father Sakwaten doesn't just give earthworms to anybody. It was only when I dug the compost heap with my bare hands to look at the earthworms that my request for starter worms was granted. According to him, it is an indicator that one will take good care of the vermin. In the past, many people got starters from him which most often died due to negligence.

How do you take care of earthworms?

The Sakwatens don't have composting bins. No sheds. The vermicompost heap is exposed to rain, sun and the cool climate of Baguio. They just dump the rabbit waste and kitchen refuse in the compost heap located in one corner of their terraced garden.



Will the addition of fresh manure drive away the earthworms? Based on literatures, you have to partially decompose the manure before feeding it to the worms. The Sakwatens add fresh manure but it works. This could be possible in their case because of Baguio's cool climate. Later, when doing vermicomposting by myself using their method, I learned that you only need to partially decompose in the beginning. When there is already enough decayed organic matter underneath, you could then add on top. If it is too hot due to decomposition, the worm will stay down and later on work on the added materials when the temperature stabilizes. The critical aspect is you have to always keep the heap moist plus ensure their food, of course.

Father Sakwaten then gathers the vermicastings even with some undecomposed materials and dump this as mulch for his plants. It entails very little work. Later, we realized that the reduced amount of work is one major factor that made it attractive to farmers who followed his vermicomposting technique. He is using the Eisenia foetida species, a surface eating and highly reproductive earthworm. The native variety endemic in the Philippines is of the burrowing type and not very good for composting purposes.

Father's style of vermicomposting replicated

Impressed by his almost do nothing technique, 3 farmer-cooperators of AGTALON who were into backyard pig raising were talked out to consider vermicomposting. Aside from reducing the smell of manure, they were hopping to produce their own fertilizers. It was not difficult convincing them because they have been using commercial compost and have seen its benefits. They were given 250 grams of earthworms as starters. Now, many farmer cooperators of AGTALON have installed vermicomposting as a standard waste management system for their livestocks. They innovated by using banana trunks or bamboos as divider or cover against foraging chickens, respectively. They now use their own compost in their ricefields. Before, they used to buy organic fertilizer from AGTALON.

A joke has been going around among adoptors of vermicompsting that you could produce a chicken out of pig manure. But mind you, this is partially true. By vermicomposting pig manure, you produce earthworms. The earthworms are then fed to fatten chickens. This is productive waste recycling.

Lately, somebody related that Father Sakwaten died. His wife has joined her daughter in the United states. However, their caretaker is continuing the project and sells earthworm starters. Moreover, his technique has spread in the lowland project sites of Agtalon.

3.1.9 Wild Sunflower as Green Manure for Sweet Potato

In Bontoc, Mt. Province and other parts of Cordillera like in Imugan, Santa Fe, Nueva Vizcaya, farmers use wild sunflower (Tithonia diversifolia), as green manure for sweet potato. They dig trenches of about 1 ft. wide and 1 ft. deep and place sunflower leaves including the young branches. They then put back the dug soil and plant camote (sweet potato). Sunflower is a very good green manure. In the experiments conducted by the Philippine Rice Research Institute, the performance of rice fertilized with sunflower is comparable to the one fertilized with 40 kg. N/ha and better than the one fertilized with azolla.

In Bontoc, they make beautiful designs of these trenches like spirals rather than straight lines. After rice, they plant sweet potato in the terraces. This practice in Bontoc is very significant in view of the prevalent zinc deficiency (locally called "lisao" or "lana") in the Cordillera rice terraces. The dry land cultivation of sweet potato helps aerate the soil which results to zinc oxidation that make it available to plants.

In other parts of the Cordillera, the terraces are kept flooded throughout the year even during the fallow period. They are afraid to dry their rice pond terrace because when it becomes dry, the soil will have wide cracks. If a heavy rain will come, water will immediately seep through the cracks and will result to sheet erosion. Reconstructing the terrace is a hard task and hence, they keep it flooded to avoid possible terrace landslide. Secondly, when the rice pond is dried up, land preparation later for the rice crop becomes more difficult since it is mainly done by puddling with the feet. However, zinc deficiency is prevalent in these areas.

Sweet potato as an alternative staple food in the Cordillera is a very low input crop. It requires minimal labor input and low fertilization rate, in most cases only organic fertilizers like wild sunflowers which are indigenous to the area. This is in contrast to rice where the labor, fertilizer and management requirement are very high. If one has to convert all the inputs including human labor into energy units that is calorie, the ratio of calorie output - calorie input for camote is much, much higher than rice. In rice, sometimes the input is even higher than the output. That is why Bill Mollison (author of Permaculture) may have a point when he said that Filipinos should diversify their carbohydrate source and not only depend on rice. Other carbohydrate sources like bananas, taro and cassava have also less input and fit even as understory crop in orchards. In Samoa, these are their main staples. Cassava and camote if prepared well, like cassava hot cake, is very appealing for breakfast. But Filipinos clamor for rice. As my son said, "I want to eat rice 3x a day".

Photo: Rosanna Mula

3.1.10 Bro. Alois Golberger Uses Green Manure Soup

Brother Alois Goldberger, a Society of Divine World Missionary based in Malibcong, Abra utilizes wild sunflower, ipil-ipil, and madre de cacao leaves as green manure soup to fertilize vegetable crops like pechay, cabbage and beans. He puts the leaves and twigs of the nitrogen fixing trees in a drum. Stone weights are then added on top to prevent it from floating. Then, he fills the drum with water. He lets this ferment for a few days, sometimes dilutes it with more water. He uses the fermented "soup" to water his vegetable crops which gives a very good response. According to him, 1/4 of an area planted to these nitrogen fixing trees is enough to fertilize 3/4 of the area of his vegetable crops. The twigs and leaves are cut in rotation. After a few weeks, they will have leaves again ready for lopping. The madre de cacao is also a repellant to insect pests.

In addition to the nitrogen fixing tree leaves, another farmer in Abra, add animal manure to the fermenting drum. He uses the "soup" to fertilize and water his black pepper vines. He also has an ingenious way of drip irrigation system. He cuts a bamboo, one node in length. On one end, the node is kept intact while the other is open. He then makes a small hole at the end where the node is intact. He buries the bamboo near the base of the black pepper plant. The manure soup is then poured into the bamboo tube which slowly releases the fertilizer for the plant. This saves him the fertilizer cost, the irrigation and labor expenses in watering.

Bros. Alois at OLTAMA Biogenic Restaurant

3.1.11 A Korean in the Philippines Shows Nature's Way to Healthful Living

Hyun Jong Hwan, is not your ordinary Korean neighbor. He is a missionary of the Seventh Day Adventist (SDA) Reform Movement who came to the Philippines in 1984. Together with his family, he stays most of the time in a farflung barrio called Painaan in Baras, Rizal--an SDA mission area. Likewise, he spends about three days per week at the mission's Home Hygiene and Health Reform Center located at 4 Temperance Lane, Sunville Subdivision in Quezon City. He manages the mission's publication department that produces the SDA's religious and health publications.

As an SDA Reform Movement missionary, he preaches healthful living. Preaching directly the SDA beliefs in this predominantly Catholic nation invites all sorts of prejudices. But preaching SDA's healthful living practices is a welcome approach for disseminating SDA beliefs and their way of life.

Healthful Living and Organic Farming

"As a preacher of healthful living," Hyun declares, "I have to serve as a model, and organic farming practices help much in maintaining healthful living".

Hyun and his family operate a 1.5 hectare organic farm in Baras, Rizal. Growing plants via the organic way for the family's sustenance (for food and disease prevention) became part of the biosystem. Hence, the Hyun's way of life.

Hyun has been into organic farming even when he was still in Korea. He raised grapes as his main crop. When he accepted the missionary work in the Philippines, he had to sell his farm in Korea in favor of a 1.5 hectare lot in Painaan, Baras, Rizal.

From the mission's office in Quezon City, Baras could be reached via Cogeo. Baras is the town next to Teresa from Cogeo. Painaan is among the barrios situated in the valley between the highlands of Baras and Antipolo. To reach Hyun's farm one has to pass a dirt road from the Baras main road and wade through a winding stream.

This wide stream, shallow but with continuous flow, serves as the source of irrigation water for nearby farms. Hyun used to pump water from this stream to irrigate his farm, especially during the dry months, where he grows fruits, vegetables, culinary and medicinal herbs, rice and corn.

Like Hyun, two other Koreans, Jong Gul (Hyun's brother) and Filimon Kim, established their vegetable farms in Painaan. Both are SDA members. But unlike Hyun, the two grow vegetables mainly for commercial purpose supplying the Korean community in Metro Manila. Kim maintains a Korean grocery in Makati serving as one of his vegetable outlets.

With only 1.5 hectares, Hyun produces more than what his family needs. "I used to grow rice once in a year within a quarter of a hectare. I used chicken manure and fermented organic materials inoculated with beneficial enzymes to supplement my crop. In 1991, I harvested more than 50 cavans which my family could not consume in two years," Hyun said.

"My children do not know the taste of meat," Hyun averred. Being vegetarians, the family gets their daily food requirement from the farm itself. Yet, there is still much left to be sold for their other needs. According to Hyun, vegetables grown organically taste different from those raised in the conventional way (supplemented with synthetic chemical fertilizers and pesticides). Conventionally-grown vegetables have bland taste when used in salads. When cooked, these vegetables require seasoning (i.e., vetsin or artificial food flavoring) to be tasteful, unlike those grown organically. Aside from stronger taste, organically grown food is safe and health-promotive. "My children have not been hospitalized. They remain healthy." Being healthy does not only mean freedom from diseases or any symptoms of illness, but having a healthy body, mind, spirit, and manners.

"What You Eat, is What You Are".

Believing that "you are what you eat," Hyun stresses that food is character-forming. "Children nourished with organically-grown food possess distinctive positive characters than those fed with chemical-supplemented food, especially those used to junk foods. The latter make the children prone to illnesses that cause them to be irritable; besides, such children could not easily be asked to perform even simple errands. Such behaviors could hardly be observed in children or even adults nourished with organically-grown food."

Thus, for character formation, Hyun recommends parents to provide their children with natural or organically-grown food especially within the critical years or before they reach the age of twelve. There are biblical basis on this, according to him.

Hyun and his colleagues had also observed the difference on chickens in their "little experimentation". They provided organically-grown rice, particularly the brown or unpolished rice, to a number of chickens. According to Hyun, they observed that the chickens were tamer and don't fight each other. They attributed such behavior to the rice fed to them. Most brown or unpolished rice are still living seeds. Only the hull has been removed in milling, thus, there is a high percentage of maintaining unharmed embryo.

Hyun added, "When regularly taken, brown rice most especially when pressure-cooked (and therefore with high percentage of nutrient retention), could prevent or ease out asthma and other illnesses."

Herbal Medicine Practitioner

Hyun is also a practitioner of herbal medicine, aside from having knowledge and skills in acupuncture. He grows a lot of herbs in his farm. He points out that the Philippines is very rich in medicinal plants. He and his group have identified no less than 342 species of local plants with medicinal value. At their mission's Home Hygiene and Health Reform Center, they are mixing about 20 kinds of essential oils aside from other various preparations of herbal medicines.

Aside from medicinal herbs, Hyun maintains two eucalyptus trees. He produces eucalyptus wood charcoal in capsule form. According to him, it is best for treating diarrhea and even cough. In Chinese medicine, they believe that the stomach is directly related to the respiratory system. He claims that when you take eucalyptus charcoal capsule, your

stomach will be cleaned and hence, your respiratory system.

Hyun is a contract grower of lagundi. The area that was once reserved for rice production is now planted with lagundi. According to Hyun, there is a good market for lagundi. A kilo of dried lagundi leaves is priced at about P70.00. Continuous production of dried lagundi leaves could start after a six month period from planting. He likewise, has a number of plastic-bagged lagundi seedlings (from cuttings) for future expansion as well as for sale.

Cultivating a 1.5-hectare organic farm is not only meant for sustaining the family's food, income and medicinal needs. It is also intended to generate income to finance Hyun's missionary work.

For income generation purposes, Hyun used to have very fruitful grapes. But now only some less productive old vines have remained. The profitability of growing grapes was affected by the import liberalization policy adopted by the government. Locally produced grapes have been eased out by the imported ones in the local market.

From grapes, Hyun shifted to guava production. His giant guava trees begin bearing fruits after only a year. According to him, with fertilizer supplement and by providing irrigation water, year-round guava production is possible. But he does not "force" his guava trees to set fruit. He usually gives time for the trees to rest. With rest periods, guava could maintain their productivity of up to seven or eight years. Without such rest periods, they could only last for about five years. But Hyun's once very productive farm with 700 guava trees was not spared by supertyphoon Rosing. Only few younger ones remain. He has new seedlings waiting for their time to be planted on the open field, though.

Various kinds of vegetables are also grown in abundance in Hyun's farm and intended for the market. He grows lettuce, cucumber and high-value crops such as Korean radish and Chinese kutsay, as well as other vegetables or fruits depending on the season. He distributes these to the community or church members and to a Korean community in Metro Manila.

How Hyun Maintains Farm Productivity

According to Hyun, he could derive from his 1.5 hectare farm an income five times greater than the salary of an ordinary government employee. The amount is enough for sustaining his family's needs as well as his missionary works. But how does Hyun maintain the productivity of his farm, aside from planting different crop varieties?

Bringing residues back to the soil. Hyun brings back farm residues to the soil. Aside from this, he applies farm manure, particularly chicken manure along with fermented organic materials, such as rice hulls and other farm wastes. He used to buy what he termed as "white yeast" which contains beneficial enzymes to enhance the fermentation process of the organic base-materials. He recalls that during his first five years, a chicken manure supplier must have delivered to his farm no less than 20 truckloads of poultry dung. Aside from soil nutrient enhancement, these materials improve the structure, friability, and water retention capacity of the soil. These, likewise, enhance the microorganism build up and microbial activities in the soil. Thus, creating a "living soil". He observes that the presence of "white molds" is a sign of good soil.

Follow period. Hyun gives the soil a regular rest period. He observes fallow period by rotation, i.e., by dividing the farm into four portions with each portion given three to four months rest. He likens it to a woman who observes spacing on child births to maintain good health.

Muiching. Hyun applies mulch on his crops, especially during the dry months to conserve soil moisture and deter weed growth. Mulching materials such as saw dust, rice hulls, and straws are left in the soil to decompose. Thus, adding nutrients to the soil upon the action of microorganisms. He says that for his vegetables, rice straw is enough. For trees, he uses either sawdust or rice hulls. The application of fermented rice hull or sawdust inoculated with beneficial enzymes controls disease organisms. Such beneficial enzymes keep the disease organisms under check.

Pest Bio-Control. To drive away the insect pests, he plants sweet basil, peppermint, and other insect repellant plants or herbs in between trees or along the boundaries of vegetable plots or the farm. These plants serve as biocontrol agents and source of culinary and medicinal herbs as well. The scents of these herbs repel insects. He observes that the local varieties emit stronger scent and thus, are better insect repellants. He simply shakes or touches these plants by his feet during his farm routines, and insects just fly away upon smelling the scents.

Hyun recalls that when he was still producing grapes, he had to prepare a mixture of extracted garlic oil and water (extracts from a kilo of pounded garlic mixed with 2,000 liters of water) and he used this mixture as spray to prevent fungal attack. He also used a mixture of vinegar and sugar placed in containers as insect traps. Insects are attracted to the scent of sugar.

"Organic Gardening Nurtures God's Creations . . . Glorifies God."

Many lessons could be learned from Hyun Jong Hwan's example. According to him, experience sharing could encourage others to adopt organic farming techniques. A farmer who uses chemicals in his farm could not easily be persuaded to shift abruptly to organic farming. Shifting to the organic way could be done little by little. Use of synthetic chemical pesticides may not be avoided during the transition period. This preacher says that plant pests and diseases are already in existence due to the wrong deeds of humans themselves just as Satan had already sown sins to the human world.

According to Hyun, farming is the main job of human beings. And organic farming, a must for healthful living, is not only about producing healthy food. It is a way of life towards what God has planned for humans and his other creations. Organic farming therefore is about nurturing God's creations. Indeed, organic farming glorifies God.

3.1.12 Use of Irrigation Water to Transport Fermented Farmyard Manure Fertilizer

Temperate vegetables are not only grown in high elevations and cool regions. Plenty of cabbage and cauliflower are raised in the lowlands of Ilocos region during the summer months. What is more unusual but very effective method is how farmers fertilize these temperate vegetables.

In Sibaan, Sta. Catalina, Ilocos Sur, they collect dried cattle manure and/or chicken dung, put it in sacks and then moisten it. They let this ferment for 2 to 3 weeks. They will then apply it in their cabbage and cauliflower (one month old plants), by putting the fermented manure in a net bag and let it be carried away by irrigation water to the cabbage plantation.

Mr. Jose Barnachea, a farmer from Sibaan, Sta. Catalina applies 20 bags of this fermented manure in 2 applications from transplanting of cabbage to harvesting. "I used to add chemical fertilizer for my cabbage but I'm no longer using any. Instead, I use 20 bags of this home made (fermented manure) fertilizer. With this technique, I can save money for labor and chemical fertilizer and I still have good harvest. I just let the fertilizer be carried away by the irrigation water", he said with a smile.

For Julian Alejo and Johnny Rabino, they mix cow dung/chicken manure with urea. The ratio is one bag urea to ten bags cattle or chicken dung. They also put it in sacks and let it stand for two to three weeks. After two to three weeks, they apply it in their cabbage by broadcasting or by placing it in the irrigation canal to be carried by the water to the field. According to Julian Alejo, the method of using the irrigation water to carry the fertilizer is not laborious compared to the broadcast method. He only have to maintain the flow of water from the canal. "It is faster for my cabbage plants to absorb nutrients because it was already mixed with water and can be directly absorbed by the roots. In just three days, I can see my cabbage forming bigger roots and vigorous leaves.

They learned the technology through the late Marcos Remolite, also a farmer from Sta. Catalina, Ilocos Sur who was the first to experiment with the technique.

3.1.13 Mang Iding's Style of Manuring

Pedro Aspiras or Mang Iding is a tenant farmer from Alacan, San Fabian, Pangasinan. He is always very proud to relate to others that through farming and sheer industriousness his 6 children have completed their college education. He said that after completing this primary obligation to his children, he decided to retire from farming. He then toured some parts of the Philippines.

In 1991, with proddings from his daughter, he attended a training course given by AGTALON on "Ecological Farm Planning and Designing". He was so inspired after the training that he decided to go back to farming. "After drafting my farm plan and design, I feel very young again, as if I'm 17. Now, I could already picture in my mind how my farm will look like 5 years from now", he said then. Indeed, after toiling again on his farm armed with a farm implementation plan, he was awarded as the 1997 Most Outstanding Farmer of Pangasinan by the Department of Agriculture.

With steep slopes on both sides of his farm, a narrow valley in the middle was formerly devoted to rice monoculture. Now he has integrated fish, pig and ducks into his rice production. He now grows pure organic rice - no chemical fertilizers and no pesticides - on contract with AGTALON.

The steep slopes were bench terraced. When he quit farming, he cut almost all the trees protecting his bench terraces and sold the trees as charcoal. He has now replanted the trees to reinforce the terraces. One time, an agricultural technician urged him to SALT (Sloping Agriculture Land Technology) his farm's hilly portion in order to produce more forage for his goats. He retorted that his bench terrace is actually a widened form of SALT that fits the large area of his farm. Nevertheless, he planted more nitrogen-fixing trees along the sides of his wide bench terraces.

A Different Way of Manuring

In almost every terrace, under the clump of trees and bananas reinforcing the side of the terrace, he dug 10 open wells about 10 feet deep each. Although very little water is coming out during dry season, he could accumulate enough overnight to water his vegetables. In these wells he dumps 2-4 sacks of manure from ducks, goats and cattle. He allows 3-4 days soaking for the manure to ferment before using the 'soup' to irrigate his vegetables. He siphons the manure soup from the wells (by gravity) to the next lower terrace. A visitor asked why he uses very small hoses. "Why not use a bigger hose to save time?" His reply was, "Look, if I will use a bigger hose, I will have to stay and wait so I can immediately transfer the hose to the other plants. But if I will use a small hose, the water could drip slowly hence, giving me enough time to work on other plots and maybe come back the next time I pass this plot. Which is more efficient then?"

His plants irrigated with the manure soup are green and robust.

Diversified Cropping and Natural Pest Control

What is admirable is Mang Iding's way of relay cropping different vegetables. Aside from the vegetables, he has also a mix of different fruit trees, timber trees and bamboos.

In different sections and corners of his farm, you could find a mix of different vegetables at different stages. They appear to be unorganized but in this way he could harvest vegetables almost year round. This also means that he could have year round supply for his household. Other farmers nowadays, monocrop only one kind of vegetable and use the earnings to buy other kinds. He also varies the vegetables planted in one location.

He says that this manner of rotation and mixed planting help protect the plants from major pest attack and diseases. He plants together different varieties of a certain crop. For example, he plants 3-4 kinds of eggplants together - 2 rounded types, the green and red variety, and 2 which are elongated. One of the elongated variety is very susceptible to fruit borers due to its softer fruit. But he always plants this as sacrificial crop to protect the rounded varieties which are more saleable in the local market in Pangasinan.

The relay-mix cropping technique also allows him to distribute his labor needs throughout the year and thus saves him money for hired labor.

A Different Marketing Style

Small vendors from the local market regularly come to his farm because of his regular supply of vegetables. They are the ones who pick the vegetables so, this also saves Mang Iding the required labor for harvesting. The vendors weigh, pack and pay right in the farm. Usually, harvesting is done late in the afternoon for selling the following morning. For camote tops alone, 100-150 bundles are harvested daily at P2.00 per bundle. The retailers then sell this at P5.00 per bundle.

Oftentimes, neighbors come to ask vegetables for free. But when he senses that it's becoming too much, he cracks jokes by showing the pointer of his weighing scale which sways from left to right as if saying 'no'. Sometimes, he also offers seeds instead of giving vegetables.

3.1.14 Atok, Benguet Farmers Control Cabbage Pest with Insect Against Insect Technology

In 1992, the Cordillera vegetable farmers lost millions of pesos due to what was termed as the green tide. They could not market their produce because of the cyanide scare. Analyses of cabbage grown in Benguet contained 30 parts per million of cyanide residue. Apparently, farmers have been using a mixture a chemical pesticide and cyanide to control the dreaded cabbage pest, the diamond backmoth (Plutella xylostella).

Diamond Backmoth infested cabbage

The Resurgence of "Tarzan"

Attack from diamond backmoth, locally known as "Tarzan", could result to 60-100% crop loss. Collectively quantified, it has been threatening the P1.5 billion crucifer vegetable industry (cabbage, pechay, wongbok, brocolli, cauliflower) in the mountain provinces of Northern Luzon. Farmers are using double, triple dosage or 'cocktailing' mixtures of different insecticides -- and later on, cyanide -- but could not control the widespread infestation. This stage is called **pest resurgence**. At such stage, the use of insecticide could even increase the rate of reproduction of the pest. I experienced this myself when I was still working with the International Rice Research Institute in the early 1980's. The use of insecticides increased the population of the dreaded brown planthoppers. Rice crop sprayed with water alone had lower population of hoppers than those sprayed with insecticide. The infestation in our experiemental plots with insecticide resulted to as much as 100% damage called "hopperburn". When the calendar spraying practice was changed to spraying only when pest population reached a critical level, brown planthopper no longer became the number 1 pest. The same phenomenon is now happening with the mango planthoppers.

How Does Pest Resistance Happen?

The massive, indiscriminate and very frequent applications of insecticide in greater and greater dosages result to the phenomenal development of resistance. When insects are sprayed, the more resistant strains are able to survive. The surviving strains will then reproduce higher percentages of offspring that take after their resistant qualities.

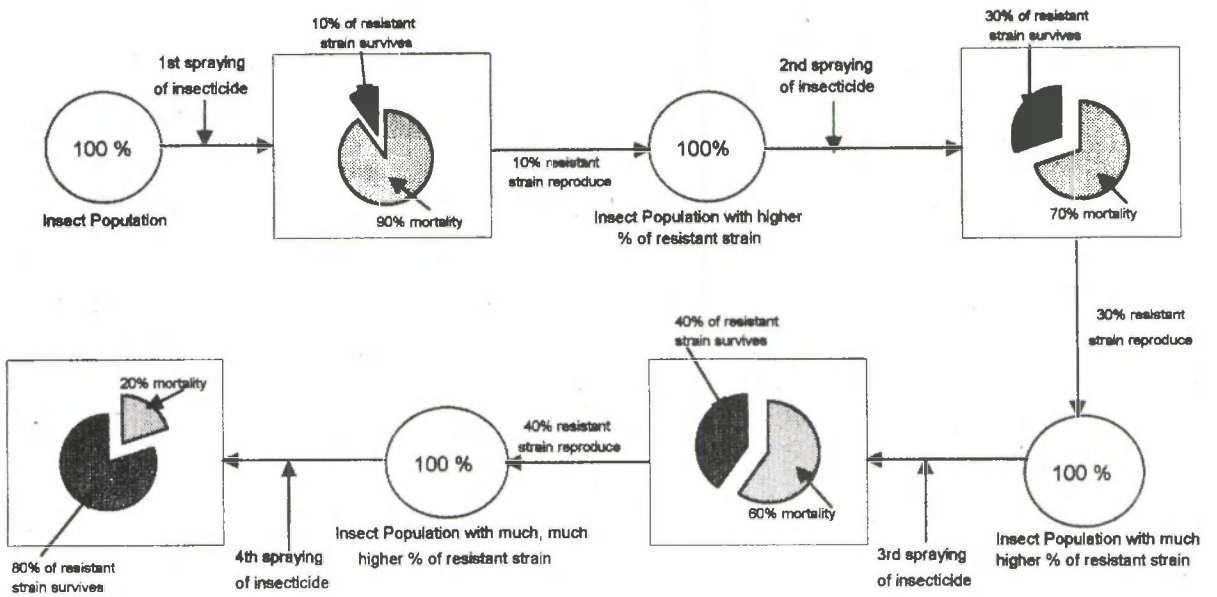


Illustration on increasing % of resistance

With another round of spraying, the least resistant will die but the resistant ones will again survive, producing a higher percentage of high degree of resistant insects and so on, and so forth. This will reach a point wherein the insect population could no longer be controlled even if ten times of the recommended dosage of insecticide is used.

Insects generate quickly. They produce huge numbers of eggs. This characteristic enables the insects to develop resistance to the insecticide very quickly. So, farmers are forced to use more and stronger pesticides. But again, the new insect generations become resistant.

Another factor favoring insect populations is the disappearance of natural enemies which acted as their parasites or predators.

Mixed cropping prevents pest population build up

The second level consumers are usually bigger but fewer in number. They have also slower generation cycle and are less productive than insects. Hence, they can not develop resistance as quick as primary consumer insects. This results to an imbalanced ecosystem. This is what happened to "tarzan".

The Farmer-Mayor of Atok Uses 'Insect vs. Insect' Pest Control

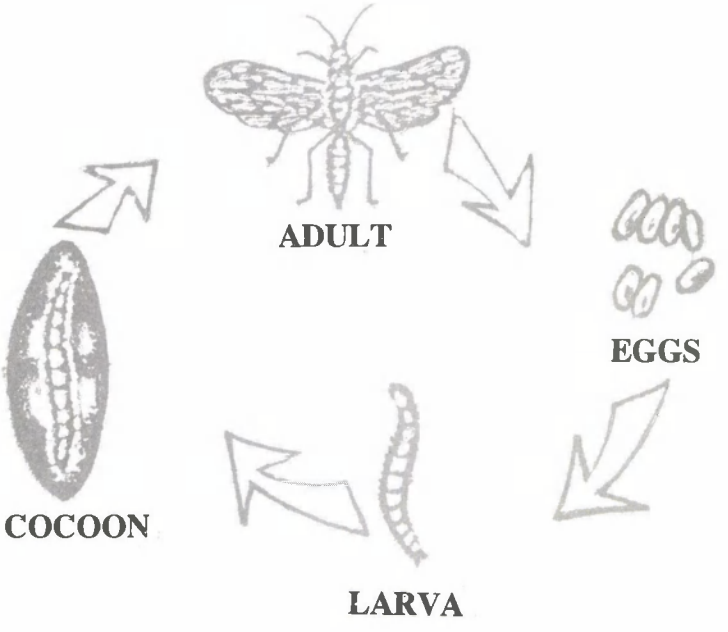
Mayor Uy in his cabbage garden

Mr. Johnny Uy, the mayor of Atok, Benguet, and his farmer-constituents use Diadegma semiclausum to control diamond backmoth. Diadegma is a wasp that parasitizes the diamond backmoth. Its size is similar to a big mosquito.

Mayor Uy has 8 hectares planted to different temperate vegetables. The main crop is cabbage. Before, like many other farmers in Benguet, he sprayed 18-24 times per cropping of cabbage. This means approximately 2x spraying per week since it takes about 160 days to grow cabbage (spraying 1-3 time within a 60-day seedbed period; and 18-22 times within 100 days after transplanting). Now, a significant reduction in the number of spraying has been possible with most farmers spraying only 1-3 times during the whole duration of the cropping period. Chemical spraying is now mainly used during the seedbed stage and/or a few days after transplanting. The purpose is to control the cutworm which usually attacks 60 days after sowing. It takes longer for cutworms to reproduce than DBM, thus the lesser spraying frequency. The diadegma released in the fields has kept the population of diamond backmoth under control.

Mayor Uy only sprays pesticide when DBM infestation could no longer be controlled by diadegma. During the visit to his farm, his robust cabbages - almost ready for harvesting - have not been sprayed. "By continuously planting cabbage in my farm, diadegma will stay in the farm and will continue to parasitize DBM", he said. Like one Japanese organic farmer said, "Let nature work for you".

Diadegma parasitizes DBM larvae at around 9:00-10:00 in the morning. They travel within a 5 kilometer radius to search for food. Thus, surrounding cabbage plantations are also benefitted. A parasitized larva exhibits small white patches on its back. This will later on turn blackish indicating that diadegma larvae are already growing inside. Some farmers collect DBM infected larvae and transfer these to their fields.



1. **The female diadegma (parasite) lays eggs on a young DBM larva (host) usually during the second larval instar. It uses its sting or ovipositor, hence, the female diadegma is important in parasitism.**
2. **The parasite eggs of diadegma develop inside the body of the DBM.**
3. **The diadegma larvae feed and grow inside the DBM larva. When the DBM larva dies, the mature diadegma emerges from the DBM larva.**
4. **The diadegma larvae spin silk to make their cocoons (pupal case) and become pupae.**
5. **The adult diadegma emerges from a cocoon.**

What Farmers Do to Protect Diadegma

If chemical spraying is done, it is timed early in the morning or late afternoon when the diadegma are not active. As much as possible, Bacillus thuringiensis - a biological insecticide - is used. The brand names are Dipel, Thuricide and Agree. If Bt is not available then green label insecticide is preferred. Spot spraying or spraying only infected plants and leaves, is practiced to avoid killing diadegma.

Before, the surrounding areas were thoroughly cleaned. But now some plants are allowed to grow (e.g. wild daisies) as alternate host plants for diadegma.

Economic and Environmental Benefits

Although farmers in Atok are still using pesticides, the amount has been greatly reduced compared to previous years. According to Mayor Uy and Carlos Balla-oy, the municipal agricultural officer, they are now using only 10-15% of what they used to spray. From 18-24 times, it is now 1-3 times spraying. They said that the local pesticide outlets could attest to the reduction.

Crucifer growers are the highest users of pesticide products among vegetable growers nationwide based on the case study of Ibrahim Ali, a graduate school reseacher of the Benguet State University. Pesticide use on cabbage even surpassed pesticide use in fruits, rice, corn, banana, pineapple, potato and tobacco. In 1992, Benguet used up to 500 tons of pesticide in vegetable production. An estimated P12,000 per hectare per cropping season can now be saved by the farmers.

In Atok, there are already around 800 farmers trained in the Diadegma technology. Farmers undergo a season-long Farmers Field School (focusing on agro-ecosystem analysis) where they observe their experimental trials from sowing to harvesting. Some farmer graduates of previous trainings already serve as instructors.

This nature's way of pitting an insect against an insect is part of the Integrated Pest Management Program being promoted by the different collaborating agencies: KASALIKASAN-Department of Agriculture, Benguet State University, Bureau of Plant Industry and the local office of the International Institute of Biological Control.

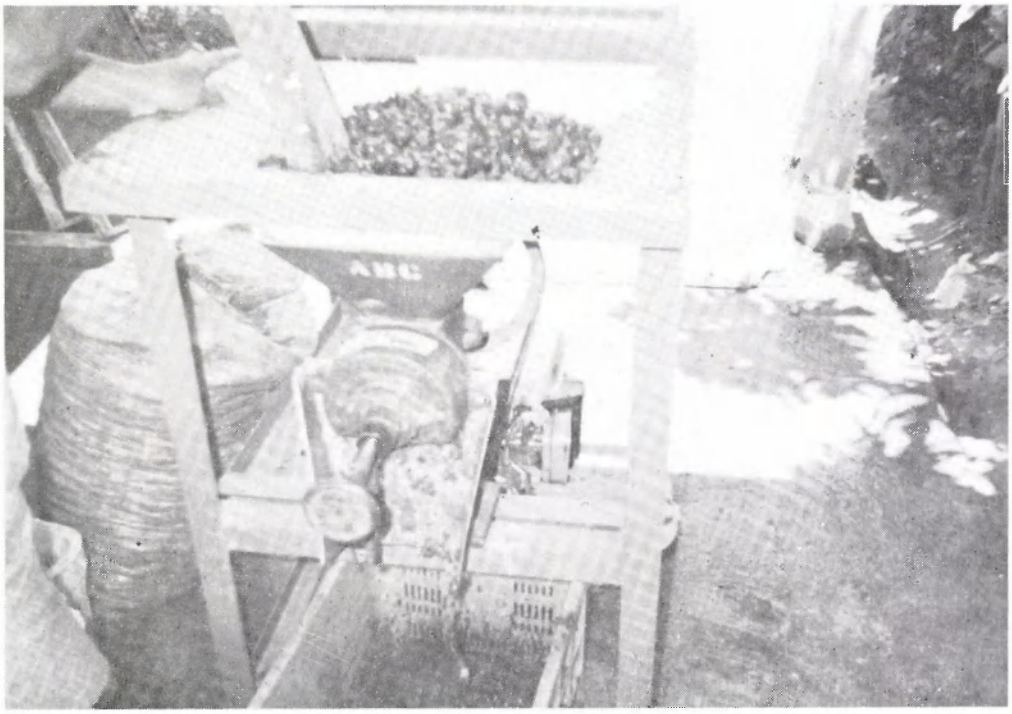
Farmers field school participants gathering data for their agroecosystem analysis.

Note: Diadegma is available in rearing houses at Benguet State University, Bureau of Plant Industry in Baguio and in Atok, Benguet. Atok is 46 kilometers away from Baguio.

Mass Rearing of Diadegma semiclausum
- Raising of cabbage as food for DBM
- Raising of DBM in Cabbage as host for Diadegma
- Rearing Diadegma
- Collection of Diadegma and field release

3.1.15 The Only Long Term Control of Golden Snail: Treat It as a Resource

The golden snail menace has been with us since the middle of 1980's. Introduced in the country as an alternative source of protein, it multiplied rapidly until it reached epidemic proportions. Agtalon, an NGO in Pangasinan, believes that the long term solution to the golden snail problem lies in treating it as a valuable resource. Hence, it ventured into the procurement and processing of golden snail as ingredient for animal feeds. The fresh golden snails are washed and then ground. Liquid drained, the golden snail is dried in a wood fired multi-crop dryer. This is then mixed with the feeds at 10-15%. In fresh form, golden snail has 17% protein and 28% calcium. The golden snail meat meal has a crude protein of 62% and 3.4% calcium. This is comparable to the 61% CP value of Peruvian fish meal. Trials with pig and poultry showed that the feeds with 10-15% golden snail meal (including the shells) had no significant difference to that of commercial feeds of the same crude protein content. One kerosene can (16 liters) of fresh golden snail is approximately 12-13 kg. This will yield an average 4 kg. of golden snail meal. The price of one kerosene can is P14.00. Agtalon buys the final product at P6-7 per kg. Some kids complain why some farmers are not willing to pay them even a small amount of incentive in collecting the snails in their ricefields while they could save much higher on the cost of pesticides.



To increase the utilization of golden snail at household level, its use in fresh form was introduced to backyard raisers of pigs. This was inspired by the experience of farmers in Bansalan, Davao del Sur. They mix 2 kg. of snail for every 1 kg. of rice bran. It was reported that pigs could gain 250-500 grams additional weight daily.

One of the adoptors is Anita Cabico of Lelemaan, Manaoag, Pangasinan. She uses a mechanical corn grinder to crush golden snails. A mix of 20% commercial feeds + 40% rice bran + 40% crushed fresh golden snail fed to nine piglets till they reached marketable weight recorded an average daily weight gain of 470 grams. The set of six piglets fed with commercial feeds recorded an average daily weight gain of 480 grams. Anita's aunt has also long been using snail meat but in cooked form to feed her hogs. She noticed that lactating sows fed with cooked snail have better milk production.

It is noteworthy that 4 backyard pig raisers with 6 heads each could virtually control golden snail in 10 hectares of rice field. This even during the height of rainy season when snails reproduce rapidly. The problem though is when golden snails become scarce especially during the dry season. The pigs will have difficulty adjusting to a diet without snails.

Drying of crushed golden snail.

Vic Ramos grinding snails for foods.

Anita feeding pigs with golden snail

Ang pesteng kuhol puwede palang gawing pakain. Mahalaga rin pala!

Sa 'di mapigilan na pagtaas ng presyo ng komersyal na pakain sa hayop, mabuti na lang at may kuhol!

Puwede rin pala naming kainin, 'di ba 'boy?

- Halos 5% bawat buwan ang pagtaas ng presyo ng mga komersyal na feeds.
- Ang pagpapakain ng kuhol sa alagang hayop ay nangangahulugan ng **malaking katipiran** sa pakain.

33% ang matitipid kung kuhol ang ipapakain sa amin.

50% ang matitipid, 'pag pinakain sa amin.

- Ang **Golden Kuhol** ay mayaman sa protina at calcium.

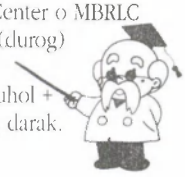
Paano naman ipinapakain ang kuhol sa mga alagang hayop?

- Durugin ang sariwang kuhol at ihalo sa mga patuka sa itik.
- Puwedeng ihalo ng hanggang 50% simula sa ika-2 buwan.
- Maaaring ipakain sa mga dumalaga at binatilyong manok:

Dinurog na kuhol (1 parte) + Giniling na mais (2 parte)

Ang Mindanao Baptist Rural Life Center o MBRLC ay nagpapakain ng 2 parte na kuhol (durog) + 1 parteng darak para sa baboy.

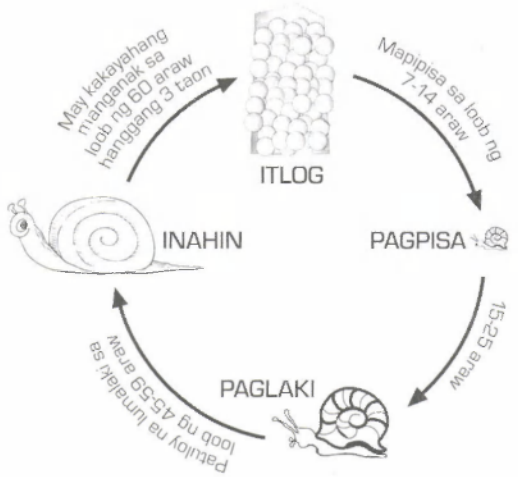
Sa mga itik naman ay 1 parteng kuhol + 1 parteng giniling na mais + 1 parteng darak.



Ang sariwang kuhol ay may:	Ang sariwang karneng kuhol ay may
17% protina 28% calcium	62% protina 3.4% calcium

15% protina lamang ang kailangan ko para lumaki

Calcium naman ang mahalaga para kami ay mangitlog



Ang Inog ng Buhay ng Kuhol

3.1.16 Orenico's Natural Weed Control in Direct Seeded Rice

Orenico Villaflores is a tenant-farmer in Lubong, Umingan, Pangasinan. As a contract grower of Agtalon for pesticide-free rice, he doesn't use any pesticides. It is surprising that his dry season direct-seeded ricefield only has a few weeds compared to his neighbors who are using herbicides. Almost every Filipino farmer who directly seeds rice is prone to using herbicide. They apply herbicide to give the rice crop a headstart against weeds. But Orenico is not applying any, yet he gets better weed control results. How does he do it?

Orenico prepares his field thoroughly. He plows it at least 3 times at weekly interval to bury and remove the weeds and its seeds. Then he broadcasts his pre-germinated rice seeds. After broadcasting comes his most critical weed control technique. He lets the field go dry for 2 weeks until the cracks in the soil become 2 centimeters wide. The pre-germinated rice could survive the temporary drought and they will grow to 3-4 inches in height. Since they are pre-germinated, the rice will have a headstart from the weeds which are just emerging. The temporary drought also strengthens the stem of the rice seedlings. After this, he floods the field at 3-4 inches deep without let up for 3 weeks. The continuous flooding kills the weeds but the taller rice seedlings could survive it.

For the first cropping during the rainy season, he transplants his rice and do manual weeding.

3.1.17 Vegetable Growing at its Best in Old Kano's Farm

Who would ever think that a retired U.S. Army would end up gardening in the Philippines? More so in a venture that not so many are undertaking? It was Mr. Fred A. Ammann who first set up an organic vegetable garden in Cavite, south of Manila. Years before the BIG (Bio-intensive gardening) technique of IIRR hit the news, Ammann, more popularly known as the Old 'Kano' (American), was already incorporating organic materials like coconut trunks and coir dust (or whatever his hands got hold of), into soil that has been excavated and double-digged. But this was years ago (~1983) when he first started an enterprising activity that has become a model for many vegetable gardening enthusiasts around the country, not to mention the so-called "copycats" in his own neighborhood.

Trendsetting Techniques

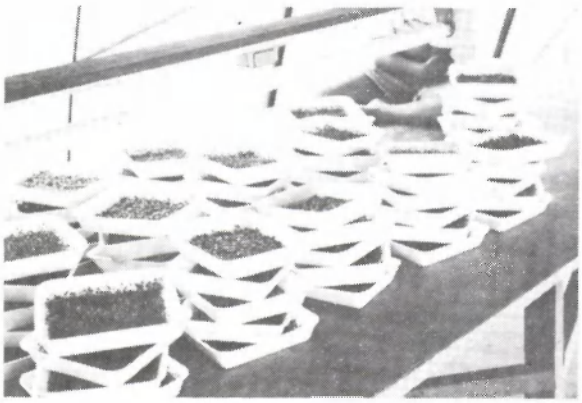
Use of Greenhouse . . . What keeps Old Kano's Farm distinct above the rest are the greenhouses that now number to about 88. Such structures are not common sight in the tropics but typical of temperate countries. With the cool weather in Silang, Cavite, the benefits derived from using greenhouses outdo the costs involved. Actually, he started with only 14 around the family house which took him a year to build. He then expanded opposite the road using only blue screen nets which earned the name 'Old Kano's Blue Screen Farm'. Now the expansion is in a lot behind his original gardens. With the screened green houses he has better control of pest. This also allows him to produce vegetables even during the height of rainy season.

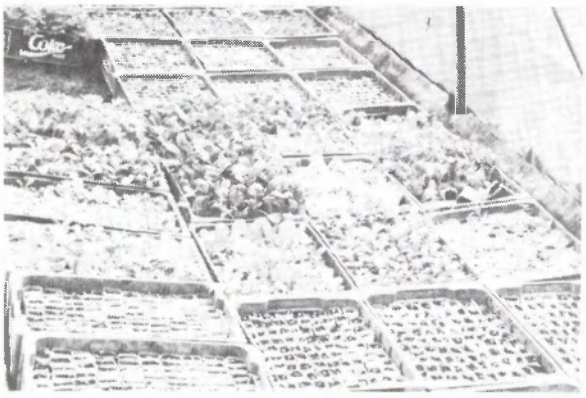
Double Digging and Incorporation of Large Amount of Organic Matter . . . A key factor for his very robust crops is the improvement of the soil life by incorporating lots of rice hull, coffee hull, passion fruit peelings and farmyard manure. A big cattle farm dumps its waste in Old Kano's Farm. Rice hull, coffee hull and passion fruit peelings come from post harvest processing enterprises. He said, "What most Filipinos throw away is my gold." After double digging, he dumps in the hard pan sub-soil hard to decompose plant materials like coconut husks and trunks. He then puts on top of the husks and trunks, the top soil. The sub-soil is then mixed with the easy to decompose rice hull, coffee hull, farmyard manure and compost. Usually, the added material amounts to more than 1 foot in depth. So, one could just imagine the tremendous amount of organic material added. Old Kano urges that you must make your soil. His soil is that soft that you could dig it with your bare hands. Still, he keeps on adding.

Pest Control and Record Keeping . . . Inside these greenhouses, he practices crop rotation and multiple cropping to avoid pests. He alternates with his son (a college student) in doing the rounds of the greenhouses, armed with flashlights, looking for worms and bugs that pester their plants in the wee hours of the morning. They record the dates for this activity in the doors of greenhouses with a red ink. Planting and harvesting dates are likewise recorded in black. Another way of avoiding pests include sterilizing soil for seedlings where microorganisms like fungus and bacteria are controlled. They use heat generated by firewood to sterilize the soil. He also discovered an ingenious way of controlling aphids. He said that it was only after 24 years that he came to realize it. To control the aphids, control the ants.

He keeps a mound of manure (provided free by a nearby poultry) for composting and application as organic fertilizer to his vegetable plots.

Sprout and Seedling Production . . . The Old Kano's Farm is noted for its sprouts and seedlings in styrofoam trays. The seeds are mostly imported ones from the U.S. or Switzerland. For sprout production, tissue paper is used as tray linings while cloth is used for seedlings which are then transferred to small plastics with sterilized soil. These are then kept in softdrink boxes for seedling revival before replanting inside greenhouses. He pays detailed attention in preparing the seedlings. His method is described in the next section as adopted in Santer's Farm.





Highly Motivated and Hard Working Farm Aides . . . The family employs 14 girls to put soil inside plastics for the seedling medium. There are 30-35 male and 10-15 female staff employed. The enterprise has grown with about 150 to 200 people dependents which live around the vicinity of the farm. Many of the trusted help have also developed their skills with the Old Kano as mentor. A mechanic has acquired his skills on the job. The farm is also open to people who want to apprentice in vegetable gardening. Some students have stayed and worked on the farm, not only learning the basics of organic gardening but also the ways of life as Ammann views it. The Old Kano has been very vocal about the need to be very practical these days - how people can overlook the value in wastes, how people if creative and hard-working, can rise above their poverty and other issues including how the after-effects of lahar could have been averted.

Plant What the Customers Need and Supply What Others Can Not Provide . . . It was not until 1985 that the farm started selling herbs as its first produce. People then asked him to grow certain vegetables. A producer and supplier of assorted leafy lettuce, exotic vegetables, fresh herbs and spices, Old Kano never fails to deliver quality produce to his clients. What he stresses is the trust built between a farmer and his customers. He never gives promises that he cannot keep to clients that include discriminating chefs of 5-star hotels and restaurants around Metro Manila. His motto is to plant only what his customers need and supply what others cannot provide. Consider these: 5 kinds of hot chili peppers and 16 types of sweet bell peppers, 10 different varieties of decorative flowers (pansies, marigolds, nasturtiums, honeysuckle, geraniums, begonias, and wild local yellow lilies), which he sells at P120 per tray, 2 varieties of sprouts (P120/tray), eggplants with smaller fruits that is more expensive since more quantity is needed of the produce. These, aside from the usual lettuce, cabbages, and herbs keep the whole staff busy throughout the year. This is how the farm generates its generous but well-earned income. He claims to have one of the highest revenue per unit area in the Philippines in forms of agricultural production. In return, the Old Kano goes out of his way to provide only the best quality vegetables.

3.1.18 Sound Marketing Strategies Do Wonders to a 3,000 - Square Meter Farm

People may think it is simply not possible to make lots of money from a small patch of farm land. But Mr. Antero de Castro, the man behind Santer's Farm, proves that it is possible. Anter is a 40-year old ex-seaman who tried farming as an alternative vocation in 1988. Producing organically-grown vegetables, Santer's Farm spreads out on a 3,000 - square meter farm lot situated in Lalaan I, Silang, Cavite.

The farm, small as it may seem, is able to make money. Last year, it registered gross sales of P785,000.00, with handsome profits of course. Anter's secret: careful planning and a lot of common sense.

Anter started his market gardening venture with an initial capital of P200 for a small area. Initially, the farm was not tilled the organic way. He says he shifted to the organic methods as part of his market development plan. Organically-grown vegetables command higher price. Most of the production techniques being practiced in his market gardening venture were inspired by Old Kano's farm experience. Old Kano's Blue Screen Farm is a market-oriented garden situated also in Lalaan. It is operated by Mr. Fred Ammann, a retired American who openly shared his farming technology to those who would like to go into a similar venture.

Anter began by growing cucumber for the local market. Unfortunately, it did not pay off as the prices offered to his produce were below what he wanted. He would rather consume his own products or give away to his friends and neighbors, than sell them to middlemen for a ridiculously low price.

Anter maintains that, for farmers to earn from farming, they should have excellent marketing position. In other words, they should be able to command a good price for their products. But in the prevailing market system, the middlemen have almost full control, in setting the price of farm products. In this system, middlemen offer prices that may pay for the farmers' labor (enough for him to continue producing) but not necessarily the cost of a given farm product. Under such set up, farmer-producers are virtually reduced to mere sellers of labor.

Frustrated, Anter realized that the basic strategy is to first work out good markets. Product and production technology management and development will follow later.

Thus, for his succeeding operations, he tried a new system of marketing -- that of bringing the produce to the direct users. This is quite similar to the "Teikei" system in Japan. With the principle of eliminating the middlemen in the marketing process, he explored other markets for his produce. He looked for contacts in big restaurants and hotels.

He was able to establish contacts and buyers of his vegetables. He then developed his farm products and farming technology to get an edge over the competitors in this type of business. He went into organic farming. Since he has a ready market and "unique farm commodities", he can name his prices and these are pegged or are not affected by the local (conventional) market price fluctuations.

Knowing the demands of his clients, he could now plan the types of products to produce. This enabled him to schedule his production and deliver the volume as targeted. The availability of some products, however, are affected by the seasonality of some crops.

Santer Farm offers varied types of temperate vegetables (for example lettuce, bell peppers, carrots, among others) and culinary herbs and spices (for example, thyme, basil, etc.), thanks largely to the cool temperature in Silang that allows these crops to thrive. During rainy season, most of these crops are raised inside greenhouses. Anter gets a continuous supply of seeds from the USA through a friend. Since seeds are sent in small packets, the delivery does not cost him much. Anter prefers not to engage in seed production as this will alter his production schedules and land use optimization. Meeting the demand of his clientele is his first priority.

As to his farm production technologies, Anter describes them as "simple and a lot of common sense". Consider the following:

Seed Preparation

To further minimize waste of time, effort and money, he adopted seed preparation techniques that would ensure uniform growth, volume and good timing (planting and harvesting).

For Small Seeds (those that require transplanting). Small seeds are first spread on or "sandwiched" in a water soaked cloth instead of seeding them on seedbeds. When the seeds have sprouted, these are planted in small plastic bags (one sprouted seed per plastic bag) with prepared soil medium that is high in organic matter. These plastic bags containing the seedlings are neatly packed in softdrink plastic cases and kept inside the greenhouses while waiting for the right time to be transferred to the garden plots.

Caring for the seedlings within the greenhouses requires less time and effort. The nylon, mosquito net - covered greenhouses do the job of protecting the seedlings from pests.

In transferring the seedlings to the garden plots, plastic bags are gently removed leaving the soil medium intact with the seedlings. Thus, there is no added stress to the seedlings. Moreover, transplanting could be done any time of the day unlike those raised on seedbeds and then pulled out (thus disturbing the root system and causing stress to the seedlings).

For larger seeds (those that are directly seeded). For larger seeds that could be directly seeded (beans, corn, and the like) the method being used is as follows:

A sandy soil medium (porous, and easy to remove without harming the seedling) is prepared by roasting it to kill fungus or deter weed seeds from growing along with the seedlings. The prepared soil is place on a basin and sprinkled with water. Then seeds are spread on the soil medium and kept inside greenhouses, watered as needed, until they begin to germinate. Those seeds that have started to sprout are picked and then transferred into the prepared garden plots (one or two seedlings per hole).

For both methods, it is assured that garden plots are planted with live seedlings and therefore lessens, if not totally eliminates, the process of replanting or thinning unlike in direct seeding. The latter requires more seeds to be sown to compensate for seed mortality or for replanting hills with infertile or damaged seeds. With uniform crop stand, harvesting is done as scheduled and each batch of crop is harvested at the same time. This assures meeting the clients' demands (in terms of required volume and schedule of delivery).

Maximizing Land Use

For Anter, intensive farming is what he calls "programmatic planting". In his method, garden plots are readily prepared for the succeeding batch of seedlings (raised inside the greenhouses) right after harvesting a crop. This succession planting also allows crop rotation.

Moreover, the time of using the garden plots per cropping is shortened since crops are harvested green or young. Therefore, more crops are grown within a year. With this practice, Anter could program his planting on each plot in such a way that he harvests and delivers his produce twice a week.

Anter estimates that his 3,000 sq. meter-farm is comparable to at least a 5 hectare-farm, using the conventional method of farming, in terms of annual economic returns.

Soil Fertility/Enhancing the Crop Sustaining Capability of the Farm

Continuous intensive planting has its own tradeoffs in terms of soil nutrient extraction. To enhance the crop sustaining capability of the soil, Anter "plows back" large amounts of organic matter. During his early ventures he occasionally applied a minimum dosage of chemical fertilizer -- a fact that his shift to organic farming is only a result of his farm product and production technology development. He continuously applies organic matter to the clayey soil. He uses partially decomposed rice hull, rice hull ash, and farm manures.

Crop Protection

In terms of pest management, Anter utilizes organic sprays made from pepper (siling labuyo), garlic extract, and coriander leaves extract diluted with water. Garlic spray is used primarily for cucumber and other cucurbits to minimize fruitfly infestation. According to him, garlic and coriander extracts do not necessarily kill fruitflies and sucking insects. The strong scent repel such insect pests.

Other culinary, strong-scented herbs propagated in the farm also serve as insect repellant.

During the rainy season, some vegetable crops are grown inside greenhouses and are thus, protected from heavy rains as well as pest and diseases.

To do away with soil nutrient competition from weeds, hand weeding is employed. Hand weeding is still practical because the area is relatively small.

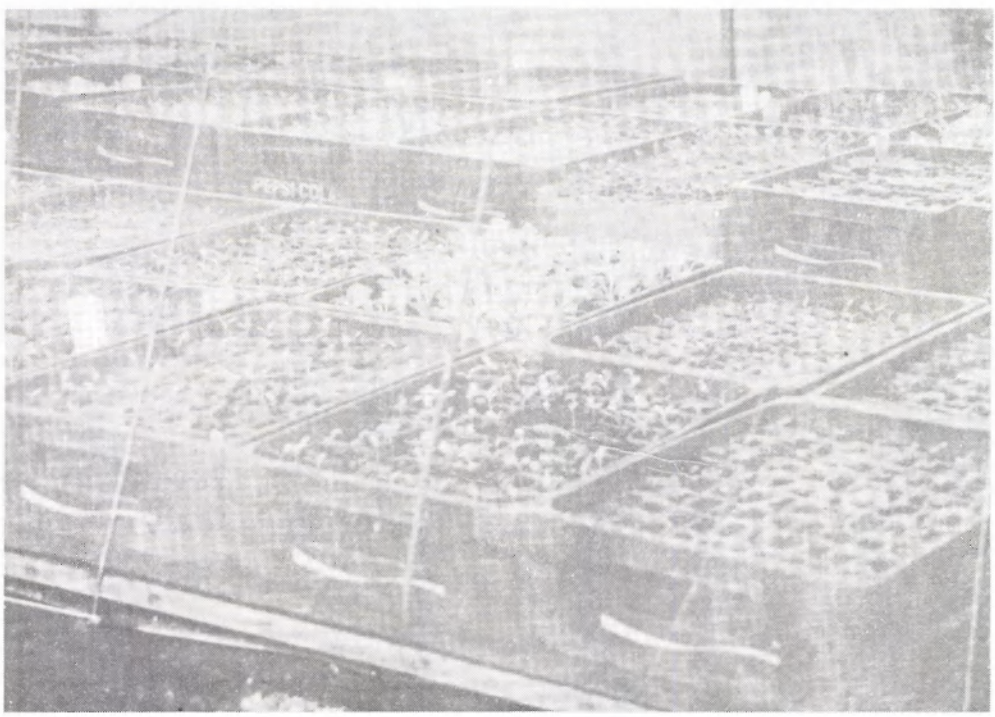
Increasing Economic Returns Through Product Packaging and Promotion

Anter is also very innovative when it comes to packaging his produce. For example, he harvests beans three days after flowering which at this stage are "seedless" and crispy and can be eaten raw. He sells these as French beans for salad and other vegetable preparations. He also sells cucumber while the fruits are still very young and "seedless". Customers prefer cucumber harvested at this stage because they find them more crispy and without "after taste". Such timing in harvesting not only shortens land utilization for the succeeding batch of crops but also creates new demands from clienteles for "new products" via good promotion and packaging, and consequently, commanding a good price.

How much does Anter earn from his 3,000-sq. meter market gardening venture? A net income of P10,000 per week is fairly ordinary. The farm pays for all expenses such as wages of the 3 farm hands and transportation cost, which he estimates at P3,000.00 per week; the cost for labor and materials in constructing greenhouses, which he approximates at about P10,000 per ten-square-meter greenhouse; and other farm inputs and maintenance cost. Through the years, he was able to construct the La Constancia Silang Seminar and Training House adjacent to the farm that can comfortably house about 70 persons.

Anter is inviting organic farming practitioners and interested persons to visit him at Santer's Farm in Lalaan I, Silang, Cavite. The farm as well as his residential house is located just a few kilometers away (accessible by bus or jeepney) from Silang town proper towards the direction of Tagaytay.

The training center is available to everybody as a venue for conferences or trainings. And if the topic is organic farming, one can even get Mr. Antero de Castro as a resource person.

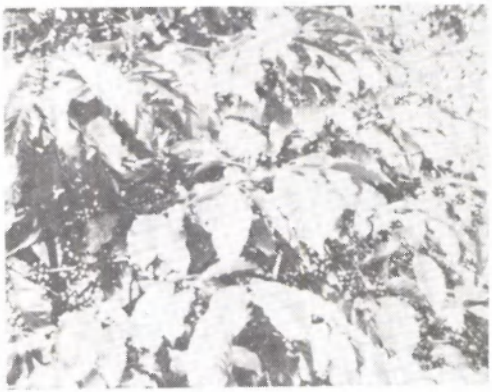


3.1.19 The Silang Multi-Storey Cropping System: Patterned from Nature

By copying the structure of the tropical rainforest, the farmers of Cavite have shown how productivity could be maximized. Their multi-storey cropping system is a successful adaptation to the tropical environment. There is maximum and efficient utilization of sunlight and space.

The forest-like farms of Cavite have several storeys of cultivated plants. The coconut trees occupy the upper layer.

Beneath the coconuts are medium-tall fruit trees such as jackfruit, mangoes, avocado, santol, lanzones and guava.



At a lower level, a canopy of leaves is formed by banana plants, coffee, and papaya which are main cash crops.

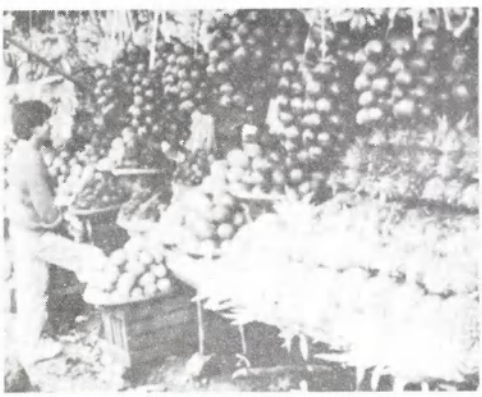
The thinner trunks then support twining plants like black pepper, yams, passion fruit, patola and squash.

Beneath this high diversity of plants grow shade-loving crops such as gabi, arrow root, sweet potato and cassava. They are randomly planted as good sources of food and animal feed. Other root crops like ginger are also added as sources of cash.

Pineapple is one of the main cash crops that occupy the lowest layer. It is usually planted when the coffee is still establishing itself. It is the main source of cash when coffee is not yet bearing fruits. Pineapple are drought tolerant and typhoon resistant. They effectively suppress weeds thus, reducing labor cost.

Multi-purpose trees like kakawate (Gliricidia sepium) and ipil-ipil are planted on the border to serve as live fence. They are also mixed with fruit trees and provide shade for coffee and black pepper; the leaves as feed for livestock.

Falling leaves and pruning provide mulch and fertilizer for the soil.

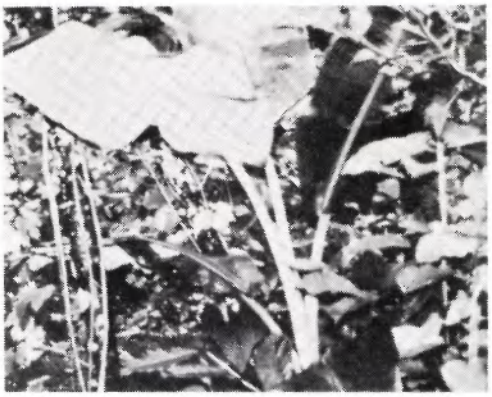


This indigenous agro-forestry system of combining different crops in a multi-storey structure results in:

- reduced economic risk that maybe associated with natural calamities, as harvest is spread over the year;
- even distribution of labor and income rather than seasonal as in monocropping;

less work as tillage is minimal and work is mainly planting and harvesting.

reduced pest infestation as a result of the high diversity of plants.



In the multi-storey structure of planting, there is maximum utilization of sunlight. Soil conservation is also improved. Strong sunlight is filtered by the leaves which prevent it from striking the soil directly. The same is true with rainfall whose soil-beating effect is moderated by the leaves.

The litter minimizes soil erosion and increases the waterholding capacity of the soil. In effect, there is high organic matter build-up.

Nature has shown that the tropical forest could be highly productive yet, delicate and vulnerable. The multi-storey cropping system imitates the forest that once covered the Cavite slopes. It is highly productive and yet, protective to its environment.

3.1.20 The Risk in Farming is Thinly Spread Through Mixed Cropping

"Young people, at least in this place, no longer want to farm. Only older folks, those 40 and above, seem to do it," rues Mr. Olimpio Rodis of Alfonso, Cavite.

"This tendency could be attributed to the perceived risk in farming due to typhoons that frequently visit our country," he explains.

"Yes, the risk is always there, but this could be minimized," Mang Olimpio asserts.

Mang Olimpio, like his father, raised his family through farming. He is now 63 years old and still tends to his two-hectare upland farm. Today, four of his six children have families of their own.

The family's spacious semi-concrete house, with an ambiance of prosperity, is located fifty meters away from his two-hectare upland farm. A small sari-sari store annexed to the house and being managed by his wife also contributes to the household income.

For Mang Olimpio, the key to spreading the risks in farming is through mixed cropping.

Crop Diversification and Its Benefits

He raises coffee, coconut, fruit trees, bananas and root crops. Black pepper and vegetables, which include sayote on trellis, are also grown in his farm. These provide cash and part of the daily food needs of the family.

Coffee is the major cash source but the income it generates is very much affected by market price fluctuations. But the sales from other crops would easily compensate to maintain good income from the farm as a whole. For example, coconut harvested as young nuts, contributes substantially to the family's coffer.

In Mang Olimpio's farm, no distinct rows or uniform planting distance could be observed. "Every vacant space should be planted to maintain the productivity of the whole farm," according to Mang Olimpio.

The diverse cropping system produces different levels of canopy which, in effect, serves as wind break that protects other less wind resistant crops. All crops are affected by typhoon, but among them, there are those that could easily recover especially those that are shorter or are protected by taller ones," Mang Olimpio explains. This statement is evidently true. This writer visited the farm one month after super typhoon Rosing devastated the country with Cavite as among the hardest hit. Yet, green and ripe coffee beans were seen abundantly clinging to their branches.

Part of Mang Olimpio's routine is to inspect and remove dead, damaged, unproductive or infested branches or plants. He also replaces plants he removes. According to Mang Olimpio, "This practice does not only allow for the optimum utilization of sunlight and land, but also helps in averting occurrence of pests and diseases. Pests and diseases can not be completely eradicated, but the damage they cause may be minimized by removing affected parts, if not the whole plant itself."

Nevertheless, Mang Olimpio resorts to chemical pesticides when needed, that is, when pests and diseases of coffee are prevalent in the area.

Occasionally, he applies a "minimum dosage" of chemical fertilizer especially for crop establishment or crop rejuvenation. In 1993, he started applying organic fertilizer to coffee. This was when he became a farmer-cooperator of IDEAS, an NGO based in Silang, Cavite. Although no account on any significant changes in terms of growth or in volume of harvest (when using organic fertilizer) was readily provided, Mang Olimpio claims the practice saves him some money on the cost of fertilizer.

It could be deduced from Mang Olimpio's account that on a per hectare basis, the income derived from single cropping (for instance coffee), expectedly is higher compared to mixed cropping. This is true especially if the price of coffee is high. But almost always the middlemen and traders dictate the price. Also, in the event of pest and disease outbreaks or when typhoon strikes, crop failure is inevitable in mono-cropping. For small farmers who do not have extra capital or buffer cash, this cropping system is too risky. Besides, it would take a longer time for the system to recover from damages brought about by calamities. Thus, Mang Olimpio maintains his mixed cropping offers more benefits, including a relatively stable cash income.

Mang Olimpio openly shares his experiences and farm practices to fellow farmers and other people, especially the younger ones. He narrates with pride that oftentimes, researchers and students from the Don Severino Agricultural College or DSAC of Silang, Cavite interview him and make ocular visits to his farm.

Ornamental Plants as IGP

Aside from the two-hectare farm production venture, Mang Olimpio and his wife have engaged in a new income-generating ornamental plants or cut flower enterprise, through their membership in a community cooperative which was established in 1995.

The cooperative accessed a loan from a bank which was used to finance the venture. Although the loan is a cooperative responsibility, each member takes responsibility in tending to their own plants. The members are grouped into two--one group engaged in orchid production while the other ventured on anthuriums. Mang Olimpio is among the group that engaged in orchid production while his wife belongs to the other group. An approximately five by ten meters greenhouse for orchid raising was constructed just beside the house of the Rodis, while a similarly sized greenhouse for the anthuriums was constructed within Mang Olimpio's farm.

Inside each greenhouse, potted plants are tended on several raised platforms. The plant stocks were purchased from Laguna. According to Mang Olimpio, the plants started to bear flowers after six months although not simultaneously. "Both ventures promise a good income to members or to the cooperative as a whole, as the plants continuously produce flowers. Cut flowers are brought and sold to a buyer in Manila, although there are some who buy flowers at the farm gate," Mang Olimpio narrated.

Anthurium flowers are sorted according to size. A dozen of small-sized anthurium flowers is sold at P60.00 while extra large ones are sold at P240.00 a dozen (farm gate price). Aside from flowers, potted suckers are also produced by separating shoots from mother plants and sold at P15.00 per potted seedling at farm gate.

Both orchid and anthurium ventures promise a good and continuous source of income for members as well as for the whole cooperative.

Indeed, the success story of Mr. Olimpio Rodis and his family can inspire small farmers who are about to abandon farming due to perceived risks. Take it from the Rodis: there is always food and money through mixed cropping.

3.1.21 Gourmet Farm

How It Started

In 1987, Ernest Escaler, envisioned to put up a farm that produces organically-grown vegetables for the A and B market. He wanted to produce fresh vegetables during that time when salad bars were still few. His vision materialized in a seven and a half-hectare Gourmet Farm, situated at Km. 52, Aguinaldo Highway, Lalaan 2, Silang, Cavite. Because of the cold climate in Cavite, the farm started to cultivate culinary herbs and spices.

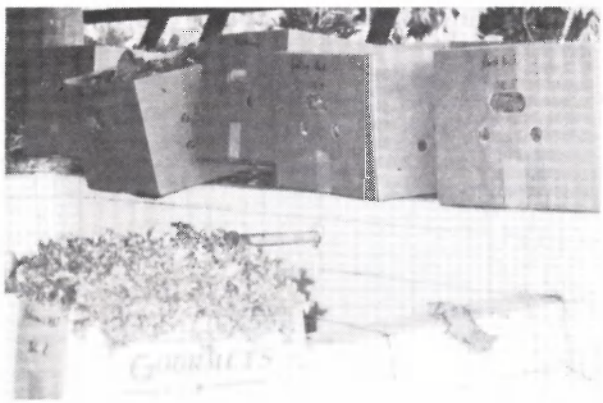
In its initial operation, the primary problem that beset the farm was lack of market. So, Mr. Escaler put up a country-style restaurant - the Gourmet's *Good Food Naturally* - on the farm's entrance to utilize its products. Later, the markets established included big restaurants, hotels, and supermarkets aside from selling at OPTA in Makati and Alabang. It also opened a shop in front of its restaurant which offers a wide variety of products including its very own processed herbs/spices, codiments, coffee, herbal tea, fresh vegetables, seedlings, and other different labeled natural foods.

The Techniques

To produce natural and organic vegetables, the farm utilizes chicken manure as fertilizer. For pest management, hot pepper, onion, garlic, and marigold extracts are used as botanical sprays. At present, the farm is experimenting the use of tubatuba extract as sprays. For fungal attacks, especially during wet season, ash is applied. Experimentation in the farm is part of the supervisors' job. Each of the four supervisors is assigned to conduct research on a particular area every month. One such study involves testing different mixtures and brands of organic fertilizers on the seedling as well as the grow out stages of vegetables.

The farm has only three and a half hectares in operation while the remaining area is still being developed. The farm has 14 greenhouses measuring 10m x 5m using sturdy materials and UV plastics imported from Israel. The greenhouses are arch shaped, built of big steel pipes and rods and a few layers of hollow blocks. A fine nylon net covers the sides of the structure with a wind resistant UV plastic roofing. They are built according to an Israeli design. Technical services of an Israeli Consultant was even employed in constructing the greenhouses.

The farm is working towards an integrated farming system in the future. In addition to vegetable growing, a piggery was introduced with an initial twenty five heads. Although still at the initial stage. the farm is planning to introduce biogas technology utilizing food waste from the restaurant and pig dung. The farm tapped the technical expertise of Don Severino Agricultural College (DSAC) to build a biogas tank. However, this is not yet fully operational.



An efficient system of irrigation is installed in the farm. Black perforated plastic tubings run along vegetable plots. These are connected to metal pipings which brings water via capillary force. Drip irrigation provides the water requirement of vegetables with less labor and more efficient utilization.

Seeds and seedling preparations are done inside the greenhouses. Pre-germinated vegetable seedlings are individually planted in plastic bags containing the prepared potting medium, as well as in other plastic containers designed and purchased for the purpose. Other herbs are propagated from cuttings and raised on seedbeds.

According to the farm manager, around 30% drop in production is experienced during the rainy season. This is due to heavy rains that affect the crops and higher pest incidence in the grow out area. They are planning to construct more greenhouses to minimize the problem.

Aside from practicing organic farming methods, the farm also implements the zero-waste management approach. Everything, including organic waste and weeds are utilized in the farm. Through these enterprising activities, Gourmet Farm continues to take its share in the A and B markets as its organic products outdo other's conventionally-grown ones. No wonder that another eighteen hectare expansion area is in the making.

3.1.22 Small Vacant Lots Could be Made Productive Through Bio-Intensive Gardening

Urban poor squatters usually resist to be relocated. One reason is the difficulty and added cost of commuting to their work places. Another is the lack of income-generating opportunities in relocation areas. But members of the Bio-Intensive Gardeners Association or BIGA in Area G, E, and F of the Dasmarinas, Cavite Resettlement have shown that the livelihood opportunity is right in their small backyards. They have transformed these small vacant spaces into productive and profitable kitchen and market gardens.

The Bio-Intensive Gardeners Association, Inc.

Organization of vegetable - producers. According to Mr. Edgar Mendez or Mang Gado, BIGA was formally organized in order to lend identity to the chemical-free vegetables they produce from practices which are based on the bio-intensive gardening (BIG) approach.

In the beginning of the project, there were about 150 individuals involved. Now, there are 44 registered active members. According to Aling Fernanda Vergara, the incumbent BIGA president, "The soil then was as hard as adobe. Part of the garden sites was of hard red clay with some exposed hard pans, while other sites were once invaded with cogon grass. Thus, some lost interest and abandoned their assigned production area. But we pursued with determination."

Benefits from BIG. At present, BIGA members are enjoying the fruits of their labor. Although not all of their cash needs are being derived from their small garden plots, they don't have to worry now for the daily food needs of their families. Fresh and chemical-free vegetables are always available. As a result, food expenses have been greatly reduced. Besides, extra income is generated from selling part of the produce. Neighbors who have no

gardens serve as one among their primary clients. Other members bring their harvest to the nearby market.

Other residents, likewise, benefit from the products and services of the BIGA members. They don't have to go to the market for their vegetable needs thus, saving them time and money. Aside from the health benefits of being chemical-free, they can get the vegetables at a lower price sans the traders. On some occasions, neighbors can even ask them for free. According to Aling Herminia Colinares, the incumbent BIGA secretary, "Being neighbors, we allow it once in a while but, we do not encourage such practice. So, aside from the occasional free vegetables, we give them some seeds or seedlings to plant on their own".

As part of the BIGA program, neighbors are encouraged to go into bio-intensive gardening. Some, if not most of their members have acquired the skills to teach BIG techniques. Not only on the practical aspect, their trained technicians have the ability to explain the principles behind the techniques as well as the benefits from adopting BIG. Some of them have the knowledge about herbal medicine production and processing, aside from vegetables.

Micro-credit program. To further encourage the members, as well as non-member residents to go into BIG, the program launched a micro-credit assistance scheme. With a P100 share per member, BIGA started to provide loans primarily, but not limited, to its members. Loans could be used for other livelihood or micro-enterprise activities as long as the would-be recipient already maintains a bio-intensive garden. Other non-members could avail of the loan if they engage on BIG.

The credit project followed a sort of progressive lending scheme. For the first loan, a maximum of P300 could be availed. After loan payment, a maximum of P500 could be applied for the next availment. If again, the borrower proved his credit worthiness, a maximum of P1,000 could be granted for other succeeding loans. A 3% per month interest is charged for every loan.

Service-orientedness. The organization also practices mutual labor exchange or *bayanihan*, especially in constructing garden plots or compost sheds. They even extended such services to other neighbors who did BIG. In the words of Mang Gado, "We are always willing to assist our neighbors who are interested in doing bio-intensive gardening. We could assist them in constructing their garden plots or compost shed for a minimal fee or even just a merienda."

Constraints. During the latter period of 1995, some BIGA members tried a new outlet, though much still have to be produced just to satisfy the demand in their locality. Aling Herminia volunteered then to bring some of the members' products at the Organic Producers Trade Association (OPTA) market in Greenbelt, Makati. "Although not yet a member of OPTA, we shared space with the Alay Kapwa Kilusang Pangkalusugan (AKAP). AKAP, one of OPTA's member-organizers, implements a health program and operates a 200 square - meter demonstration area where herbal and organic vegetable gardens are being maintained in a resettlement site in Dasmarinas. Aling Herminia is one of AKAP trained community health volunteer workers in the area.

According to Aling Herminia, "Good income was derived from selling our products at the OPTA Greenbelt market. However, we can hardly sustain this. We have to commute from Dasmarinas to Makati by transferring from one passenger vehicle to another. Much effort and time was needed in transporting our products especially with the number of commuters and the traffic. For now, we could not yet afford renting a vehicle to transport our products."

BIG Technique

BIGA members learned BIG from the International Institute for Rural Reconstruction (IIRR).

IIRR implemented its Peri-Urban Development Program within the Dasmarinas resettlement area with the facilitation of the National Housing Authority (NHA) in 1986. Through its field technicians, BIGA members have been provided with knowledge, skills and attitudes necessary through a series of trainings towards establishing a self-sustaining vegetable production via the bio-intensive gardening approach.

According to some BIGA leaders, about 30 individual members have undergone BIG training with a practicum program launched by IIRR. NAPOCOR through NHA, then granted the participants with their respective production lots where application of the learnings or practicum were later done. Not all of them got the whole course program. But participants who trained on particular topics always shared whatever learnings they acquired. Close supervision, monitoring and trouble-shooting were provided by the IIRR field staff and trainors. As part of the training program, some BIGA members were exposed to IIRR's project in Bacolod, where the BIG methods have been in practice.

BIG - the BIGA way. Together with Aling Fernanda and Mang Gado, Aling Herminia led in sharing the BIG techniques as adopted by BIGA in their particular situation. "The following narration does not necessarily follow the sequence of the trainings provided to us but is based on the techniques we learned in establishing a bio-intensive garden. Nevertheless, we acquired these techniques from the IIRR trainings," Aling Herminia explained.

She proceeded, "Since BIG does not promote conventional (chemical-based) farming and given the particular soil condition in our production site, we have to prepare compost. We have a red, clay type and adobe-like, hard soil."

The area was once planted with sugarcane. When it was converted into a resettlement site, the soil had to be moved and flattened using graders. Thus, to prepare the soil, organic matter had to be added for plants to grow. BIGA members constructed either a compost pit or shed. The latter does not require diggings but needed wallings to hold the compost materials, as well as the roofing. Dry leaves, grasses, kitchen refuse, animal manures, and other biodegradables are continuously piled up in such compost pit or shed. For about three months, these organic wastes at the lower portion of the heap would have been decomposed and be ready for use.

"At the start we didn't have much source of compost materials (i.e., plant debris and animal manure)

lect these from other places. Sometimes the IIRR staff, using their service vehicle, had to arrange trips for us only to collect animal manure somewhere else. Likewise, ipil-ipil and kakawate seeds were provided by IIRR for BIGA members to plant as source of compost materials and as living fence for our gardens. We practice garbage segregation, separating bio-degradable from non-bio-degradables. I collect bio-degradable waste materials from my neighbors who are not into BIG. I instructed them to practice waste segregation. Thus, their problem in waste disposal has been lessened. They're happy about it, so am I. Some members collect urine and wood ash to add to their compost heap. Now, we have plenty of plant-based compost materials. Animal manure is still scarce, though. But composting is one of our component activities in bio-intensive gardening."

The 3 BIG options. Preparing the soil or establishing garden plots at the start is not easy given the soil condition in the area. Based on the trainings provided, each BIGA member adopted one or several among the 3 BIG options in establishing garden plots. But all of the 3 options could be observed within the area. Most, if not all, BIGA members prepare their garden plots following what they called a standard size of 4 x 25 square feet per plot. The following are the 3 BIG options as related by the three BIGA leaders.

Option 1: The Double Digging Method. This is done by digging twice up to about 24 inches deep. In the first 12 inch digging, the soil is removed to facilitate the second dig - another 12 inches. IIRR provided the organization with a simple digging device designed for this purpose. After double digging, the soil is returned with the organic matter laid in the mid section. According to Aling Herminia, this method is best suited for deep rooting plants and enhances the water holding capacity of the soil.

Option 2: One Foot Deep, One Foot Raised Seedbed. This is done by digging the garden plot 12 inches deep. Then, top soil and compost materials are added to prepare a 12 inch-raised garden bed. Some members, like Aling Fernanda, hauled several cans of soil from the nearby river bank to prepare their raised garden plots.

Option 3: One Foot Raised Seedbed. This is done by placing sidings to hold the soil in preparing the raised seedbed. With shallow diggings, a 4 x 25 feet sidings, about a foot high, is constructed (could be made from supported wooden slats, old GI sheet, or even braced banana stalks) to prevent the soil from being washed out by heavy rains or surface run-off. Soil and compost, about 12 inches high, are then added to prepare the raised garden plots.

In all 3 options, most BIGA members do not prefer pulverized garden plots. According to them, this would make the soil compact.

Using Nitrogen-Fixing Trees as Live Fence. Garden plots could be enclosed with a live fence of ipil-ipil and kakawate trees. Even with shallow diggings at the start, ipil-ipil and kakawate roots could penetrate to help loosen the soil. These leguminous trees have nitrogen-fixing micro-organisms in their root nodules that help provide crops with nitrogen. Moreover, dried leaves and twigs fall directly or near the plots for easy soil incorporation. Ipil-ipil and kakawate shoots are also regularly cut and used as mulch.

Seeds and seeding. BIGA members produce their own seeds. Some of the initial seeds were provided by IIRR on the condition that BIGA propagate these for dispersal to others. Other seeds were purchased from outside sources,while some were obtained through an organic producers seed exchange program.

In seed selection, particularly for bigger seeds (i.e., papaya, corn, etc.), "we take only those at the middle part of the mature or ripe fruit to ensure uniformity. For papaya, we only plant female seedlings, not those with long primary roots which are male," Aling Herminia averred.

Through the information and/or training provided, most of their members practice seed drying (sun drying) between eight to ten in the morning and

(sun drying) between eight to ten in the morning and two to four o'clock in the afternoon. In storing their seeds, small bottle containers with caps are used. About halfway of the bottle is filled with seeds and depending on the size of the seeds, charcoal or dried sand is added on top to absorb moisture and prevent the growth of molds.

Small seeds are then grown on prepared seedbeds prior to transplanting. Seedbeds are either within garden plots or separately located in old plastic basins and seedboxes. Other bigger seeds, as well as cuttings, are directly planted.

Designing and planning. "Usually, we design our gardens and plan out planting schemes. By this, we mean, not only the garden plots but the entire individual production site." Some members include herbs with medicinal value and ornamental plants. Aling Fernanda had some grafted kalamansi trees on her garden plots. Even along boundaries, a live fence of several tree species, and leguminous vines are planted, thus maximizing available space.

Nutrient and pest management. Crop rotation and fallow period are among the practices adopted by BIGA members. These require subdividing the 4 x 25 square feet plot into four. Each division is given a fallow period, while others are planted with different types of crops. Through succession planting, members who only have a single plot to till can produce several kinds of vegetables for their kitchen.

Leguminous plants (i.e., mungbean, peanuts) are the crops planted in rotation. "Aside from introducing nitrogen-fixing organisms into the plots," Aling Herminia explained, "good composting materials are produced upon harvest. We also make our liquid fertilizer. We soak in a drum of water a sack of fresh ipil-ipil or kakawate leaves with rocks to serve as weight. Within three weeks, the fermented liquid is ready for use as fertilizer. Sometimes, animal manure is utilized in the fermentation, after which, residues are incorporated into the compost pile or in the soil. Kakawate extract is also used as insect pest repellant just like marigold. To protect the seedlings from ants or slugs, ashes are applied around each seedling or garden plot."

Water management. During dry months, the plots are mulched to conserve soil moisture. Cogon grass or chopped banana stalks are used for mulching among other plant parts that they could gather. Planting in furrows or between hills is likewise done during this period.

Watering the plants has not become a problem nowadays. IIRR provided handpumps constructed within each of the seven cluster areas. "Before," Aling Fernanda recounted, "watering our plants was a problem. We used to fetch water from afar. Sometimes, I paid P0.50 for a container of water, and not only two or three containers are needed for watering my plants daily."

NAWASA also installed a potable water distribution system in the area. Right after the super typhoon Rosing, water distribution was temporarily cut off. Thus, the neighborhood gathered water for household needs at the installed handpumps. The organization collected P0.50 per container during that time for pump repair and maintenance purposes.

Other Activities Related to BIG

Aside from the above cited practices, a lot of experiences and practices could still be shared by each BIGA member. Aling Fernanda has her ornamental plants that provide good income, from flowers and foliage, especially during All Souls Day. Aling Herminia for her part, has acquired some expertise in medicinal herbs -- their medicinal value, preparation or formulation, and dosage or application. Meanwhile, Mang Gado has two small water impoundments (2.25 and 18 square meters) which also serve as fishponds, except during the driest months. He also made a hanging garden of potted vegetables at the kitchen windows for his wife. Surely

interesting to follow up are the consequent results of the "little" experimentations he is currently doing. He is making and testing pelleted organic fertilizers and several formulations of bio sprays.

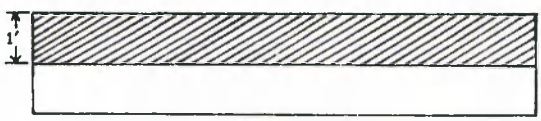
For information exchange and promotion of bio-intensive gardening, Mang Gado is in the process of documenting the BIG techniques being practiced, the experimentation results and experiences. A booklet in Tagalog could be reproduced for dissemination. As the current leader of two clusters in Area F, he wanted to discuss with his group about his plan of setting up a small but attractive farm stand where members could bring in their products. "This would not only serve as a marketing channel but also a contribution, in our own little way, in mainstreaming organic products, as well as spreading health and environmental awareness," Mang Gado asserted.

With their experiences, the BIGA members oftentimes receive IIRR trainees. The area has become the site of exposure or field trips for trainees especially after the IIRR program pulled out in 1990. A number of BIGA members, like Aling Herminia, Aling Fernanda, and Mang Gado, have acquired trainor's capabilities. Still fresh from their memory is Senator Juan Flavier's visit, as Health Secretary and IIRR Board Member, when he showed his big appetite for the BIGA vegetable dishes that were served.

Indeed, an increasing number of both local and foreign visitors come and go to learn how the members have transformed their small vacant lots into productive and profitable bio-intensive gardens. It would be a wholesome experience visiting BIGA not only because of their BIG techniques but for their hospitality. According to Aling Fernanda, "We always treat our visitors, whether local or foreign, similarly the way we treat our friends and allies." But please arrange your visits in advance by contacting Aling Fernanda Vergara at their residence in Brgy. San Luis, Dasmarinas, Cavite, or through IIRR in Silang, Cavite.

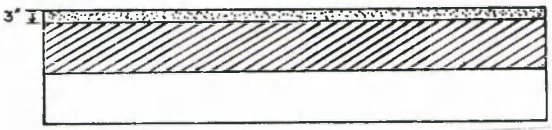
BED PREPARATION FOR A BIO INTENSIVE GARDEN

(OPTION NO. 1)

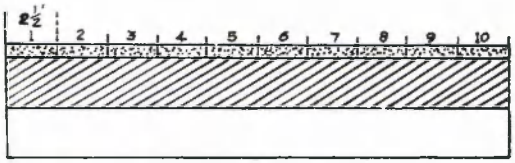


1a. Dig the bed to a depth of 1 foot. (Standardsized beds are usually 14' wide and 25' long but the length could vary according to convenience.)

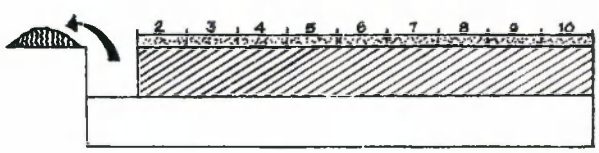
1b. Then, level the bed using a rake. Remove large stones or stubbles. Pulverize big clods.



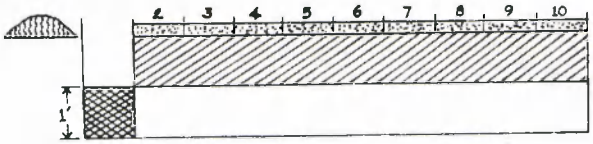
2. Evenly spread a 3" layer of compost or decomposed animal manure over the entire bed.



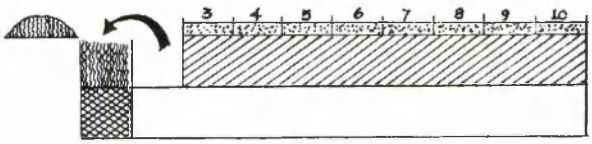
3. Divide the bed temporarily into sections 2 1/2' wide using wooden stakes as guides.



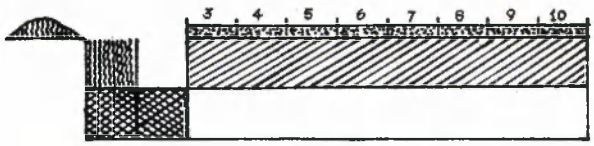
4. Initiate the second digging. Dig a trench 1' deep and 2 1/2' wide at one end of the bed. Place the soil from this trench on one end of the bed.



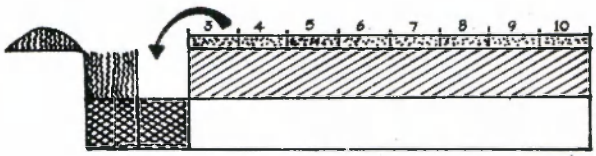
5. Loosen the soil in the trench for another 1' with the use of a crow bar. (Please note that the soil is not removed.)



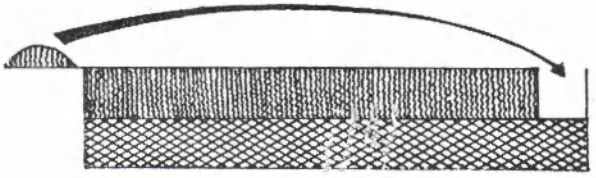
6. Dig a second trench adjacent to the first one. Cover the first trench with the soil coming from this trench.



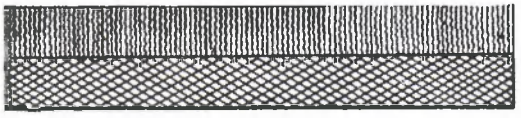
7. Again, loosen the bottom of this second trench just like in step 5.



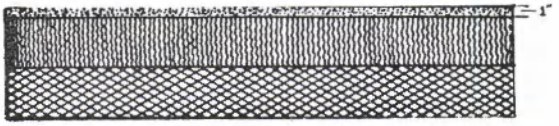
8. The process of second digging is continued.



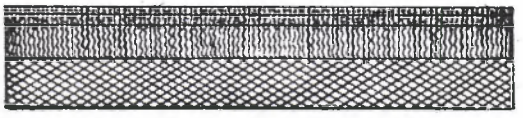
9. *This leaves an open trench at the other side of the bed. Fill this with the soil previously dug out from the first trench. (See step 4.)*



10. *The double digging process is complete. The bed is now levelled using a rake. (Never step over the bed!).*



11. *Add to the bed the nutrients which the plants are going to need. Apply the following in layers: 1" compost or decomposed manure, 2 lbs. wood ash, 2 lbs. bone meal, 1 - 3 lbs. fish meal or Leucaena/ipil-ipil leaves, and 2 lbs. of any of the following -- crushed egg shells, mussle shells, snail shells, etc. This is the required quantity for every 100 sq. ft. bed area.*



12. *Mix these plant foods thoroughly into the top 6" layer of the soil. Level the bed. It is then ready for planting.*

Source: The Bio-Intensive Approach to Small-Scale Household Food Production, International Institute for Rural Reconstruction Silang, Cavite, Philippines.

3.1.23 The Bees of Ilog Maria Farms: "Fertilizers on the Air"

The greatest benefit of bees is pollination. Bee pollination improves fruit set and fruit formation; and hence, increases fruit, vegetable, nut and seed yields; increases seed viability; aids in forest self-propagation; ensures the propagation of wild and indigenous flora; and is essential in seed production operations. Crop harvests normally increase by 30 to 40 percent due to pollination.

Gardeners and farmers are not the only beneficiaries of the wonder works and products of beekeeping. Women, children, teenagers, students, out-of-school youth, office workers, and retirees could engage and benefit from beekeeping.

The story of *Ilog Maria Bee Farms* in Silang, Cavite is a good and encouraging example . . .

The Setting

Silang, an agricultural town, is the largest in the province of Cavite. It is Metro Manila's source of fresh fruits and excellent coffee. Silang has more than 50,000 hectares planted to all kinds of fruits intercropped with coffee. Organic vegetable raising is also practiced here with its mild climate, together with the cultivation of varied flower-bearing ornamentals. Its pristine environment is an ideal setting for a healthy rural lifestyle. It is also perfect for keeping honeybees.

Just a few kilometers from the town center leading to Tagaytay, a signboard stands at the right side of the road indicating the presence of a honeybee farm - the Ilog Maria Honeybee Farms. The signboard advertises honeybee products, such as honey, pollen, propolis, and royal jelly. At the opposite side of the sign is a dirt road leading directly to the farm.

Ilog Maria flows from seven natural springs. It is owned by the Magsaysay family. The modest farm house also serves as a place where the Magsaysay clan holds its reunions. There are millions of honeybees here. They swarm into their colonies after gathering nectar and distributing pollen within a several kilometer radius.

Joel Magsaysay, the proprietor, started keeping bees at Ilog Maria fifteen years ago with just a few bee colonies. His wife, Violaine, is also a bee keeper. Together with their four small kids, they now run about 200 honeybee colonies.

"All structures, facilities and development in the farm came from the products of the honeybees", Joel declared.

From a Hobby to Source of Livelihood

How did Joel decide to go into beekeeping?

Joel relates, "I had this delimma before: whether to pursue studies at Harvard through a scholarship or go into entrepreneurship. I had already taken the exams for the scholarship and earned high grades. At that time, my friend and I went wind surfing in Batangas. It was March then so the wind was quite strong. I said to my friend right after we stepped on the shore, "kailangang may mainom tayo nito' . . . 'yong pampalakas". My friend readily answered, "Don't worry, I know a place not far from here, there's a honey producer where we could take some for our need".

"It so happened that the honey producer was a relative. Thus, after some talks, I got this interest and tried beekeeping. At first I kept my bees in the city, as a hobby. I was still single at that time.

"I once worked as a management consultant and not long after then, I had a mid-life crisis. It seemed to me that everybody pushed their way along the same direction to get ahead of others, as in a rat-race"..

For Joel, he preferred to go where others seemed not to bother. "Kung saan may bakante, doon ako", he exclaimed. "There's a lot of room for beekeeping so I went into it, Thus, from a hobby, my beekeeping turned into a source of livelihood. This (mid-life crisis) likewise, set a vision for myself. I wanted to have a change -- from city living to a rural lifestyle." Joel opted for a retirement, at least from city lifestyle, at the early age of 30.

From City Life to Rural Lifestyle

His retirement greatly differed from others. "While most people work hard to save lots of money for their retirement, I retired 'without money' but full of ideas".

How did he select his niche? "I first set a criteria for selecting a place for country living: first, with natural sources of clean water; then, a silent, green and pollution-free environment. Ilog Maria is just the perfect place. Thus, I took my bees with me to Ilog Maria".

Joel, now 40, exudes an aura of contentment for the rural lifestyle he chose. Together with his family he tends and enjoys the benefits from keeping bees. "Everything has changed - from water, food and shelter. We grow plants in the farm for our use as well as for our bees. Beekeeping as our livelihood has become our way of life".

Achievements in Honeybee Keeping

Joel and his family produce ripe and unfiltered honey, natural pollen pellets, raw propolis and fresh royal jelly. Ilog Maria boasts of its solid reputation as a producer of the highest quality bee products. "We do not alter our products in any way", Joel stressed.

Apiculture is a science, craft and art where visual and tactile skills can be easily learned under adequate guidance. Once acquired, "beekeeping needs only about 24 hours within a week".

The Magsaysays have a floral bloom calendar -- one that indicates the months when certain trees or plants flower. "It is a must for any beekeeper to have, aside from knowing where such trees or plants grow in abundance. It serves as a guide for 'herding' bees. I maintain different sites where I could herd my bees, such as Tagaytay and Los Banos, aside from Ilog Maria". Most of the plantation owners ask them to herd the bees for their crops.

"Our honeybee colonies are also in great demand as contract pollinators by certified seed producers and fruit growers. Reports of 30 to 70 percent increase in fruit and seed set are common. Bee pollinated fruits are better formed, larger and sweeter."

"Our bees are kept in the best of health because we follow a rigid schedule of preventive medication.

Bee samples are frequently sent for health analysis to the University of the Philippines at Los Banos.

Ilog Maria is also the major honeybee breeder in the country. "We regularly import pure Italian and Carniolan breeder queen bees whose daughters mate with tested drones from its current bee stock. The first generation daughters are known as the first generation hybrids which are gentle, prolific and productive.

"European bees are more productive in the tropics. They work hard to gather and store nectar in preparation for the 'winter'. We have lots of lush vegetation and don't have winter here, thus, they have an extended time storing food. Bees acclimatize themselves with the environment. For this reason, we have to upgrade our stocks, usually every two years.

According to Joel, Ilog Maria holds a record of producing 100 kilograms of honey from a single colony in one honey flow season. It's good business at P20,000.00 per colony. "I would attribute such record to long experience in beekeeping", he adds.

"Beginners normally produce 25 kg. of honey. I would advise a beginner to start with two or three starter sets, at least to gain further on the what's, why's, how's, etc. in beekeeping operation".

A starter set would cost about P4,908.00. It consists of one nucleus colony (i.e., 3 mature brood frames with adhering bees; 1 young, mated queen, all in a ventilated transport box); a complete standard 2-storey beehive (completely knocked down); and supplies (i.e., beeswax comb foundation, miticide "Apistan"). An added cost of about P1,070.00 is for other equipment (stainless steel smoker and bee veil).

Beginners normally harvest 25 kilograms honey in their first season. This amounts to P5,000.00 with honey sold at P200.00 per kg. Total investment is usually recouped in 4-7 months. The "ber" months is the best time to start keeping bees.

Beekeeping: An Alternative Drugstore

Aside from honey, Ilog Maria produces bee pollen, propolis, and royal jelly.

"We use pollen as supplementary diet, especially for our kids. Pollen is the most complete food on earth. It contains vitamins, minerals, enzymes and amino acids needed to sustain a healthy body. Pollen induces enphoria and high-energy levels. Pollen retails at P2,000.00 per kilogram.

Propolis is a natural antibiotic with antifungal, antibacterial, anti-viral and analgesic properties.It can be made into a tincture for wounds, mouthwash and toothache drops. It is particularly effective for throat infections, fevers, and for use by persons allergic to penicillin. "My wife prepares these formulations". Raw propolis sells for P40.00 per gram vial.

Royal jelly is the second most expensive product of honeybees. A 5 gram vial would cost about P300.00. Royal jelly has been highly prized by the Chinese who have been extracting it from beehives for over a millennium. It has been found to abate the symptoms of internal ailments because of its beneficial effects on the cardio-vascular, endocrine, gastro-intestinal, respiratory and immune system.

Other bee products are beeswax and bee venom. Beeswax has so many uses. Joel cast these into sheets of wax comb foundation on which bees build honeycomb. High quality candles are likewise produced from beeswax. Raw beeswax is sold at P170.00 per kilogram.

The most expensive product of honeybees is bee venom. Bee venom therapy has been used to reverse the symptoms of rheumatoid arthritis and multiple sclerosis, both hitherto deemed irreversible. It is sold at P10 per bee sting.

Beekeeping: A Tool for Rural Development Programs

Ilog Maria takes pride in its contribution to rural development programs. It has a long list of educational institutions, GOs, POs, and NGOs that have been supplied with selected purebred queens and nucleus colonies from its private stock.

"These institutions, especially NGOs, help promote beekeeping at the grassroots level in various areas. They help make people appreciate nature and the benefits of apiculture. For example, hard wood is the best source of honey. But wild bees do not stay put in one area. Thus, people hunt for their honey. And most of the time, they gather the honey even when it is still unripe or not at the right age as each one wants to be ahead of the others. Beekeeping then is presented as their best alternative. But without appropriate information dissemination, people would not dare to culture bees for fear that these would harm them".

"Most of the larger bee projects that availed of our bees have retained me as apiculture consultant on a contractual basis. Proponents of newly-started bee projects and hobby beekeepers frequently visit us at Ilog Maria and we freely share our experience and technical advice with them.

"Beekeeping is a sustainable rural livelihood program. It does not require one to own land to keep bees; it is not gender nor age-specific; it requires minimal investment.

"Beekeeping also serves as an integration tool in development programs". It promotes health. Regular household use of bee products results in healthier families. It is eco-friendly. Bees depend entirely on flowers. Beekeepers are highly motivated to protect existing vegetation, plant additional bee forage, and increase plant diversity. They are also highly motivated to preserve the environment. Pesticides decimate apiaries. Air and water pollution is detrimental to bee culture. On the other hand, bee pollination increases yield of agricultural crops, and is essential in seed production operation. It aids in forest self-propagation.

Producing, harvesting, processing, and selling beehive products offer many opportunities wherein parents and children can share wholesome and productive activities. Families who keep bees are highly motivated to integrate and balance their ecosystem. Planting bee forage for human food integrates the biosystem and becomes the life of the family.

Other Services

Ilog Maria conducts regular seminars on beekeeping, as well as upon special arrangement.

The Magsaysays encourage group field trips to their apiaries. But a two weeks advance notice is requested to make the necessary preparations.

If you are interested to know or consider going into apiculture, you are very welcome to visit Ilog Maria. You just need to inform the Magsaysays at least a week in advance so that they could be there to receive you. All you have to do is write your intention and proposed date of visit. Address your letter to:

Joel Magsaysay
P.O. Box #01
4118 Silang, Cavite

Ilog Maria's Thrust for the Future

Ilog Maria Bee Farms is a success story. The Magsaysay family however, knows that more can be done.

Joel declares, "we want to develop our marketing. Ilog Maria has not experienced bringing its bee products to supermarkets or other store outlets. We are directly selling. Our customers usually want to go directly to the farm. They want to make sure that what they get really comes from our quality bee products. And all our products are easily bought. There is always an increasing demand for our products."

"Well, this is good. What I mean by developing our marketing, is producing what is called brand equity. An ownership of a brand that could be handed down to our children and future grandchildren. This will be our thrust towards the year 2000".

"We want to attain this by maintaining fair price, excellent packaging, and maintaining best quality products".

3.1.24 Producing Prime Quality Beef: How Music Creates a Difference

The Aranez Agri-Food Corporation has an unusual story to tell about how they produce prime quality beef.

The Aranez Agri-Food Corp., the brainchild of Mr. German "Jerry" Aranez, is serving an increasing number of clients who trek daily to its five outlets located in Quezon City, Makati, and Las Pinas. Its prime quality beef is directly produced from its 15-hectare cattle fattening farm in Sitio Hanopon, Brgy. Santor, Tanauan, Batangas.

Mr. Aranez or Mang Jerry personally manages the cattle fattening farm in Batangas with a modest number of workers including a veterinarian. Like any cattle raiser, he feeds the cows, cleans their stalls, and makes sure they are healthy. But unlike any other conventional cattle raiser, Mang Jerry plays music to his cows. Yes, music -- not the loud rock and roll type but classical, sweet or slow music. Fattened cattle at the Aranez farm enjoy good music while munching their fodder and feed concentrates. A global traveller in quest of practical knowledge, Mang Jerry learned in US the beneficial effects of music on cattle. He observed that music was being played to condition and calm down cattle. The soothing effects of music played just before a cow is slaughtered prevent its meat from hardening and ensure tender meat.

Just How Did the Aranez Food Venture Start?

Mang Jerry's interest in tending to livestock began at an early age. He experienced tending a large livestock farm during the war. His father was a horse breeder. In 1956, he was brought to Japan by a family friend and there, he learned the art of fattening cows.

Back in the Philippines not long after, he ventured in a logging business for plywood and other wood products. After 33 years as a timber man, he was forced to look for other means of livelihood when the NPA burned down their $3 million worth of equipment in Samar.

Instead of wallowing in self-pity, he chose to keep his mind on the future and to look for other business opportunities. He had observed the great potential and steady demand for food and he was convinced of the enormous possibilities in the food industry. Soon, he made his entry by going into cattle raising.

The family's cattle fattening venture began modestly - just 3 cows worth P2,700 each. They admitted that lots of knowledge about the enterprise still have to be learned. In seeking for more knowledge, Mang Jerry listened to advice from other cattle raisers. He experimented and tried new techniques. Not satisfied with the taste of the beef being sold in the country, he continued to study cattle fattening techniques elsewhere.

His openness to new ideas, advices and experimentation started to pay off. The venture started to rake in profit as more people began to like the taste of his beef. Thus, he was able to increase the number of his cows from three to 50.

As the venture demanded for a bigger place and volume, Mang Jerry started to set up the feedlot facilities in a 15-hectare farm in 1986 via a P2.5 million loan from the government's Technology and Livelihood Resource Center.

The cattle shed constructed was patterned after the Japanese cattle houses in Kobe, Japan. It is structured in such a way that the cows are completely out of sun's rays throughout the day. Its flooring is "layered" with sawdust which, when combined with the cattle's urine and solid waste, could be fermented into organic fertilizer. The accumulated organic fertilizer is used in their farm to grow corn, sorghum, and legumes for feeds. Cattle fattened with feeds grown from plants fertilized by the cattle's own organic wastes is said to produce high quality beef. The feedlot farm was set up in such a way that it will require little labor for cut-and-carry feeding. Furthermore, he installed piped-in music for his cows to hear while savouring their feed.

The business continued to grow. Mang Jerry put up new farm structures and bought new equipment. He began to import increasing number of cattle from Australia. He also engaged in contract growing of corn for silage. With the increase in the number of cattle, the business included setting up meat shops in Metro Manila.

Mang Jerry employed unconventional methods in taking care of his cows. Aside from playing classical or sweet music to his cows, he adapted techniques he picked up from other cattle raisers here and abroad, particularly in Japan, Australia, and the US.

For instance, he has his cows massaged to make them more comfortable. "This would make them concentrate on eating while being less affected by outside disturbances." He employs feeding techniques which would prevent indigestion or bleat, which can be fatal for cows, by giving roughage or fresh grass first before feeding them with concentrates made from agricultural wastes. He also adapted methods of preventing heat stress in cows. Aside from the Kobe-patterned cattle shed, the cattle are hosed with cold water before feeding to lower their body temperature.

Indeed, such techniques proved to be a great help to the venture as these hasten the cattle fattening process. Before, it took him four to six months to fatten a cow. The average daily weight gain then ranged only from 700 to 800 grams per head per day. By employing such techniques, fattening time was cut to half and the average daily weight gain ranged from 1.4 to 1.6 kgs per head per day.

Although Mang Jerry's cattle business has attained considerable progress, it is not without problems. One of these is the decline of the peso value against the strengthening US and Australian dollars. Due to this, a corresponding increase in feeding cost, aside from a rising cost in imported cattle stocks, reduces the earnings. In fact, had the venture remained in cattle fattening alone and had not expanded to other activities, it would probably have closed shop already.

But in business as in any endeavor, problems come and go. To make it in the cattle business, commitment and determination to pursue the vision one has set is important, as Mang Jerry's success story shows.

Indeed, the Aranez Agri-Food Corporation has come a long way since it started with only three cows. Mang Jerry remains determined to pursue his vision for the business to grow really big. Thus, he has plans to expand his feedlot capacity from 4,000 to 15,000 cows. More so, he wants to build a meat processing factory. With the unwavering commitment and the attitude of openness to new ideas, attaining such vision for the Aranez Agri-Food Corporation is just a matter of time.

3.1.25 CONDORA: SALT Model In the North

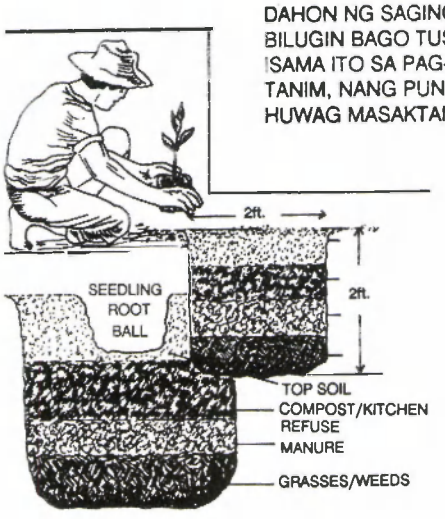
Mr. Basas demonstrating plant propagation technique.

The Center for Northern Luzon Development of Rurban Areas or CONDORA, is an arm of the United Church of Christ in the Philippines in the North Luzon Jurisdiction. It was established to promote the development of soil and soul for the well-being and transformation of society. Their main program is Sloping Agriculture Land Technology (SALT). The training program and demonstration farm is patterned after the Mindanao Baptist Rural Life Center, the pioneer of SALT in the Philippines. CONDORA, where one could have a breathtaking view of Lingayen Gulf, has very good facilities.

Farmers highly appreciate training in CONDORA because of the well maintained SALT and Agroforestry demonstration farm. The following techniques are also promoted:

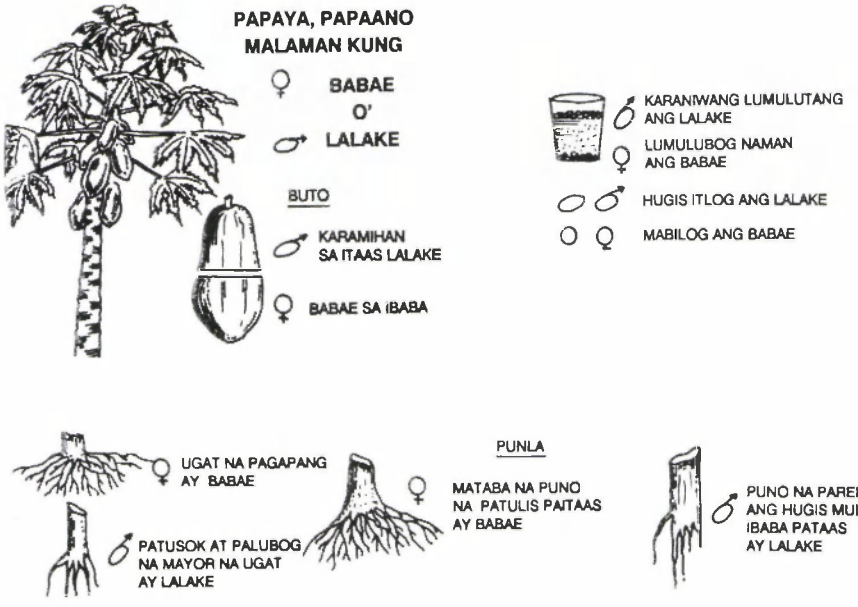
Tree Planting

Their method of preparing the soil in the planting hole results to high seedling survival rate and vigorous growth.



GIVE THE SEEDLING A HEADSTART BY PROVIDING
THE NECESSARY NUTRIENTS FROM THE VERY START.

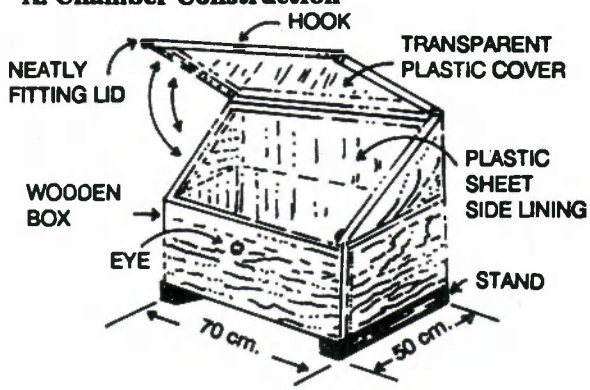
How to make sure that your papaya seedling is female?

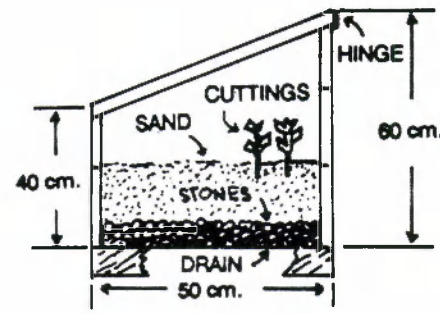


Propagating plants with the use of a propagation box for faster rooting and high survival rate of cuttings.

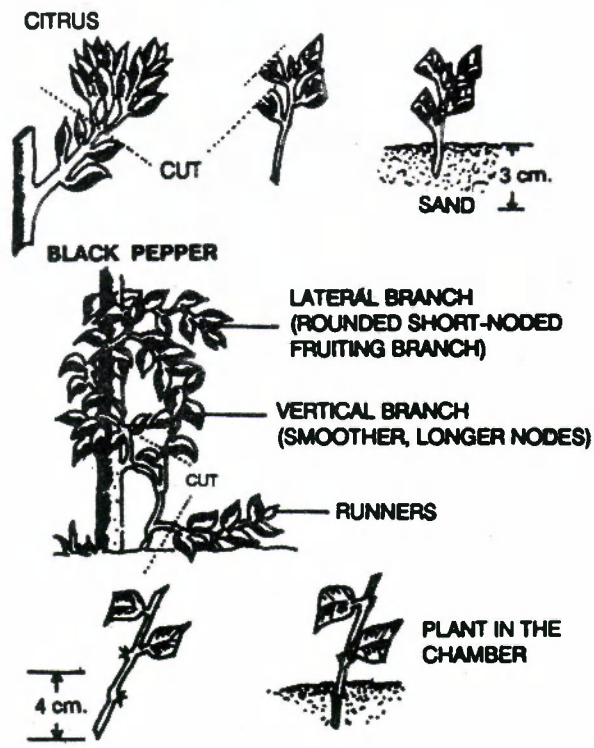
MAGPARAMI NG CUTTINGS SA PROPAGATION BOX/CHAMBER

A. Chamber Construction





B. Cutting Preparation



Jimbucide: a natural spray

Jimmy Basas, former farm supervisor of CONDORA, was instrumental in developing the SALT demonstration farm and training center. In his quest to produce crops free from pesticides, he developed a natural spray which proved to be effective. He called it Jimbucide.

I. INGREDIENTS

	ONE LOAD (Good for 1 Spray)	THIRTEEN LOADS (Good for 1 Hectare)
kakawate leaves (fresh)	1 kilo	
vinegar	1/2 kilo	1 lapad
egg/gawgaw	1/1 pc	4/2 pcs
powdered soap (small)	1 pack	4 packs
tobacco leaves (dried)	2 leaves	6 leaves
hot pepper (fresh fruit)	8 tbsp.	18 tbsp. (2 handful)
cooking oil	4 tbsp.	8 tbsp.

II. PROCEDURE

1. Pound fresh kakawate leaves/ small twigs (1 kg).
2. Add 2 gallons of water and soak overnight.
3. Strain the kakawate leaves.
4. Boil dried tobacco leaves, squeeze and strain.
5. Beat the eggs or gawgaw with little amount of water.
6. Pound fresh hot pepper with little water and strain.
7. Prepare powdered soap until it produces bubbles, place the material in can/kerosene.
8. Add another 2 gallons of water.
9. Spray as often as you need.

NOTE: Effectiveness of the mixture will last for 3 months if tightly closed or sealed.

III. MODE AND RATE OF APPLICATION

1. Spraying time is 5:30 - 8:00 a.m. and 4:30 - 6:00 p.m.
2. Spray properly and thorougly wet the plants.
3. Successive spray:
   a. 2 times application for a day in small scale areas.
   b. Large scale areas repeat spraying on the following day(s) right after the first spraying.

IV. CONTROL

1. Whorl maggots
2. Aphids and ants
3. Beetles / Bugs
4. Case worm
5. Beanfly

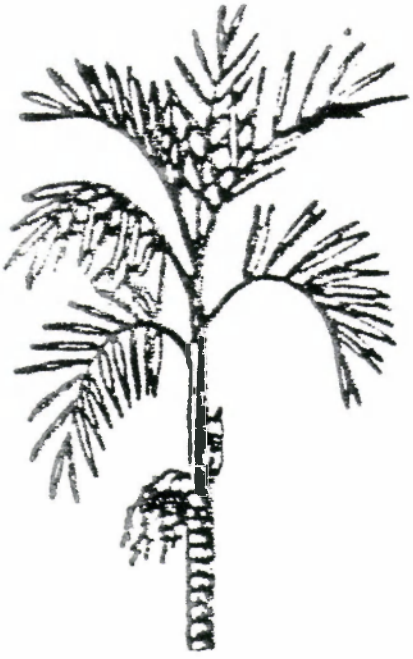
3.1.26 Betel Nut as Dewormer

Betel nut can be a livestock dewormer. It is particularly effective against tapeworms, roundworms and hookworms according to Agribusiness Magazine. First, dehusk and grind the dried betel nuts. Mix the powdered nuts with water, 8 cc of warm water for every 5 grams of ground nuts. Filter the solution through cheesecloth. Store in medicine bottles for future use.

Betel nut is also a popular dewormer among fightingcock afficionados. One-fourth of the young betel nut fruit is given to each rooster. To increase its efficacy, the chickens are not fed for a day before the betel nut is administered.

Mr. Ed Guevara, an organic farmer from Bayambang, Pangasinan, also uses betel nut tea to cure amoebiasis.

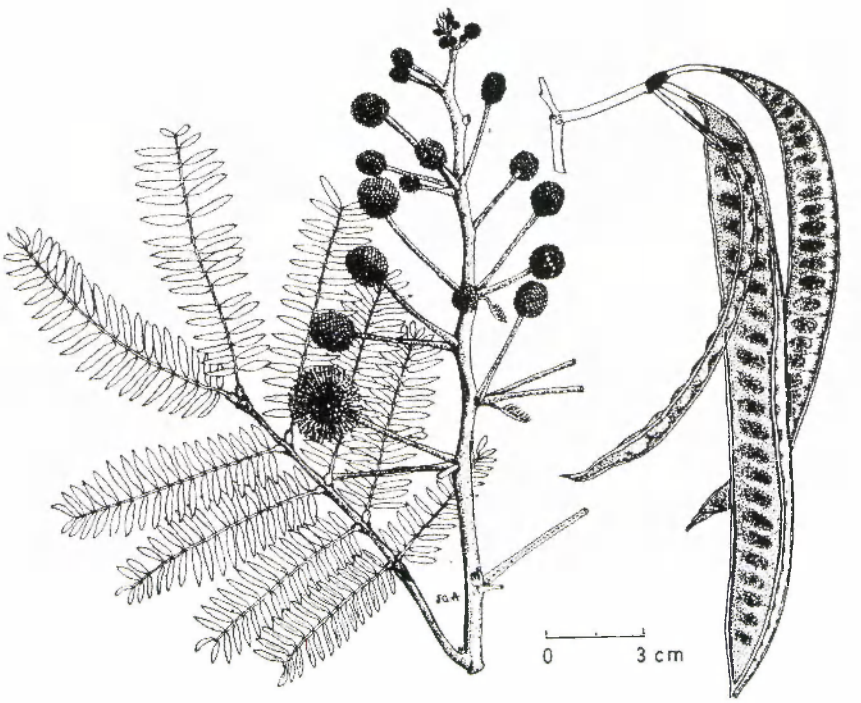
The main component of betel nut are tannin and fat and alkaloids which are responsible for the strong purgative and vermifungal effect of the nut.



3.1.27 Ipil-Ipil Seed as Dewormer for Goats

Ipil-ipil (Leucaena leucocephala) has many uses like source of wood, forage and animal feed, for reforestation and erosion control, as windbreaks, fertilizer and agroforestry. Other uses include food and beverage, dye, seedcraft, ornamental plant and medicine.

Some small goat raisers discovered that feeding young seeds of ipil-ipil to goats is an excellent dewormer. About 50-100 young seeds are removed from the pods and are pounded to form a paste. This is mixed with 5-8 ounces of water and given to the goat as an oral drench. The effect of the concentrated mixture is laxative and can kill or expel ascaris.



Source: Sustainable Agriculture Newsletter, Vol. 3, No. 1, Nov. 1991

3.1.28 Cocowater Good for Keeping Sitao Fresh

Stringbean or pole sitao (Vigna sesquidalis), is highly perishable and can be stored for only one or two days under ordinary room conditions. Reseachers have found out that sitao pods dipped in coconut water stayed up fresh up to the fourth day of storage. They are more acceptable than those dipped in tap water.

The process can also delay the yellowing of pods. This is because coconut water contains cytokinin - like substances that can delay protein breakdown, slowing down the yellowing and senescence of detached plant organs like leaves and fruits. Water from mature coconut can help retain more of the green color of sitao pods than water from young coconut.

The post-harvest dipping method is as follows:

a. Collect the water from mature coconuts in any suitable container.

b. Dip the sitao pods in coconut water for one minute.

c. Afterwards, remove the excess water and air dry.

Source: Agriscope, Vol. 2, p.7

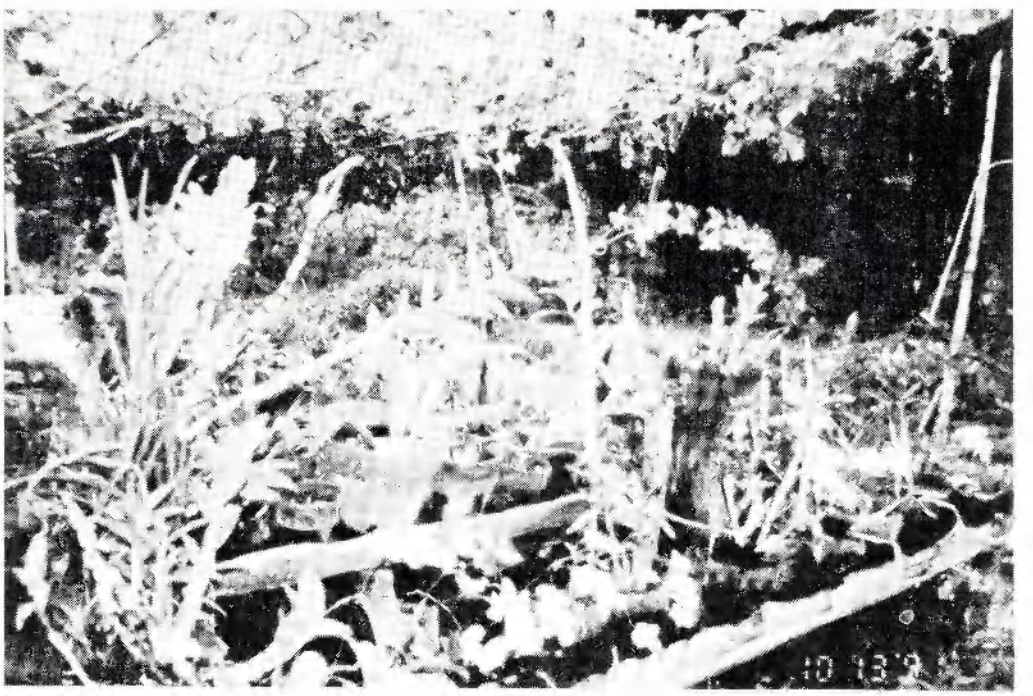
3.1.29 Pig Manure for Orchids

Remy Rodis of Paradise Orchids, tried pig manure as an organic fertilizer to her orchids. Pig manure contain nitrogen, potassium, phosphorus and even some micronutrients or trace elements such as boron, manganese, copper, zinc, molybdenum and cobalt.

Pig manure can be used either in the form of paste liquid. It is also important to sundry it to remove the foul odor and to get rid of other organisms or pathogens that may be present and could be harmful to the plants later on.

To prepare manure paste, fill half of the pail or any other container with sundried pig manure and then fill it up with water. Keep the manure soaked for at least 2 days. When the manure expands and becomes somewhat sticky, it is ready for application. The soaked manure is applied around the base of the plants. The effect could be seen in more and bigger shiny roots coming out. The leaves are also greener in color.

Source: Agribusiness Weekly Magazine, June 9 - 16, 1990



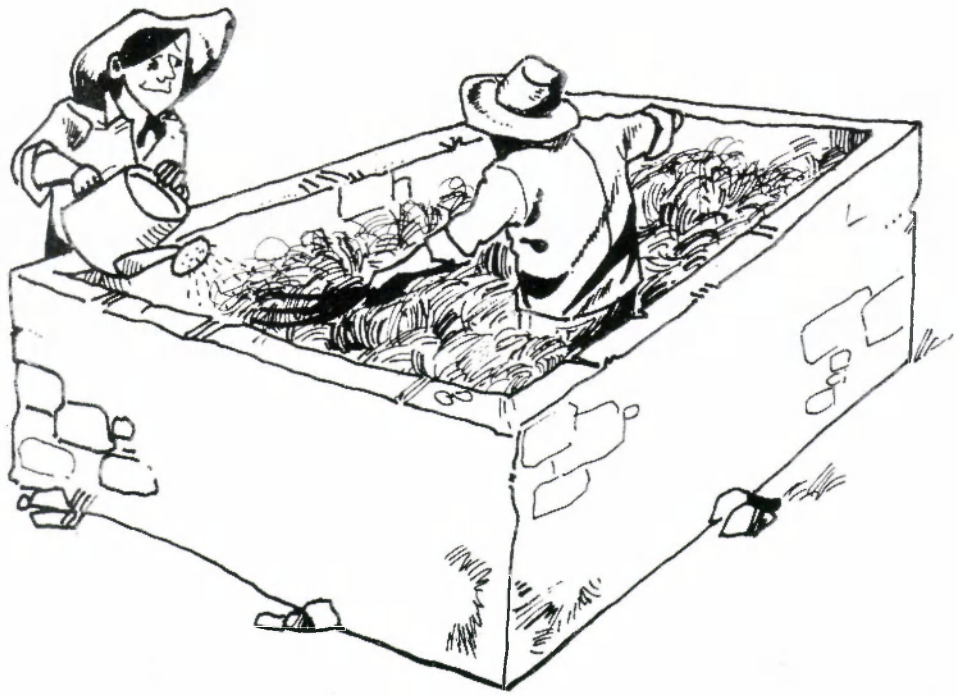
3.1.30 Silage Good As Ever After Almost Two Years

Patrick Pineda of Pioneer Overseas Corp., utilizes a plastic drum in making silage out of sugarcane tops. Under farm situations, it would be more advisable to use a trench dug in the ground, or utilize empty concrete hog houses.

According to Patrick, silage-making is the answer to the problem of cattle feed shortage. The country is in short supply of cattle because of feed problem, especially during the summer months. Backyard farmers can only take care of one or two heads of cattle because they do not have enough forage to feed the animals during summer months. If only the farmers are assured of enough feed that is cheap and readily available on the farm, they would certainly take care of two or more heads in their backyards.

Patrick pointed out that even only two hectares could be very sufficient to grow 40 heads if animals are confined and given silage as the main feed.

Source: Agribusiness Weekly Magazine, April 1 - 15, 1991, page 2



Source: Low-External Input Rice Production (LIRP): A Technology Information Kit (IIRR)

3.1.31 Forced Feeding Technology for Cattle Fattening

Forced feeding is a common practice in Batangas. It is used in fattening cattle in confinement for a shorter period of time. Known as the "sumpak" method, it is done 60-90 days before livestock is to be sold. The feed composition makes for rapid increase in body weight and also improve meat quality.

Steps in Preparing the Feed Mixture:

1. Chop about 20 kg. of Ipil-ipil leaves. Remove the midribs.

2. Pound the leaves with mortar and pestle and place it in a mixing container.

3. Add 1-2 kg. of fine rice bran, 15-19 liters of water and a handful of salt. Mix the ingredients thoroughly.

The mixture is fed to the cattle using a bamboo tube once or twice daily. Water is provided at all times. Later, when the animal is used to the feed mixture, it eats from a pail.

Cattle with a poor appetite is also forced fed regularly in addition to being provided with fodder.

Any of the following mixture can be divided into two and be given to animals twice a day.

* Pounded ipil-ipil leaves (15-20 kg) + water (15 liters) + salt (.1 kg)
* Finely chopped gabi tuber (15-20 kg) + water (15) + salt (.1kg)
* Rice bran (2-3 kg) + water (15 liters) + salt (.1 kg)

Important Reminder:
Raise the cows head to be level with its back.

3.1.32 Envisioning the Future of a Farm

Mr. Crispin Lucas is a farmer from Naguey, Atok, Benguet. Naguey is a very scenic place that can be reached through a winding road that descends from the Halsema highway near Km. 32. It is the head water source of the Amburayan.River. It is one of the remaining more extensive rice terraces in Benguet.

In 1994, Mang Crispin participated in a "Farm Planning and Design Course" conducted by Hil Padilla of AGTALON and John Button of Permaculture Institute Australia. The training was sponsored by Plan International-Baguio.

Eco-Designing

During the training, Mang Crispin drafted an eco-design of his farm which was commented on by other farmer participants. During that time, his hilly lot was barren. The main land use system was grazing. His land was overgrazed and had very low carrying capacity. He planted napier grass along the river bed which serves as food source for the cows during summer when forage is very scarce.

He identified the following as his target farm components; pigs, native chicken, goats, cattle, agroforestry area, forage garden, fishpond, rice paddy, and temperate vegetable production. He then analyzed how these different farm components relate to each other. He saw how the by-product of one component can become an input to the other components. One component will at least have 3 functions. Goats for example, consume the fodder grown at the edge of the ravine and the corn stubbles of green corn. In return, provide manure for the vegetable crops. They are also valued as ritual animals and a source of cash. Then he layouted the different components in the farm taking into consideration the topography, the irrigation system, and the physical movements within the farm to achieve a more efficient time management.

Irrigation

The main problem was irrigation. On the other side of the river, irrigation water could be tapped from a stream. But the problem was how to get the water across the deep river ravine which is around 60 meters deep and 70 meters wide.

They constructed 2 pylons on each side of the ravine. Then they hang a cable. On the cable the 3-inch G.I. pipe was tied. It was Mang Crispin, the Baranggay Captain then who personally climbed up the cable and tied the pipe. He was likened to an Inca constructing the hanging rope bridges of South America. It was an incredible feat. With the flowing irrigation water, the community members were able to open up around 9 hectares of new ricefields on the other side of the river. This included Mang Crispin's 1 hectare portion of land on the foot of the mountain. The cost of materials for the irrigation was financed by Plan International-Baguio. The labor was the counterpart of the community.

Integrated Farm

Slowly, Mang Crispin implemented his farm plan. He started with the agroforestry component where he planted timber and fruit trees on the mountain side which used to be a pasture land. Unfortunately, only the ones at the foot of the mountain survived. The uncontrollable forest fires destroyed his 2-year old trees.

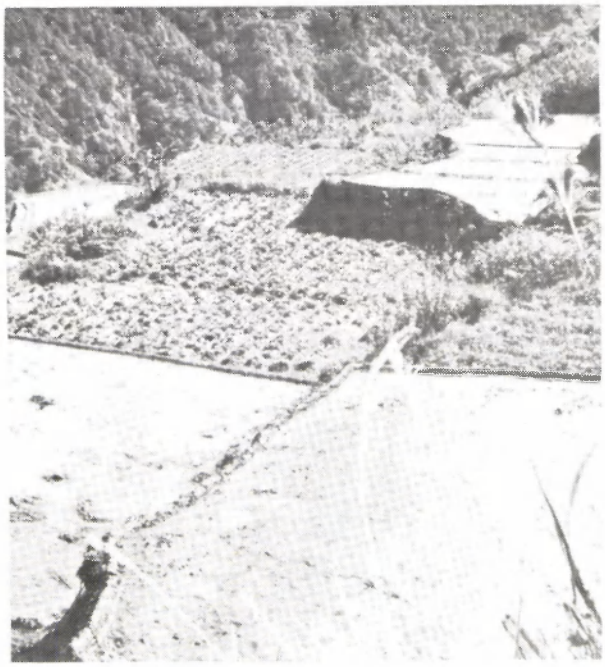
On the side of the ravine he planted nitrogen-fixing trees as supplemental forage source for his goats and occasionally for his cattle.

With very high labor input, he constructed his rice terraces. Then he dug his fishpond. He now raises tilapia and azolla. The azolla also serves as feed for his pigs, chickens and ducks.

The temperate vegetables which Benguet is noted for is now providing good income. He incurs minimal expenses since he uses a lot of animal manure from his livestock. He has all sorts of crops which are planted in rotation throughout the year. With the different kinds of crops, they barely buy food for household consumption.

The Value of Eco-Design and Farm Planning

Mang Crispin said that with the farm plan, he was able to foresee how his farm will eventually look like. He claims, that without the farm plan, he may have been discouraged by the tremendous obstacles that faced him and the community. It was the vision that fired up his spirits.



According to him, the farm plan also enabled him to look at his farm from afar and another angle like an outsider. Otherwise, he would have been caught in the daily bustle of farm activities and thus, lose the foresight to realize the synergy of the different components. Periodic review of the plan resulted to some minor changes like the placement of elements. But, basically, the concept of looking at the farm as an organism with different elements with symbiotic functions remained.

The plan also aided in the prioritization and planning of daily activities in the farm. The farm is now a sight to behold!

3.1.33 The Perfect Combination in Organic Rice Production

The author used to integrate ducks during rice production using matured ones. The ducks are introduced into the ricefield 3-4 weeks after transplanting, when the rice seedlings have established to avoid damage to the plants. He observed that weed control by the ducks was not that effective although it helped a lot in maintaining soil fertility and in controlling pest.

Integration of 3-Week Old Ducks

In one of the workshops he attended, he met the Japanese farmer, Furuno Takao. Furuno is famous for his duck-rice integration using the "Aigamo" breed of duck. He learned from Furuno that it is better to introduce the ducks at a very early stage. Japanese farmers who organized themselves into the Aigamo Association, introduce the 3-day old aigamo ducks right after transplanting. The author together with other farmers tried this technique using the native (itik) duck breed. They experienced a high duck mortality. The very young ducks could not withstand the cold water during rainy season. Hence, they now introduce 2-3 week old ducks 1-2 weeks after transplanting.

Effective Weed Control. They found out that when the ducks were introduced at an early stage, the emerging weeds were either eaten or uprooted. The weed seedlings float due to the soil puddling activity of the ducks. When the ducks are introduced at a later stage, weed control is not that effective because the weeds have already established their stronger root system.

Perfect Pest Control. When the field was used as a laboratory to monitor pest population, the farmers attending the Agtalon Farmer's Field School found out that the field which did not get the duck treatment had much more destructive insects and pest damage compared to the fields with ducks. They also tried to butcher some ducks to see their feeding behavior. They saw that the ducks ate more destructive insects than friendly ones.

No Need for Chemical Fertilizer. Integrating 200-250 heads of ducks in 1 hectare ricefield is enough. The yields are comparable to fields applied with 4-5 bags chemical fertilizer. The yields ranged from 90-110 cavans per hectare.

Puddling Effect. The Japanese experience showed that the part of the field fenced with G.I. sheets so that the ducks could not enter have fewer tillers and thinner hills compared to the part of the field where ducks wandered. It was observed that when the mud was puddled by the ducks, the fine clayey part of the soil which is nutrient rich settled at the top layer of the soil. Since the root system of the rice plant is fibrous, they got more nutrient as evidenced by the more robust and more extensive root system compared to the part of the field without ducks.

Oxygenation Effect. The puddling of the ducks oxygenate the soil. This simulates the effect of intermittent draining and flooding of the ricefield which results to a more robust crop growth. Many farmers do not want to periodically drain their fields to prevent the growth of weeds. But this results to thin rice stalks which render it susceptible to lodging. With the ducks, this is corrected while weeds are controlled.

Integration of Pigs

The author remembers the soil to be of very poor quality. It was very stony. So, He added a lot of compost. Then he integrated pigs following the style of the Mindanao Baptist Rural Life Center. He let the irrigation water pass through the pig pen before it goes into the settling pond, used by some ducks. The water from the pond then goes to the ricefield. This technique together with the duck integration technology resulted to a dramatic increase in rice yield without using any chemical inputs.

Economics of Integrating Ducks

As mentioned earlier, 200-250 ducks are introduced to 1 hectare of ricefield. If you get ducklings from balut makers, they cost P8.00 each which totals to P2,000/ha. If you get all the male ducklings from hatcheries, they cost P2.00 per head. To fence a 1 hectare ricefield 4 to 5 rolls (100 meters /roll) of net is needed. This costs P8,000 - P10,000. The nets have a life span of at least 2 years. So this has a depreciation cost of P5,000/year. The ducks need only supplemental feeding which may cost around P2,000 for the whole cropping season. After 3 months, the pullet ducks are sold at P60-75 per bird. With a survival rate of 85%, the cost of the pullet ducks is around P12,750. In one cropping the cost of investment before labor is more or less recouped.

Problems Encountered

The ducks should be taken out from the field at flowering stage. There is slight difficulty letting the ducks out. They will hide among the rice plants. However, this is not a problem if they are trained to go to one area for supplemental feeding during a definite time of the day. This area could be fenced off while they are being fed.

The second problem is during dry season when the irrigation water is not continuously flowing. The young ducks get scalded by the hot water in the ricefield due to intense sunlight. Introducing 1-month old ducks can be a solution.

Another problem concerns petty thieves. They will steal the ducks when they are old enough to be sold or eaten. On the other hand, farmers will be forced to construct a small hut in their fields and secure the ducks. However, this will lead to a more intense monitoring the rice crop.

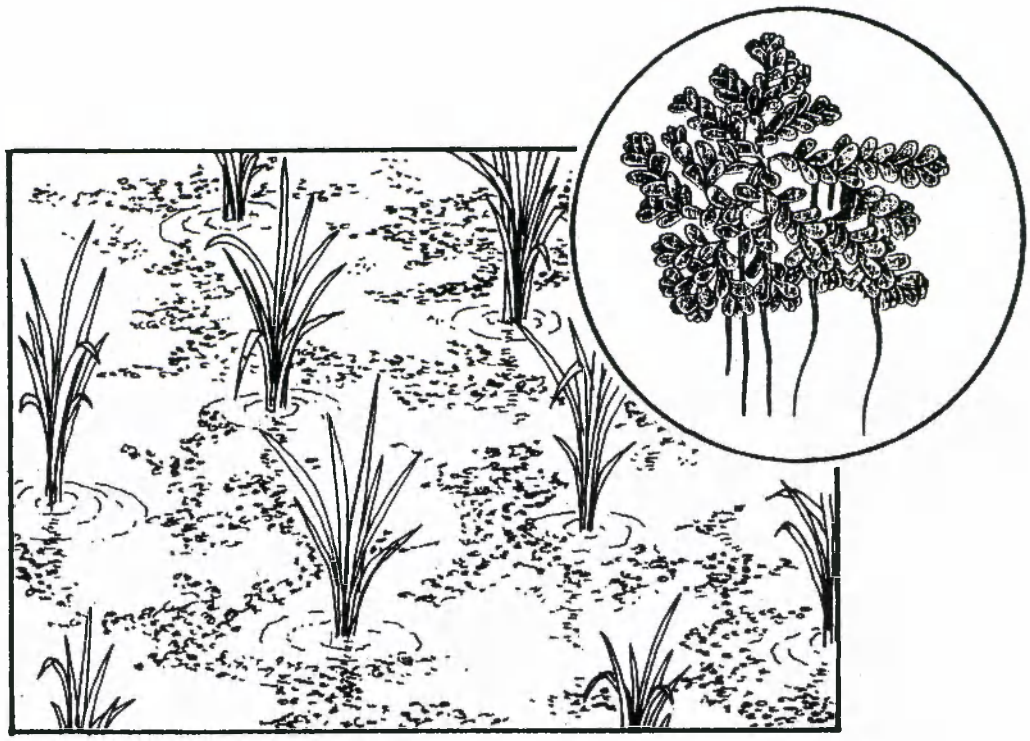
Ducks are indeed a perfect combination for the production of organic rice. The ducks work at least 14 hours per day.

3.1.34 German Brigola Uses Azolla as Tilapia Feeds

German Brigola, a 64 - year old farmer from Baao, Camarines Sur, used to feed fresh azolla to his tilapia.

Everyday he is hauling nearly 100 kg. of fresh azolla from his propagation pond to his fishponds. The tilapia consume more azolla than commercial feeds or other non-traditional fish feeds. Brigola had some interesting observations on the effect of azolla on fish. He noticed that tilapia fed with azolla were plump and heavy. The tilapia fetched a good price in the market.

Source: Azolla Notes, Vol. 5, Nos. 3 & 4, July - Sept., Oct. - Dec., 1988, pages 20 & 21.



Source: *Low-External Input Rice Production (LIRP): A Technology Information Kit (RBF/IRR)*

3.1.35 Preserving Tomatoes in Charcoal

Ka Boning Dizon, a farmer from Pakil, Laguna learned about this technique when he accidentally left some fresh green tomatoes inside a sack of charcoal in his dirty kitchen. Three months later, when he was cleaning the kitchen, he found out the tomatoes red - ripe and still fresh. He improved this technology by experimenting with storing tomatoes inside a basket. He made alternate layers with charcoal, then tomatoes, charcoal until the basket was almost filled. The last layer of tomatoes was covered with charcoal again. After nearly six months, the tomatoes were still good to eat.

Source: Organic Matters

Farmers in Laoac, Pangasinan preserve tomatoes in dry season when it is very cheap and sell during rainy season when tomatoes are very expensive. In Pangasinan, during the months of February - April, tomatoes cost P 3 - 5 per kilogram. In July - August, it will range from P20 - 30 per kilogram.

What the farmers in Laoac do is to harvest half ripe (about to ripe) tomatoes, tie the petiole of the fruit together becoming like a bunch of grape and hang it in the ceiling or below their elevated houses.

3.1.36 Pablo Abocado: A Farmer-Trainor

The name is sure to ring a bell - Pablo Abocado. This is why people easily remember the former OCW, who after only 5 years, has built a name in the local scene of alternative farming. Unlike the seasonal fruit, Mang Pablo is available whole year round to visitors who would like to learn the rudiments of integrated pest and nutrient management. As President of the Pangasinan KASAKALIKASAN Farmers Federation (aside from being a Municipal Agricultural Fisheries Council or MAFC Chairman of Urdaneta), he spends his time training other farmers in his locality and wherever his services are needed. But this does not keep him from pursuing his trials and experimentations in his 3-hectare farm in Nancamaliran East, Urdaneta, Pangasinan. What does it take to become all these?

Integrated Farm

An electrician by profession, Mang Pablo decided to go into farming six years ago when he was 59 years old. He was a very receptive beginner who attended a series of trainings on farming in order to learn his new craft. Learn it, he did. He has now set up an integrated farm where his family can get their daily food subsistence - rice as staple, root crops, tomatoes, stringbeans, gourds, eggplants, cucurbits and other vegetables (some native while others are exotic - sourced from other countries), fruits like bananas, guavas, mangoes, pineapples, sour sop and of course, avocados. He even grows his own tilapias and takes care of coconut seedlings for dispersal to farmer recipients. One thing that often catches his visitors' attention is the way trees around his farm are growing in a somewhat 'bonsai' or miniature way but, unusually big for its age. He attributes this to the tip-pruning technique he applies on his trees at seedling stage. His openness to try, observe the effects, and learn from his experiences, have earned him a nomination for the Most Outstanding Farmer of Pangasinan for 1998. The number of visitors to his farm has reached almost 200 since 1995, when his work started to be noticed.

Control Method for Golden Snail

Mang Pablo also developed a very ingenious way of controlling golden snails. He makes a small canal around his rice paddy. When the field is drained, all the golden snails naturally go to the canal where there is water. He then feeds the snails with rice hull which has a choking effect. The rice hull is so abrasive that it will get stuck in the throat of the snails.

A Trainor - Innovator

During the first seasons of growing rice, Mang Pablo's use of chemical pesticides accounted for about 5% of his total expenses. Just like other farmers, he would spray up to three times within the four to five months cropping period which yielded him about 85 cavans rice per hectare. He then tried pesticide-free rice farming and the use of organic fertilizer in the 2nd cropping season of 1993 and to his surprise, got 110 cav/ha. This experience was even surpassed the next season when his yield increased to 124 cavans, earning for him more while saving on the cost of pesticides. This experience, coupled with the positive results he generated on organic fertilization trials, made his resolve to go more organic. Instead of chemical pesticides, he uses a bio-spray from the 300 neem trees growing on his farm. He soaks pounded neem leaves overnight in water. He then filters the resulting tea and mixes this with 1 tablespoon of powdered detergent inside a sprayer. But he does this only when he sees the need which very seldom happens. Very recently, he had a successful rice-fish production which according to him is the most natural and pest-free way of growing rice. He also practiced ratooning of rice which is a way of optimizing yield while reducing the expenses to a minimum. Before adopting the technique, he participated in an on-farm trial conducted with other farmers where they saw the benefits of rice ratooning.

Mang Pablo has been very active in the Dept. of Agriculture's KASAKALIKASAN Programme where he is now a farmer-trainor. He is also an organic rice producer of Agtalon where he actively recruits for its organic rice program from areas where his work takes him.

He sells part of his organic rice produce directly to selected local consumers. His unrelenting stand on preserving mother nature has made him generous in sharing his ideas and experiences with others. What keeps him always fired up is the thought that all his efforts are now bearing fruits like what his name connotes.

3.1.37 Asparagus Sent His Children to College

REGALADO B. MANIMTIM used to be a salesman of farm chemicals for a foreign company. When he retired in 1984, he decided to go into hobby farming in Tagaytay City.

He had some coffee but that did not give him much income. That time, coffee prices had gone down below production cost. So he did not pay much attention to coffee. Instead, he cleared 1,000 square meters and decided to grow asparagus starting 1985.

That 1,000 square meters of asparagus has been his savior. Up to this day, the asparagus patch is productive, and he credits the college education of two of his children to his income from asparagus.

From that little patch, he estimates he grosses at least P120,000 a year. And the expense is very minimal. He himself and his wife did most of the work until last year when he got a boy to help on the farm. That was because a consulting firm has hired him for a big asparagus production project in Central Luzon.

When he started his asparagus project in Tagaytay, the neighboring farmers were skeptical about his venture. He was the first to undertake asparagus growing in the area and they doubted if the new crop will turn out to be profitable.

What he did was to prepare his land thoroughly. He plowed it deep and incorporated a lot of rice hull before planting to make the soil porous and easily drained. He also applied a lot of animal manure to make the soil richer and more favorable for plant growth. Two times a year, he applies four bags of complete fertilizer to supplement the manure. This is at the beginning of the rainy season in June and before the rains stop in December.

There's also one secret he does to make his plants very robust and productive. He calls it "suwero" or "intravenous" but it is actually manure tea.

He constructed a cement tank measuring three meters long, one meter wide and one meter deep. He fills one foot of the tank with carabao manure and then fills the whole tank with water. Every week, for one month, he stirs the mixture. In one month the mixture is ready for application.

He gets a liter of the manure tea and mixes it with a gallon of water. Then he uses this to water the asparagus plants every week. It is very potent, he said.

Asparagus is one crop that is productive for a long time.

No daily watering of the asparagus plants is necessary because he uses a lot of coffee hull as mulch. Since he started his asparagus garden, he estimates he must have applied no less than 2,000 sacks of old coffee hull which he gets for free from his neighbors.

The coffee hull spread on the asparagus plots about four inches thick conserves the moisture in the soil and at the same time prevents the growth of weeds.

Most of the work done in the asparagus project is the harvesting of the spears everyday. He gets about three kilos worth P300 retailed to celebrity customers, including a popular movie actress who is very fond of asparagus.

Aside from making money from the spears, he also derives income from selling seeds for planting. Other growers pay P50 for 600 seeds.

In the new project in Central Luzon, he expects many farmers to benefit from asparagus growing. The consulting company that hired him is coordinating the commercial production of asparagus in Magalang, Arayat, Floridablanca and Sta. Rita in Pampanga. Over 150 hectares are scheduled to be planted by cooperating farmers whose production would be absorbed by a canning plant to be established by an investor in Bulacan.

The canning factory will buy all the production of the farmers at P23 per kilo, according to Manimtim. The production will be mostly for export.

Manimtim said that harvesting starts in eight to 12 months from planting. From that time on, the plants will be productive for as long as 20 to 30 years.

Reprinted from

Successful Agri-People (II)
by Zac Zanan P80-83

3.1.38 Unusual Farming Practices

The Agroforestry Seeds Circular has one article on unusual farming practices. They included them as readers might be able to develop better or more acceptable techniques out of these indigenous practices.

Piercing of Papaya Trees

This is a practice of one farmer in Bulacan by the name of Mang Galo. When papaya plants are 1.5-2 meters tall, the trunk near the base is pierced through vertically with a double-edged bolo, creating a vertical cut of approximately 1 foot through the trunk. He claims that this practice strengthens the plant roots and becomes sturdier against typhoons.

When the papaya plant has become less productive it is usually ratooned to induce regrowth. The trees are cut down to approximately 2 feet above the ground. One foot above the area where the papaya was pierced. This ratooned plant is said to produce sturdier sprout and bear more uniform fruit compared to the ratoons which did not undergo piercing. Ratooned plants bear fruit earlier and produce more female flowers than those started from seedlings.

Gliricidia Leaves as Fertilizer for Rice

The Aetas use fresh Gliricidia sepium (madre de cacao or kakawate) leaves to alleviate nitrogen deficiency of rice seedlings in seedbeds. One or two applications of leaves at weekly intervals from the first sign of deficiency is sufficient to correct the problem.

They scatter 500 kg. of leaves throughout a one hectare field after transplanting rice to control a number of pest. Another 250 kg. are added weekly thereafter for four weeks to control golden snail, leaf folders, whorl maggots and brown planthoppers. On the fifth week, they add another 150 kg. to deter rice bugs. Its a lot of green manure.

Sesame as Pest Repellant

Aetas plant sesame or linga (*Sesanum indicum)* on the perimeter of their fields as insect repellant. They also claim that carabaos and other animals are also deterred from entering the fields.

Moringa and Tobacco Against Golden Snails

Some farmers use pounded malunggay (*Moringa olifera*) and tobacco to control golden snails, a serious rice pest. It was also reported that pili nut latex, palo china wood (*Veitcha merillii*) and amamaho tree are effective pest repellants. Amamaho trees are used by Mindoro farmers as markers in their fields.

Rice Bugs Against Rice Bugs

Mindoro farmers control rice bug infestations by collecting the rice bugs, grinding them and spreading the powdered bugs in the field. Spray from the bugs is also reportedly used by other Filipino farmers. There are some indications that the repellant factor could be the smell of the bugs which the bug themselves do not like.

Rats Against Rats

An effective method of rat control used by some farmers in different parts of the Philippines is to catch a number of rats, sew their anus and release them. The rats could not defecate, run amok and kill the other rats. It is also believed that the rat would be in agony that it would emit sounds that would scare other rats away. Instead of sewing the anus, some farmers feed them with rice mixed with cement powder. This will harden in the rat's stomach creating the same effect.

Snake Oil Against Rats

The Aeta tribal people use snake oil to drive away rats. The snake oil extracted from a dead snake is put in containers and hung around the field. The smell is claimed to scare the rats away.

Monkeys to Control Monkeys

In areas like Mindoro where monkeys still abound and are considered pest, ingenious ways have been found to keep them away from cropped fields. One way is dressing a captured monkey in red clothes. Monkeys apparently dislike the red color. They claim that monkeys associate it with blood. This will scare the other monkeys away.

Another way is to catch the monkey and tie a can which contains stones. The noise made as the monkey moves around irritates the other monkeys and discourages them from visiting the fields.

Source:
Agroforestry Seeds Circular
March 1993

3 Farmer - Proven Ecological Farming Techniques

3.2 Visayas and Mindanao Practitioners

3.2.1 The Integrated and Organic Approach to Farming: The Fantilanan Model

Mr. Mamerto Fantilanan is multi-awarded farmer from Angub, Cuartero, Capiz in Panay island.

Mr. Fantilanan clearly stated his goals when he developed his farm;

1) to maximize land use
2) to increase income from a limited area
3) to make products safe for human consumption
4) to return nutrients taken out from the soil
5) to make farming sustainable.

With one half hectare farm and banking on family labor, he was able to attain these goals. The keys, he says, are discipline, determination and systematized marketing. In order for a farmer to maximize profit, the farmer should think of ways how to add value to his product. To elucidate, instead of selling mere eggs, Mr. Fantilanan hatched the eggs into 1 day-old ducklings which are more expensive.

Bi-weekly Planting and Harvesting

Mr. Fantilanan plants and harvests rice every other week. In this way rice is available throughout the year. Labor requirement is also evenly distributed. During typhoons, not all the crops are damaged since the rice are in different stages of growth. Most often, he sells his rice as seeds whose price is higher and buy rice from the market for his home consumption.

A unique feature of his farm is the cropping strip technique where rice plants are spaced at 70cm. between four rows with 10 x 10 cm. spacing in between hills. Under this system, plant density is higher than the conventional 20 x 20 cm. In a 20 x 20 cm planting distance, plant density is 250,000 hills per hectare. In Mr. Fantilanan's system, there are 392,040 hills. The wide spacing in between rows is also claimed to reduce pest problems and increase solar radiation efficiency in between rows. The planting distance employed is one factor identified that contributed to high yields.

He plants high yielding rice varieties. He tried traditional varieties but their yields are lower. He uses the "dapog" system of seedling preparation. They are transplanted at 3-leaf stage.

Composting Method

Rice straw obtained after harvest is used as compost. It is placed as litter in the duck house. When they are covered with droppings and compacted by the ducks, another layer is placed on top of the previous layer. If compost is needed, the topmost layers are rolled and compost is collected from the decomposed bottom layers.

Fertilization

Compost is applied before planting. Sludge from the biogas digester is applied every week. Fertilizer application takes about 1 1/2 hours per paddy (500 square meters). About 10 cans (16 liters per can) are applied between each strip which contains 4 rows. One hundred forty cans of sludge are applied for every parcel. Azolla is also periodically incorporated in the soil.

According to Mr. Fantilanan, when chemical fertilizers are used, plants become attractive to pests. As a result, farmers are inclined to use pesticides.

Pest Management

Due to continuous submergence of the paddies and cover provided by azolla, the growth of weeds is prevented. Therefore, the paddies do not need weeding.

Golden snail is not considered a pest. He uses it as an ingredient in the duck feed ration. They attack azolla first before they attack the rice plant.

Rats are controlled with Racumin, a rodenticide. Baiting stations are made of bamboo tubes.

Insect pests are not a problem. He attributes this to balanced nutrition as a result of compost application and balance ecology in the rice paddies.

Azolla Culture

Fresh azolla is used as fertilizer in rice and vegetables. It also constitutes 70-80% of pig feed and around 50% of duck feed.

Azolla doubles its weight in 3-5 days. Sludge taken from the biogas digester is mixed with 5 parts of azolla to make azolla-based compost. He harvests 20 kerosene cans of azolla daily. Twenty five to 30 percent are harvested daily leaving the 70% to multiply further. He sells azolla at P50 per sack. He is the source of azolla for propagation in the province and other regions.

Gabi or Taro Production

According to Mr. Fantilanan, gabi is 4 times more profitable than rice. With planting distance of 50 cm., 40,00 plants could be planted in one hectare. Three-months old gabi is sold at P3.00. A six-month old gabi is sold at P5.00-P6.00. Gabi can also produce 30 suckers in one cropping season. He sells suckers at P0.25 each.

Vegetables

Vegetables are planted on the wide paddy dikes. Before planting, a trench is dug and then azolla and sludge is placed on it. The trench is then covered with soil and the vegetable seeds are planted on the soil. This is to prevent the vegetable seeds from rotting due to the decomposing azolla.

Plant Nursery

Seedlings for sale are black pepper, laurel, coffee, cacao, guapple, guyabano, atis, papaya and red palms. Potting medium is composed of 1/3 sludge, 1/3 top soil and 1/3 sand.

Piggery

Pigs include the Hyphor and Sheager breeds. Piglets are sold as breeders. They are more profitable than fatteners. Breeding is done by artificial insemination. He has 4 sows. They produce an average of 10 piglets per sow.

Feed formulation for piglets:

- 60 kg azolla meal (dried, grounded)
- 20 kg grounded palay
- 10 kg roasted, grounded soybean
- 5 kg snails
- 5 kg grated fresh coconut

This ration contains approximately 19 % crude protein.

Feed formulation for sows and boars:

- 60 kg fresh azolla
- 20 kg rice bran
- 10 kg grated fresh cocomeat
- 10 kg golden snail

This ration contains around 10% crude protein.

Ducks

Mr. Fantilanan has around 200 ducks. Eggs are sold at P3.00 each. Day-old ducklings are sold at P12 per head. One month old are sold at P30/head. Ready to lay ducks are sold at P80/head. He has 15 Muscovy ducks used as sitters in the natural incubation. Sixteen to 20 eggs are set per duck. With at least 10 ducks sitting, he could incubate 150 eggs. After hatching, it is replaced with another set of 16-20 eggs. He claims that Muscovy ducks could continually sit for 3 years after which they refuse to sit and becomes very fat. So, fat that one duck could produce 1 liter of oil.

The ducks are mainly fed with azolla, ricebran and golden snail. Golden snail is bought from other farms at P60/sack since the production in the farm is not enough. He also raises a few chickens for home consumption.

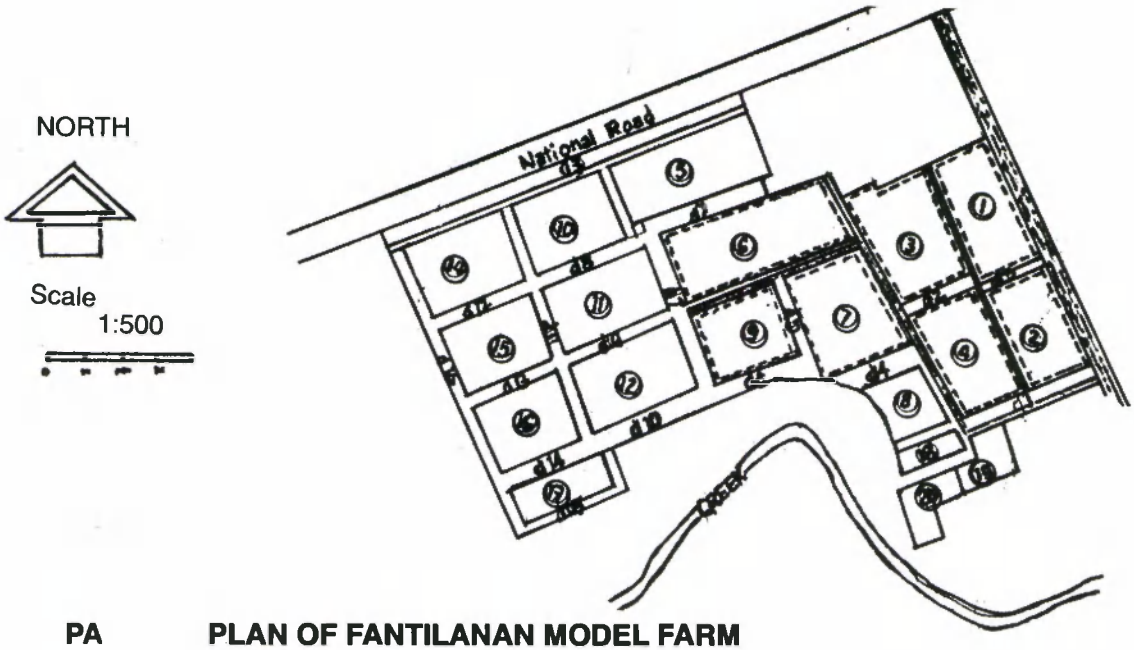
Fish Pond

He raises tilapia, clams and azolla in his fishpond and also in his ricefields.

Biogas

Crop residues, pig manure and azolla are the raw materials for the digester. It provides sludge for fertilizer and the methane gas generated provide fuel for cooking. He also use the gas for lighting during brownouts.

His biogas digester has a fixed dome type gas collector. It requires minimal stirring. It is of cylindrical shape and made of ferro-cement. It is set in an inclined position. The lower portion of the digester contains the sludge. The upper portion of the chamber contains the gas. The pressure created by the gas builds up thereby pushing the sludge into the outlet. The digester is half filled with sludge. Upon loading, the organic material is stirred first. When the wooden baffle found in the inlet is lifted, fresh organic matter is pushed down into the digester by force of gravity. This allows self-stirring and self-cleaning inside the digester. The digester was constructed by Mr. Fantilanan himself.



PA PLAN OF FANTILANAN MODEL FARM

LEGEND:

Parcel No.	Area sq. m.	Planted with	Dike No.	Planted with
①		90-week-old rice	d1	onion, ginger, chili
②	1351	2-week-old rice	d2	banana, papaya
③		4-week-old rice	d3	cassava
④	364	Azolla with fingerlings	d4	okra, eggplant
⑤	563	Newly prepared land	d5	Newly prepared land
⑥	372	Planted with 14-week-old rice	d6	coconut, eggplant
⑦	210	Kangkong, Golden apple snail pond, clam nursery	d7	mongo
⑧	262	Planted with 15-week-old rice	d8	soybeans
⑨	277	Azolla	d9	eggplant
⑩	307	Planted with 6-week-old rice	d10	soybeans
⑪	315	Azolla	d11	papaya
⑫	291	Golden apple snail pond	d12	bush sitao
⑬	257	Azolla	d13	(dried hay)
⑭	238	Azolla	d14	ipil-ipil, coffee
⑮	155	Clam reserve pond	d15	ipil-ipil, banana
⑯		Monggo, Sesbania, Soybeans, Papaya, Cassava		coconut, cacao
⑰	83	Duckery (Muscovy)		cassava, black pepper
⑱	75	Piggery	d16	ipil-ipil, coconut coffee, cacao
		Duckery (Layering) Cherry Valley Khaki Campbell Indian Runner	d17	kapok

Figure 26. Mr. Fantilanan's existing farm lay-out designed for bi-weekly planting and harvesting

Farm Economics

Farm Income summary of Mr. Fantilanans' 0.5 hectare farm from January to June 1990 as documented by the International Development Research Center.

Components	Gross Income (P)	Expenses (P)	Net Income (P)
Azolla	39,780	4,039	35,741
Rice	19,800	2,217.6	17,582.4
Gabi	18,465	1,320	17,145
Vegetables	11,255	3,580	7,675
Fish	210	30	180
Clam	3,720	510	340
Swine	16,000	6,170	9,830
Duck	12,415	6,270	6,145
Hatchery	13,990	2,480	11,510
Broiler	3,420	3,185	235
Integrated nursery	14,770	300	14,470
TOTAL	153,825	31,106.6	123,734.4

Farm Income per year: P247,468.80
Farm Income per month: P20,622.40
Farm Income per day: P678.00

Source: Sustainable Agriculture as Practiced by Farmers in the Philippines (Case Studies) by SIBAT National Secretariat

3.2.2 Goat Manure Tea Makes His Guavas Productive

Romulo Cruz of Compostela, Cebu, would rather plant guavas than mangoes.

In his rocky hill farm, he has planted over three hectares to some 3,000 guavas of the Bangkok variety. At the same time, he is also raising 50 Nubian goats that command a premium price because they are sold for breeding.

He makes money selling the purebred goats but even more important is that they provide all the manure that keeps his guava trees fruitful throughout the year.

He has a unique way of utilizing his goat manure as fertilizer. In the three hectares planted to guavas, he has constructed four concrete reservoirs where he stores the water for the daily watering of his trees.

Each reservoir measures 4 meters long, 3 meters wide and one meter tall. He fills each tank with water and then submerges four sacks of newly collected goat manure. The goat manure is ideal because it comes in pellet-like form and does not have a bad smell.

The manure transforms the water into a dark tea that is rich in nutrients. This is what he uses to water the trees everyday. It makes them very robust, hardy against diseases, very fruitful, and the fruits are sweet, crisp and with shiny skin. And that is the reason why he can sell his guavas at P22 per kilo right in Cebu. Which is virtually double the P10 - P12 per kilo that other growers get for their guavas.

Every two to three weeks, he takes out the manure in the tank and spreads it around his guava trees. Then he puts in another four sacks in the tank. Throughout the year, that is his way of fertilizing his trees.

He swears that his goat manure tea really works wonders for his trees. He has a number of neighbors who also planted guavas but many of their trees have already died because they don't water and fertilize them. His seven-year-old guava trees are still very robust and he believes they will continue to be productive for another five years or more.

He does not use any chemical fertilizer. He says that chemical fertilizer will not do his plants any good because of the rocky character of the farm. There's virtually no soil except in the one cubic meter that he dug for planting the trees which he filled up with topsoil and manure before planting his seedlings.

He raises his goats in complete confinement. He feeds them with concentrates and grass gathered from the orchard.

The combination of guavas and goats is really excellent, he says. That is why he plans to relocate in Bukidnon so he could undertake his goat and guava project on a larger scale. He has already bought a 17-hectare farm there.

Cruz is also busy as an area coordinator of the USAID's Agribusiness System Assistance Program. He goes around the country attending to various assignments but he does not have to worry about his farm because his daughter Eloisa, an agriculture graduate of Silliman University, is helping him in the daily operations, overseeing 14 workers.

Reprinted from Successful Agri-People (II) by Zac Zarian pp32 - 34.

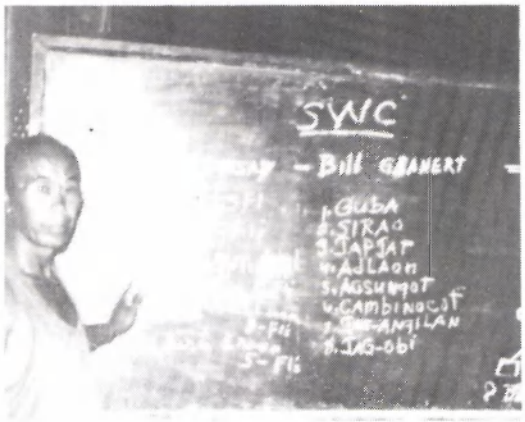
3.2.3 Soil and Water Conservation: Tiometeo Llena's Experience

Introduction: Poor Soil, Poor Yield

The loss of top soil results to low productivity. The problem becomes more serious in hilly lands.

In this corn field, the growth of corn is better near the group of trees compared to those near the erosion gullies. This kind of problem is felt by many poor farmers in the uplands. One farmer, Timoteo Llena, was able to solve the problem of soil erosion in his farm. Now, he gets far better yields than other farmers in his village. Let me tell you his story.

Teo Llena: An Innovator



To Teo Llena, "Life is a continuous process of learning; there is always something to learn", he happily tells his friends, as he recalled the day when the A-frame and contour farming was first introduced to him. He and several of his co-farmers have come a long way since then. Teo and 4 others started in 1981 and has grown to 600-900 adoptors in 8 barangays in 1991.

It began in 1981, in Guba, Cebu, when Mang Teo established his first contour canals with the help of his 3 brothers and a sister. The contour canals slowed down the flow of rain water that otherwise would have washed the top soil away.

To provide further protection to the soil against erosion, they constructed rock walls and planted contour hedges. At first his neighbors had mixed feelings about the whole thing: some laughed while others waited patiently for the results.

Note: The Mindanao Baptist Rural Life Center's experience since 1978 excludes contour canals which greatly reduced labor requirement.

Later on, as they saw the improvements on Teo's farm other farmers realized the value of conserving the soil and water. With Teo's leadership, they formed 'alayons' or 'bayanihan' groups to make the work easier. The soil and water conservation technique has since then spread within and outside the village.

Mang Teo used the A-frame to establish the contour lines across the hillsides. The contour line is leveled at all points on a hillside and perpendicular to the flow of water. The A-frame functions like a carpenter's level. This technique of contour farming is sometimes called the Sloping Agriculture Land Technology or SALT.

Soil Conservation: The Benefits

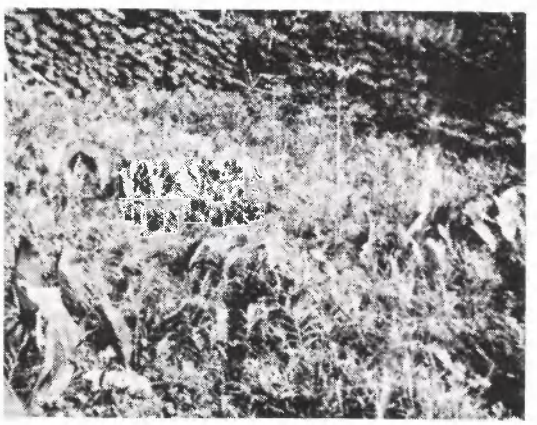
Today, Mang Teo's farm look like this. Soil erosion has been reduced to a minimum.

In between the contours are the various crops. Grapes is his main cash crop.

Vegetables like tomatoes, onions .

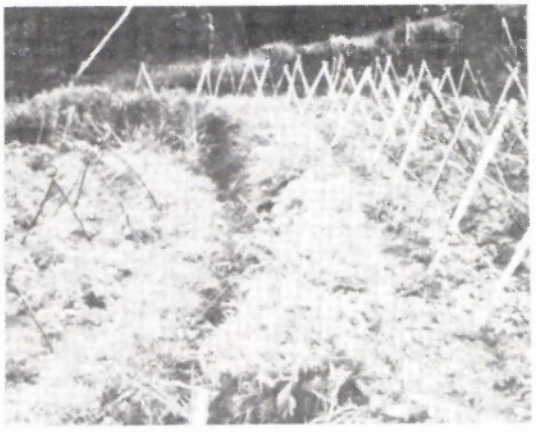
. . . eggplants, bell peppers .

. . . beans, malunggay and black pepper are intercropped.



Rootcrops like taro, ginger, cassava, sweet potato,

and yam provide additional food for the family the whole year round.



Crops are rotated in the strips which are planted to annuals. Rotation is between crops that are Nitrogen users and those that are Nitrogen fixers (legumes).

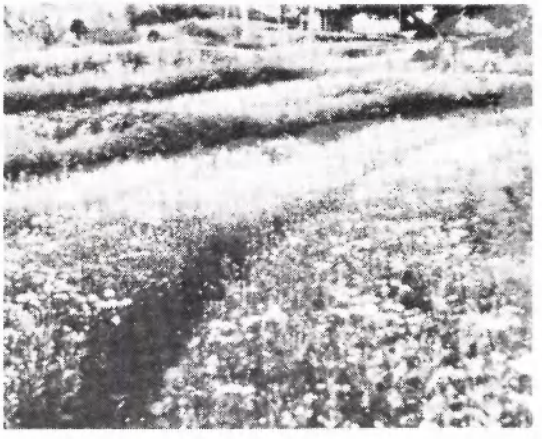
On the uppermost part of his farm are fruit trees like mango, jackfruit, cacao and guavas. Some of these are also mixed along the contours on every 3rd strip. These permanent crops provide added income without necessarily adding costly inputs.

He integrates a few animals into his farming system. Some of the loppings (cuttings) from the contour hedges are fed to the goats . . .

. . . while the sweet potato and kangkong leaves serve as feed supplement to the pigs.

Legumes like Flemengia macrophylla, Desmodium rensonii, ipil-ipil, and madre de cacao are good hedgerows that provide goats with year-round nutritious food.

Cutflowers like daisies and chrysanthemums are also sources of cash.



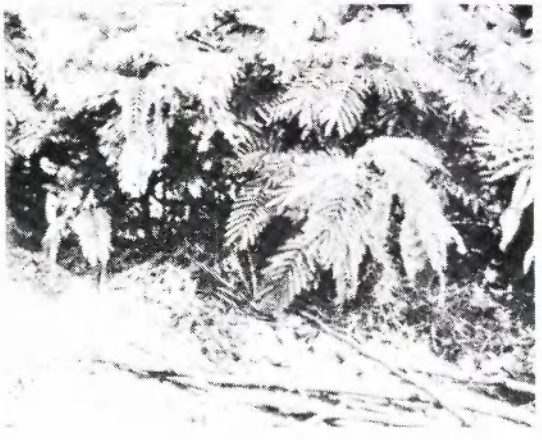
They are planted in contour beds. Some roses are even planted as hedge crop.

Ferns also serve as hedgerows. Its foliage are sold to go with flower arrangements. Aside from being a cash earner the fern is effective in controlling erosion and grows well near the contour canal where there is higher moisture content.

By maintaining a small nursery, Mang Teo further diversifies his sources of income from the sale of seedlings.

Contour hedges are regularly cut to serve as mulch and green manure - added benefits from this water and soil conservation technique. This reduces his dependency on outside inputs that are increasingly becoming costly.

One could see the effect of the contour hedges. If there had been no barriers, the rich humus (organic matter) content would have been washed away.



Leguminous contour crops like Calliandra calothyrsus, Leucaena diversifolia, Flemengia macrophylla, Gliricidia sepium (madre de cacao) . . .

. . . Leucaena leucocephala (ipil-ipil), Desmodium rensonii and grasses like napier and vetiver serve as belts that hold the soil intact. They satisfy the following requisites of a good hedgerow: nitrogen-fixer, good coppicing ability, high biomass, and a good seed producer.

With this soil and water conservation technique, Mang Teo was able to double his income. In the process, he was able to support the college education of his son and even renovate his house.

But for him, there is an equally important personal gain aside from the economic benefits of his soil and water conservation work. It turned him into a better person. The shy Mang Teo has found self-confidence - a confidence that enables him to share his knowledge and experience with others. He spends 2 days a week teaching other farmers and agricultural extension workers his art of conserving soil and water.

He is contented to see other upland farms transforming into a scenic sight like this. And seeing eroded hillsides, as shown in the foreground, poses a challenge for others to adopt soil and water conservation techniques.

If soil fertility is the goal, then soil and water conservation is the tool!

3.2.4 MBRLC: The Shopping Center for Agricultural Technologies

The Mindanao Baptist Rural Life Center (MBRLC) is located in Kinuskusan, Bansalan, Davao del Sur. The elevation is 400 meters above sea level. The slopes range from 15 to 30 degrees. It is located in the foothills of Mount Apo, the highest mountain in the Philippines. They have developed one of the best agricultural technology models in the country. It is considered as the shopping center for agricultural technologies.

SALT 1, 2, 3, and 4

The Sloping Agricultural Land Technology (SALT) is one of the best models not only in the Philippines but also in the world. The technology has been adopted as far as Nepal. For sustainability, it combines production and soil conservation. Soil conservation is defined as the control of erosion and maintenance of soil fertility.

SALT 1 is the combination of 75% agricultural crops and 25% forestry. They have documented that this system increases crop yield 5 to 6 fold compared to traditional upland farming.

Photo: Tej Partap

SALT 2 is simple agro-livestock technology. It is SALT 1 plus the integration of livestock rearing. Goats are preferred because they have high fertility rates, short intervals between kidding, and easy to market. Goat manure is also a good source of fertilizer.

SALT 3 is the combination of SALT 1, SALT 2 and a separate land for timber production. Farmers owning 2 hectares or more can practice it.

Photo: Tej Partap

SALT 4 is a recent development. It is focused on horticulture and plantation crops. They call it the "small agrofruit livelihood technology." This system is based on the realization that to improve hillyland agricultural economy, commercialization of crops is necessary. The cut flower industry in the hillylands of Cebu where the flowers are planted in between hedgerows of nitrogen fixing trees is a good example of SALT 4.

Photo: Tej Partap

Test SALT and Demonstration Models

A SALT and non-SALT comparative test is being demonstrated at MBRLC. This was established in 1984. It contains 2 SALT plots and 2 non-SALT plots. Labor input, yield, net income, soil loss and the chemical and physical properties of the soil are the data being gathered over the years.

Aside from testing and developing the 4 SALT models, they also tested the performance of different hedgerow species in terms of biomass production, resistance to periodic lopping and adaptability and hedgerow spacing. The results showed that a closer spacing of 2 meters is better. It gave higher corn yields compared to wider spacing.

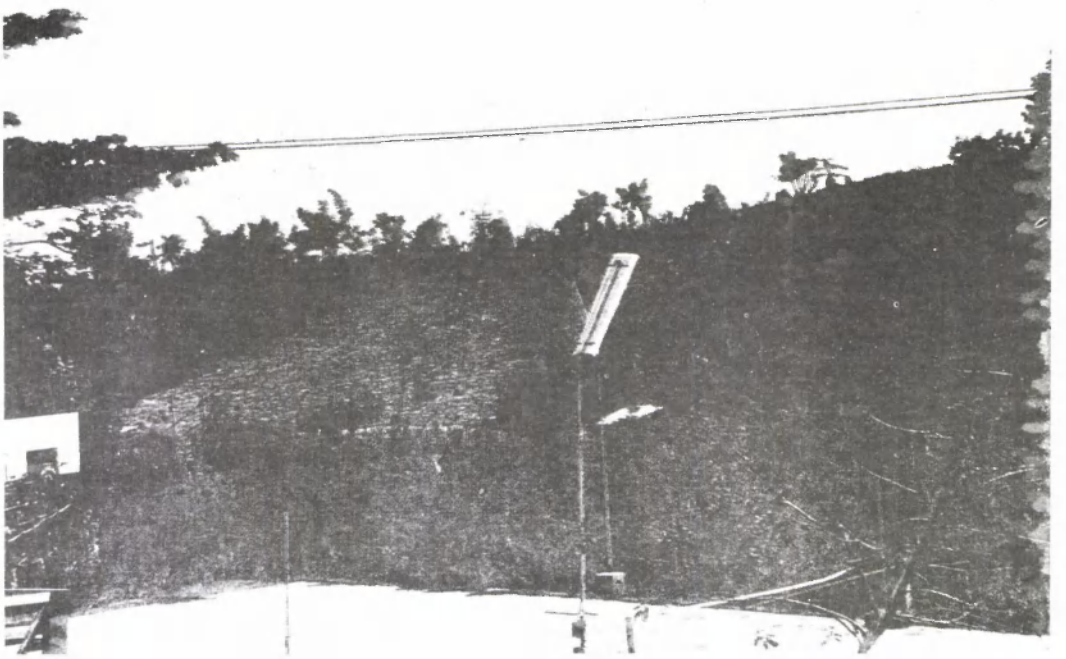


Photo: Jeff Palmer

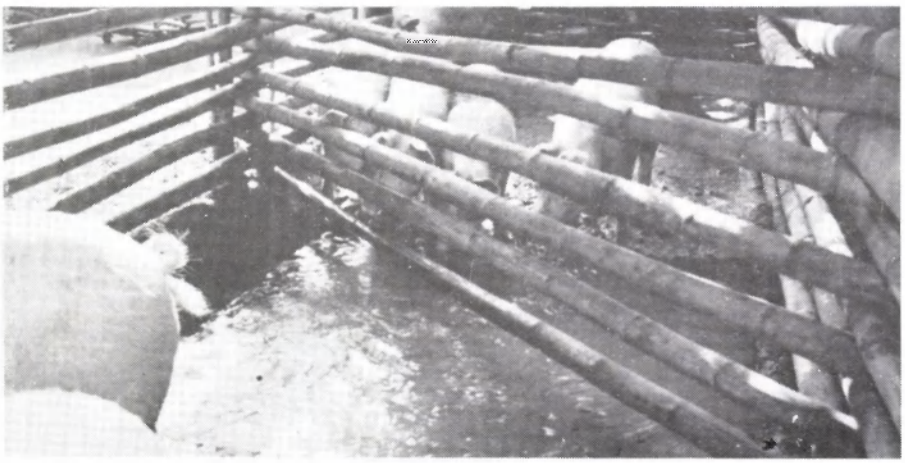
Goat Raising

Anglo Nubian goats are raised in pens. A forage garden was established to provide continuous source of fodder. They follow the cut and carry feeding system. Many farmers in Davao del Sur have adopted this technology. They sell their milk to MBRLC. Some farmers process their milk and sell to passing buses as chocomilk ice candy. Usually, they barter some milk to MBRLC in exchange for feed concentrate which is necessary to maintain stable milk production. They get an average of 2.5-3 liters of goat's milk per day.

Aside from Anglo Nubian goats, MBRLC is also raising the small Indonesian cattle called 'banteng" in their pasture land with Napier as the main grass.

UPLIFT

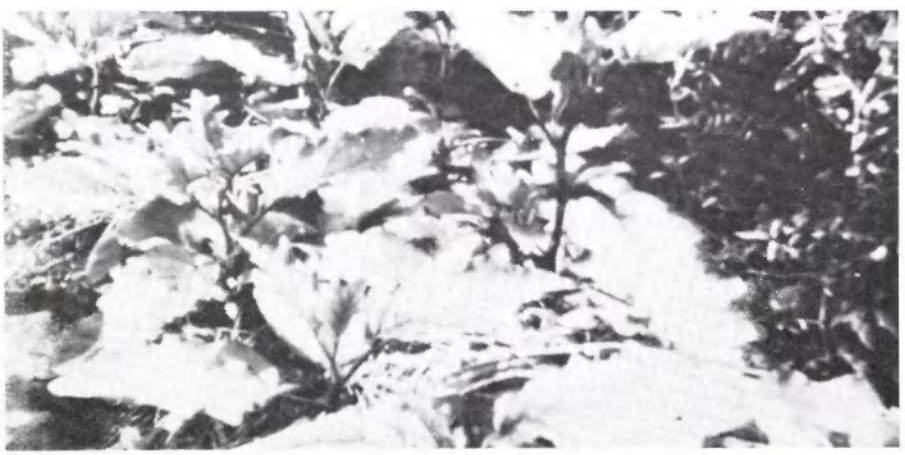
Using Properly Lowland Integrated Farming Technology, is a lowland rice-based farming technology. One-fourth of the area is used for the house, the vegetable garden, and for backyard raising of ducks, chicken, goats and pigs. Three-fourths is used for continuous rice production in combination with fish and duck raising. The ducks are used to plow and fertilize the ricefields. The irrigation water passes through the pig pen or the goat house before it flows to the ricefields. Perfect crop-livestock integration is achieved.



FAITH

FAITH means Food Always In The Home. This is a backyard garden with a well-planned production of vegetables that will always be available for the household. For fertilization, basket composting is practiced. Kitchen waste, backyard sweepings and animal manure are dumped in the basket. The vegetables are planted around the basket. The decomposing materials within the basket continuously supply the surrounding plants with nutrients. This simulates the function of the litter in the forest.

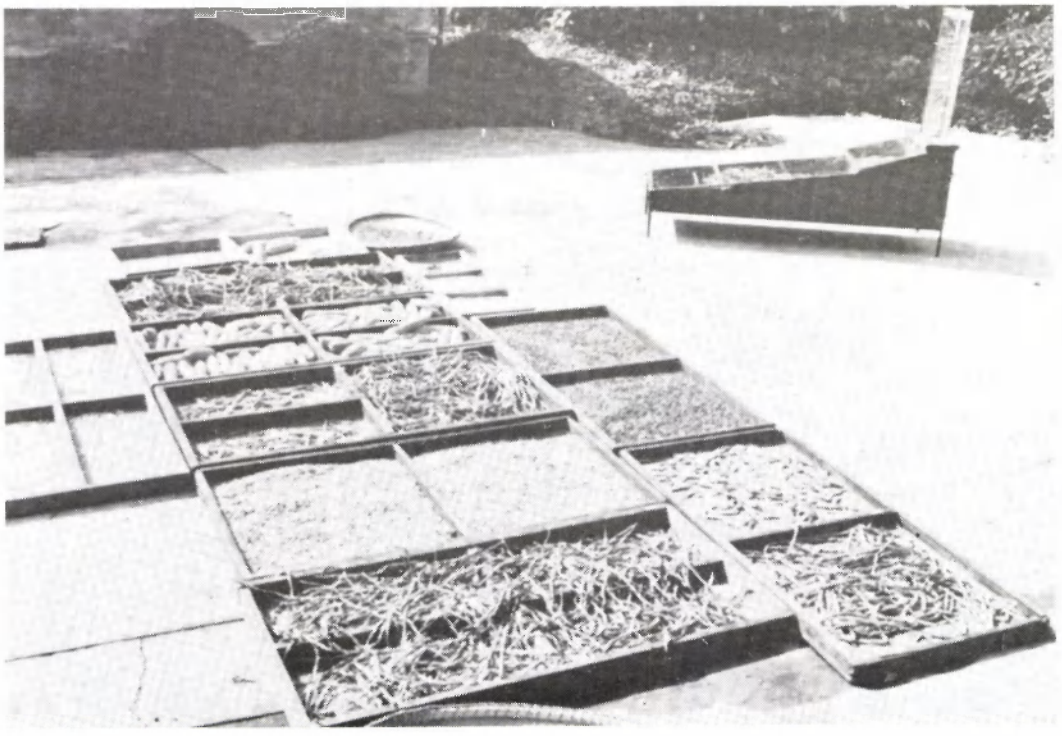
Around the garden, hedgerows are planted as live fence. It is also a source of green manure for the crops.



Plant Propagation

Seedlings are mainly reproduced through cuttings. A type of plant propagator used is a box made of concrete and equipped with mist irrigation system. The box is filled with 4-6 inches big stones, followed by 4-6 inches of pebbles, and 4-6 inches river sand. The cuttings are planted in the moist sand. After a few weeks, when they have developed roots, the cuttings are transferred into potting plastics.

Another type of propagator is a smaller version of the box. It is covered with plastic to conserve moisture. This is an alternative in the absence of mist irrigation.



Other Enterprising Activities

MBRLC also has a seed processing center. They sell different kinds of vegetable seeds in small packets. They are the main supplier of nitrogen-fixing tree seeds that could be used as hedgerows. This venture provides market for the farmers who have adopted SALT where they can sell their extra seeds. Fruit and timber tree seedlings are also available at a very reasonable price.

Goats' milk, groceries, feeds and excellent educational materials are likewise sold in their cooperative store.

3.2.5 Ducks as Tractors

The Mindanao Baptist Rural Life Center (MBRLC) developed a farming system for the lowlands called UPLIFT (Using Properly Lowland Integrated Farming Technology). It integrates rice production with vegetables, tree crops, fish and poultry, by recycling and utilizing organic resources. In this way, they get more products from a limited area that otherwise would have been solely devoted to rice.

The big dikes (one meter wide and one meter high) which follow the contour lines are planted to different crops including shrub-like trees such as citrus, coffee, and nitrogen-fixers.

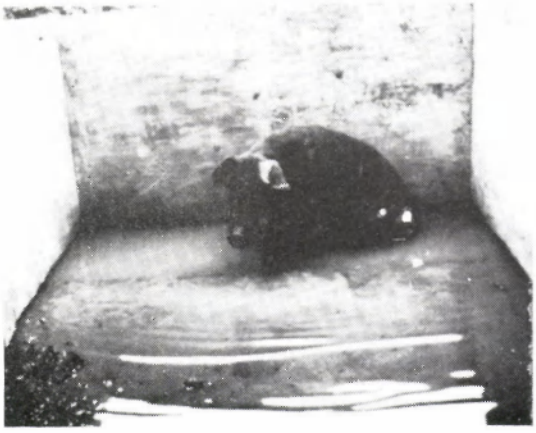
They also include vegetables.

One-fourth of the total land area is occupied by fishponds and animals. They are located on the upper portion of the farm. Manures excreted by the animals go directly to the water source which are used to water and fertilize the lower levels of the farm.

Three-fourths of the land is utilized for lowland rice production. The rice area is divided into 3 portions: one part is newly-harvested, another is newly planted and the third is ready for harvesting. The newly harvested area serves as "green pasture" for ducks. After harvest the rice straw is put back in the field. Other plant materials like the cuttings from the hedgerows in the dikes are added. After irrigating the field the ducks are let in for 3 weeks. The ducks till and fertilize the soil making plowing unnecessary.

The perimeter of the farm is planted with Gliricidia sepium, Sesbania sesban, S. rostrata and cassava that serve as live fence. They are regularly pruned as feed for the animals . . .

. . . and as green manure for the vegetable gardens. The prunings are placed in the basket compost.



The water is managed in such a way that it passes through the animals and fishponds before finally going into the rice paddies. By the time the water reaches the rice paddies, it's already quite fertile that only very minimal input is applied to the crops. Such practices highlight the need for low-external-input systems to be encouraged in rice production whenever and wherever possible.

3.2.6 The SALT System

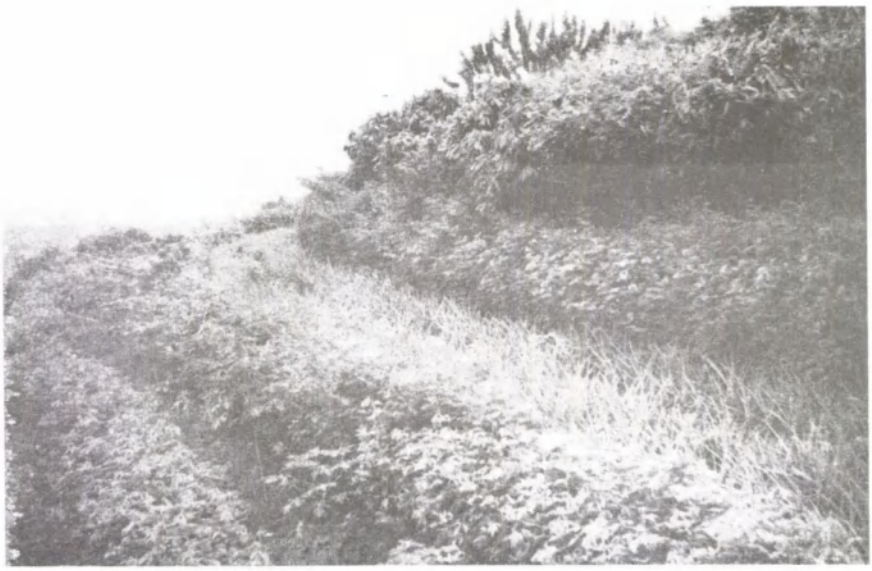


Photo: J. W. Hansen

View of the original SALT farm developed by the Mindanao Baptist Rural Life Center on a hillside slope in the Philippines.

In the Philippines, government agencies are implementing a number of agroforestry-based rural development projects in different parts of the country. Non-governmental organizations (NGOs) also undertake their own agroforestry projects. The Mindanao Baptist Rural Life Center, an affiliate of the Asian Rural Life Development Foundation, started working in 1978 to develop an agroforestry-based land-use system that would enhance food production for Filipino families with small farms.

The focus is on sloping land, where many small-scale farmers face serious problems of soil erosion. Work is based in Kinuskusan, Bansalan, Davao del Sur, but the system has been designed to function on at least half the hillside farms in the Philippines. Called Sloping Agricultural Land Technology (SALT), the objectives are to:

- Control soil erosion
- Help restore soil structure and fertility
- Produce food efficiently.

To encourage acceptance by local farmers, the system is designed to require a minimum of labour and resources, without relying on outside loans. It is meant to be economically feasible, environmentally sound, and fully functional in as short a time as possible. It is also designed to be culturally acceptable to Filipino farmers.

In 1980, the first experimental plot was established to test and develop the SALT system. This first SALT model, now known as SALT 1, was designed for a 1-hectare farm on land with a 25% slope. It was followed in 1984 by Test SALT and Contour Hedgerow Test SALT, and in 1987 SALT 2 (Simple Agro-Livestock Technology) and SALT 3 (Sustainable Agroforest Land Technology) were developed. Replicated trials have shown that these models, based on agroforestry technologies, can be more productive than traditional cropping systems while dramatically reducing soil loss.

The SALT 3 model has been designed for a farm of 2 hectares. The aims are to produce food, fruit, animal feed, fertilizer, fuelwood, and timber. Based on the original SALT 1 system, development begins with the location of contour lines on a 1-hectare plot in the lower part of the farm, using an A-frame. The contour lines are spaced 4 to 6 meters apart.

The farmer then plants woody perennials to form hedgerows along these lines, using primarily nitrogen-fixing trees or shrubs. Previously, Filipino farmers generally preferred *Leucaena leucocephala.* However, this species now suffers widely from psyllid infestation in the Philippines, so attention has turned to alternative species.

To date, the center has screened about 35 local and exotic hedgerow species. The criteria for screening include survival, biomass production, nitrogen-fixing capacity, rate of litter decomposition, fodder and fuelwood production, seed production, drought tolerance, and resistance to pests and diseases. Based on these criteria, five hedgerow species have been identified as good alternatives to L. leucocephala. These are *Flemingia congesta, Desmodium resonii, Gliricidia sepium, Leucaena diversifolia, and Calliandra calothyrsus.*

Farmers are encouraged to plant a variety of species. One approach is to plant *Flemingia congesta and Gliricidia sepium* or another nitrogen-fixing species in alternate hedgerows. Planting every other row with different species discourages pest attacks.

Between the hedgerows, the recommendation is to plant a combination of permanent, semi-permanent, and annual crops. Crop combinations are balanced to enhance soil fertility, maximize yields, and allow the farmer to organize an efficient work schedule.

Every first and second alley between the hedgerows is planted in annual crops. These include maize, upland rice, beans, ginger, and pineapple. Crop rotation in these alleys helps maintain soil fertility and good soil formation. Normal recommendations for crop management, such as weeding and pest control, should also be practised on a regular basis.

In every third alley, farmers plant fruit trees and other permanent cash crops, such as coffee, cocoa, banana, citrus species, guava, rambutan *(Nephelium lappaceum),* durian *(Durio zibethinus)* and lanzones *(Lansium domesticum).* In these al-

Photo: H.D. Tacio

Legumes, such as cowpea, are planted in the alleys in rotation with maize.

leys, weeding should be confined to spot weeding around plants until the hedgerows are large enough to hold the soil in place. During the initial development phase, short-term cash crops — such as cowpea, groundnut, mungbean, eggplant, and tomato — may also be planted.

Hedgerows should be cut when they grow to a height of 2 meters. At this point, they should be cut back to a height of 50 centimeters to encourage coppice regrowth. Cut foliage is spread in the alleys to provide organic fertilizer.

The one-hectare portion of the farm upslope from the agroforestry plot is used for tree production. Again, farmers are encouraged to plant a variety of species. The selection should include trees that are harvested at different times: from 1 to 5 years, 6 to 10 years, 11 to 15 years, and 16 to 20 years.

Short-term tree species are used mainly for fuelwood, poles, charcoal, construction material, and furniture. Medium-term trees provide material for furniture, construction, charcoal, and leaf meal. The long-term species provide sawlogs, lumber, charcoal, and fuelwood.

In the Philippines, recommended species are *Samanea saman, Acacia auriculiformis, A. mangium, Pterocarpus indicus. Swietenia macrophylla, Calliandra calothyrsus, Sesbania sesban, S. formosa, and Leucaena diversifolia.* Each species is planted in pure stand in a strip along the contour. The space between the upper and lower hectares of the farm may be planted with bamboo (*Bambusa* spp.).

Development of the two-hectare SALT 3 farm during the first 21 months costs P6,500 (US$325) as long as seedlings are free and all labour is provided by the farm family. At this point in the production cycle, the family can begin to earn a net income of P1,200 (US$60) per month. Total family income rises as soon as the perennial crops and fruit trees reach a marketable age.

by Henrylito D. Tacio
Source: Agroforestry Today. Jan-March 1991, pp. 12-13.

Photo: H.D. Tacio

Multiple cropping is practised within the SALT 3 land-use system. Here, Gliricidia sepium is used as a living stake for black pepper, alternating with rows of pineapple.

3.2.7 Goats, Trees and Other Things

In the Philippines, about 60% of the total land area is sloping. With increasing population pressure, more and more of this sloping land has been brought under intense cultivation. Even back in 1980, the population density on land sloping at 18 degrees or more averaged 119 persons per square kilometer. This intensity of farming activity on land this steep has drastic implications — both for the farmers and for the land.

In fact, upland farmers are one of the poorest population groups in the Philippines, with annual incomes averaging less than US $ 100. Dietary levels are also inadequate: studies in Palawan showed second - and third-degree malnutrition in 41 to 47% of the population.

The land has not fared any better. Out of nearly 15 million hectares of classified forest land in the Philippines, more than 5 million hectares are already categorized as badly denuded and much of the remainder is in various stages of degradation.

To help alleviate this situation, the Mindanao Baptist Rural Life Center, a non-governmental organization in Davao del Sur, has developed an agroforestry system for small farms that combines crops, fuelwood, fodder and livestock. The name of the system is Simple Agro-Livestock Technology, or SALT 2.

Although the system can be adapted to other livestock species, the emphasis is on goats. With high fertility and short kidding intervals; goats are a good source of meat and milk. Breeding stock are also relatively inexpensive and the animals have good resistance to pests and diseases.

Under the SALT 2 agroforestry system, 40% of a farmer's land is devoted to agricultural crops, 40% to livestock and 20% to forestry. As with Salt 1 (see the January-March 1991 issue of *Agroforestry Today*, pages 12-13), the first step is to locate the contour lines on sloping fields.

There are several techniques for locating contours. Two simple methods are introduced in this issue of Agroforestry Today. Using whatever method, mark out the contour lines across the entire field. Then mark out additional lines 4 to 5 meters apart until the whole field is covered.

The next step is to establish hedgerows along the contour line. Cultivate thoroughly along the contours, forming raised beds 1 meter wide. Make two furrows on each bed, 50 centimeters apart, and plant nitrogen-fixing trees or shrubs in dense rows along each furrow. Examples of good hedgerow species for conditions in the Philippines are *Flemingia macrophylla, Desmodium rensonii, Bauhinia purpurea, Leucaena leucocephala, Leucaena diversifolia, Gliricidia sepium and Calliandra calothyrsus.* Plant the same species along the upper boundaries of the farm. Fruit trees such as lanzones (Lansium domesticum), rambutan (Nephelium lappaceum), durian (Durio zibethinus) or guava (Psidium guajava) may be planted along the side boundaries.

Plant food and cash crops on the upper half of the farm so that soil loosened by cultivation is caught on the lower half, which is devoted to permanent fodder crops. To minimize disturbance of the soil, plant 75% of the cropping area to long-term crops and only 25% to short-term species.

When the hedgerows start to shade the crops, they should be cut to a height of 50 to 100 centimeters. Missing hedge plants should be replaced and the entire area weeded on a regular basis. Non-permanent crops should be rotated.

The lower half of the farm is devoted to fodder crops. Plant high-yielding, fast-coppicing species that are high in protein and palatable to goats. A suggested mix would include Desmodium rensonii, Flemingia congesta, Gliricidia sepium and grasses such as napier (Pennisetum purpureum.) The fodder plants should be well established for six to eight months before bringing in the goats.

Build a goat shed in the middle of the farm between the crop area and the fodder area. This will save time and labour in taking fodder to the goats and manure to the fields. Allow about 2 square meters of floor space for each animal. For convenient removal of manure, construct the floor of boards nailed about 1 centimeter apart and raised about 1 meter above the ground. If possible, a separate shed should be built for the buck, or a single shed should be partitioned so that the buck can be kept away from the does.

When the fodder supply is assured, bring in the animals. Recommended breeds are purebreds, crossbreds or upgrades of Nubian, Alpine or La Mancha. A good stocking rate is 1 buck plus 12 does for every 0.5 hectare.

Dairy goats should be fed morning and afternoon at regular times. They need concentrates as well as fodder. A good concentrate mixture consists of 36% leucaena leaf meal, 23% maize grain or rice midlings, 21% copra meal, 18% first-class rice bran, 1% salt and 1% limestone. A good fodder mixture is 50% Desmodium resonii, 25% Flemingia congesta, 20% Gliricidia sepium and 5% grass. Goats should also have salt and plenty of water every day.

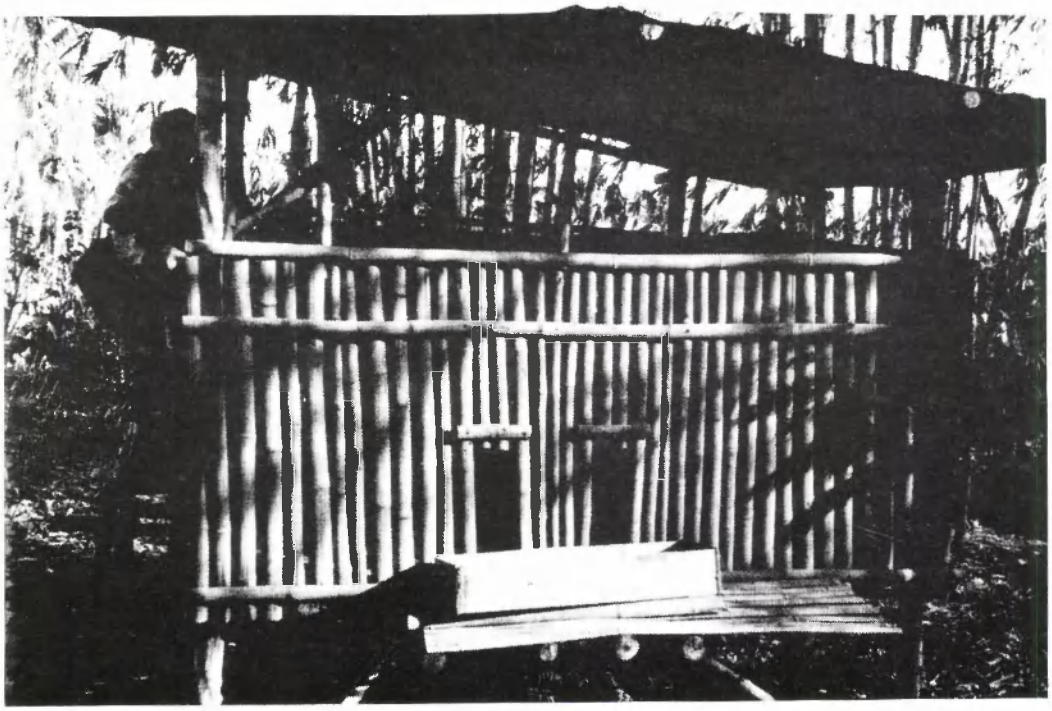


Photo: Tej Partap

Goat shed built of wooden poles and bamboo in the middle of a SALT 2 farm.

The does should be bred for the first time when they are 10 to 12 months old or weigh 45 to 50 kilograms. If a doe is not pregnant after being bred over three heat periods, she should normally be culled. Kids can be sold at 10 to 12 months old, or when they weigh 35 to 55 kilograms.

Lactating animals should be milked daily, following a regular schedule and procedure. Any change in the feeding or milking routine may result in a reduced milk yield. Pasteurize the milk by heating it to 74°C for 30 seconds before it is sold or consumed.

During the rains, the farmer may have extra fodder. This should be applied to the agricultural crops as green manure. The goat manure is used to fertilize both the food and fodder crops.

Young animals could be derwormed every month for five months and every three months thereafter. Kids should be disbudded between 5 and 30 days after birth. Adults can be dehorned using a dehorning instrument or by sawing off the horns close to the skull.

With food crops plus about 4,700 liters of goat milk a year, the SALT 2 system can generate a net monthly profit of US$94 per 0.5 hectare of farmland. The return on investment is 33%, but with two assumptions — that there is a ready market for goat's milk and a cold storage for the milk, either on the farm or through marketing channels.

However, profitability is not the only consideration. This system helps to protect and improve the soil and contributes substantially to the self-sufficiency of the farm family.

by Henrylito D. Tacio
Source: Agroforestry Today - Jan-Mar 1992, pp12-13

3.2.8 Napier Grass as Forage and Hedgerow

Napier grass (Pennisetum purpureum) is the most widely used forage among livestock raisers. According to the Matalom farmers, it is a good feed for ruminants. Farmers have been very much impressed with the feed quality of this forage species. According to them, this species was used to feed thin and sickly carabaos or cattle and obtain highly favorable results. Most of them say that, had it not been for the napier grass, the sick animal would not have recovered.

Napier can aiso be established fast even in infertile and weedy areas. It is a widely adopted practice. It also produces a large amount of edible forage portion. The leaves are big and this part is where the greatest amount of nutrients can be found. With this, the animal eats more of the nutrient - rich part. It can also withstand drought and some extent of grazing pressure. This is a common comment of farmers who utilize this forage as the sole feed for their animals during dry periods.

Farmers usually allow these to grow tall. This is because when napier grass is cut low and the lower portion is grazed upon by the animals like pigs, the plant dies out. This has been observed by the farmers whose pasture areas can be reached by swine. These favorable characteristics of napier grass account for its widespread adoption by farmers. One concern though is its long-term stability as grass hedgerows. Being a highly productive species, it is expected to be soil nutrient depleting. Another thing is whether it would really be beneficial in the long run in terms of soil fertility restoration.

Source: On-Farm Research,
No. 19, June 1994

3.2.9 The Value of Daily Family Meetings to Plan Farm Activities

Virgilio Acala started farming in Negros in 1970. He tilled a 2 hectare hilly land. He planted corn, their staple food. During heavy rains, big portions of his corn crops were washed out. The water coming from the barren surrounding slopes aggravated the problem. To minimize the damage, he placed coconut and banana trunks across the slopes. The barriers were not enough. The months of heavy labor ended up with inadequate food. This drove him to Mindanao.

In Mindanao, he ended up getting the same hilly land like many other settlers. In 1990, he got in touch with the Center for Alternative Rural Technology. He was trained on Sloping Agriculture Land Technology (SALT). Manong Ver contoured and planted madre de cacao as hedgerows. Now, his 3-hectare farm is a leading example of SALT. His farm is located in Sta. Cruz, Dansolihon, Cagayan de Oro City.

More Heads, more Hands... the Better

Establishing hedgerow is a very laborious activity but has far reaching benefits. This is a major reason for the slow adoption rate of the technology. In Manong Ver's case, the whole family was involved in all farm activities, from planning to implementation. "I always discuss and plan with my wife and kid. We talk every night about next day's activity, the assignment of each individual. We also assess how far we have gone in our general farm development plan," Manong Ver says.

After layouting the contour lines with the use of an A-frame, they planted madre de cacao cuttings. They did this every day. They gathered and planted 180 cuttings daily, 60 for each member of the family. The cuttings were about 4 feet long. Every member was required to do his/her share - Manong Ver, his wife Lydia and their youngest son, Jun-jun. In this way, they planted 1,080 cuttings per week. After six months, they were able to plant 33,480 cuttings, enough to contour the 3-hectare farm. Nobody missed to carry out his/her assignment. If somebody missed, it was accumulated the next day. Establishing hedgerows is indeed very laborious. It needs a lot of determination as experienced by the Acala family. Despite the hard work, Manong Ver says that this is better than seeing the crops being washed away and having not enough food to eat. The participative mode of planning the farm activities, open communication within the family, discipline and hard work, strengthened their family ties. "More heads, more hands are better than one. I hope other families could think this over," Manong Ver suggests.

Innovative Techniques

Along the madre de cacao hedgerows, he planted pineapple. Aside from stabilizing the hedgerows, pineapple as a cash crop gives good income.

The double hedgerows of madre de cacao are planted 24 inches in between rows. They are periodically pruned at a height of 3 feet. The leaves are scattered and left to rot in between the hedgerows. The small branches are also used as firewood. The alleys for permanent crops are planted with banana, mango, black pepper, guava and papaya. The alleys for annual crops are planted with peanuts, cowpea, mungbean, eggplant, okra and corn. The legumes are rotated with corn, their staple crop. In every 4 rows of corn, okra is planted during the last hilling up activity. According to him, the okra serves as the catch crop for corn pod borers. Recently, he made a trial on the effect of weeding on corn. He observed that the unweeded corn produced higher.

He converted some of the alleys from annual crops to forage garden. After establishing a forage garden, he increased his carabaos to 3 heads and added 9 cows. He cuts the forage in rotation. He also uses corn stubbles for animal feed plus the grasses.

At the foot of a contoured hillside he established a small rice paddy where he grows rice following the MASIPAG technology.

He has a very innovative way of raising seedlings. Both ends of the corn cob are cut to get an average 3 inch-sized cobs. The corn cobs are soaked in water with animal manure for about 5 days. This makes them spongy. The small hole in the middle of the cob is then filled with soil mixed with compost where the seed is planted. The seedling together with the corn cob is then planted whole. When the seedling grows, the corn cob also rots. This technique prevents transplanting stress. Watering is also minimized during that stage. He claims to have a higher seedling survival rate using this technique.

If you go to his farm now you could observe that the alleys have become a terraced bench. The height of terrace walls ranged from .9 to 1.2 meters. "Look how fast the soil erodes. This should have been carried away by the water if not for my hedgerows," he said. Gone were the days when he has to carry coconut and banana trunks to save his corn crop from heavy rains.

By Apollo Pacamalan, Rey Canunayon and Hil Padilla

3.2.10 Towards Household Food Security

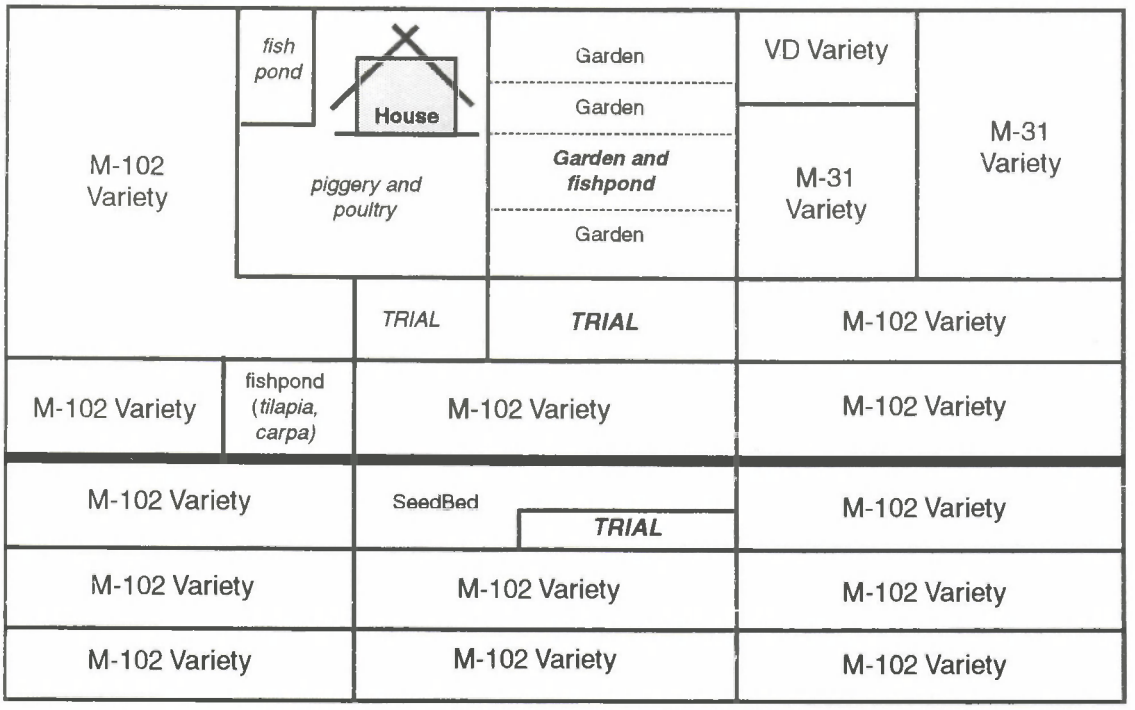
Romulo Andalesio stands before his diversified garden in Sinayawan, Valencia, Bukidnon.

Romulo Andalesio started tilling his 1 hectare lowland farm with traditional methods in the 1960s. At the height of the Green Revolution campaign, he adopted chemical rice farming technology. Over several years, he observed that his debts have mounted. He also realized the degenerating effects of the chemical inputs he was using on his soil. Pest problems also increased inspite of the regular pesticide spraying.

In 1993, upon the recommendation of the parish priest in Sinayawan, Valencia, Bukidnon who is active in environmental protection, he attended a seminar on sustainable agriculture. He realized that farming is not only planting rice but also vegetables, trees, and raising of animals. Household food security is primary. Afterwards, he converted his farm into a model of diversified and integrated farming. Within a year, he proclaimed that food was always in their home. Most importantly, he was able to send his children to college and was able to repay his loan slowly. He also cooperates with the Sustainable Agriculture Center (SAC) of Xavier University in testing alternative farming systems.

His crop diversification was based on their food needs. In this way, he was able to cut down his household food expenses to a minimum unlike before when he bought most of their needs. His cash income comes mainly from livestock sales. Aided by a farm plan, he was able to upgrade his farm management and the synergy of the different components.

Current Farm Lay-out



Bio-Resource Flow

Romulo Andalesio studied carefully the flow of resource materials that comes from his farm and the possible ways that farm wastes could be recycled. He realized that as he diversified, the sustainability also increased. With more integration, more organic inputs could be supplied to the different components and more diversified food is produced for his family. Below is a list he prepared to explain and show how the different components interrelate.

Components	Products/By products	End User/s
	1) Rice bran	*- fishpond, piggery*
	2) Rice (grains)	*- house, market*
	3) Rice Hulls	*- absorbent of manure and urine in compost pit*
Kitchen Garden	***1) Vegetables***	
	2) Livestock Feed	*- house, animals, market*
Fishpond	***1) Fish***	*- house, market*
Poultry	***1) Chicken dung***	*- fishpond, garden, rice fields, compost project, corn field house, market*
	2) Meat	
Piggery	***1) Manure***	*- compost project, garden, corn field*
	2) Meat	*- house, market*
Live Fence & Trees	***1) Firewood***	*- house, market, and trellis to vegetable garden*
Compost Pit	***1) Organic Fertilizer***	*- Vegetable Garden, Rice Fields, Corn Field*
	1) Fruits	*- House, Market*
	1) Fruits	*- House, Market*
	1) Services	*- Rice Fields, Corn field, Vegetable garden*
Corn	***1) Corn Kernels (Milled)***	*- House, Market*
	2) Corn Bran	*- Poultry*

Rice Production Using MASIPAG Technology

Three-fourths of his 1 hectare farm is planted with 3 different MASIPAG rice varieties which are responsive to low input fertilization. On a small scale, he is testing 12 other varieties in cooperation with SAC of Xavier University. He puts back all the rice straws and adds compost. Seedlings are planted singly in an east-west direction with 40 cm x 10 cm spacing. He uses only around 25 kg of seeds per hectare which he produces on his own based on his varietal trials. He doesn't apply any pesticide. Labor comes from his family. Hence, his cash outlay for rice production is very minimal. He sells half of the produce and the other half is consumed by the household.

Kitchen Garden

Before he planted only rice. Now, he is planting okra intercropped with cowpeas, saluyot, alugbati, camote, eggplant, corn, ampalaya, and other vegetables. The perimeter of his fishpond is planted with stringbeans. He manually picks the pests. For aphids, he sprays tobacco extract mixed with soap. Damaged vegetables are boiled as pig feed. The extra vegetables are sometimes sold. Highly noticeable are the different flowers interspersed with the vegetables.

Fishpond

The fishpond established near the rice fields now provide the family with enough supply of fish for consumption.

The fishpond is only 5 x 20 meters but the produce is more than enough for their needs. He raises tilapia and carp. The fishpond edges are planted with kangkong and beans. Before every stocking with fingerlings, he applies chicken manure and compost for a better growth of algae. Water for vegetables also comes from the pond.

Nong Mulong's residence on his lowland farm area. He believes that farm operations can be maximized only if the family stays with in the farm.

Backyard Animals

He has 25 ducks, 40 chickens, 13 turkeys, 3 sows, and 1 carabao. The ducks help fertilize the fishpond. They also graze in the ricefields especially after harvest which helps greatly in improving soil fertility. He uses rice straw and rice hull as bedding for the animals to absorb the urine which mixes with the manure and thus, saves on labor. This goes to the compost. Eggs and poultry meat are enough for the family. Poultry feed mainly comes from the rice bran, the corn he planted and their own grazing area under the trees. If in need of cash, he sells chickens, eggs, and piglets. He has also a very unusual way of treating chicken pox. He immerses a red hot rod in the drinking water of the chickens. He claims that it is effective.

Live Fence and Fruit Trees

Different fruit trees and bananas are planted along the perimeter of and near the house. The trees serve as shelter for his animals and the grazing area. It is also a source of firewood. There are also some medicinal plants. The extra papayas and bananas are sold.

Composting

A 500 square meter lot from the paddy field section is utilized as composting area. This is located near the pig pen and beside the shed of ducks and turkeys. He doesn't buy chemical fertilizer anymore.

Community Service

As a church lay worker of the St. Joseph Parish of Sinayawan, he shares his experiences during church meetings and homilies. He often shares what he learned during the conversion process towards a more sustainable farming system and his family's food security. He always interplays it with values and attitude formation. He also participated in the school on the air radio program on agriculture.

Apollo Pacamalan with Hil Padilla

3.2.11 The Model Farm of Silverio Trases

Silverio Trases is a Bukidnon farmer who is now 73 years old. He is well-known in his locality and is fondly called Bio. All his five children were able to finish college. Through income from his farm. Hundreds of farmers, students and rural development workers both from NGOs and the government sector visit him every cropping season. His farm is located in Batangan, Valencia, Bulacan. After graduating from high school in Negros Oriental, he worked in the Araneta Farm in Valencia, Bukidnon. His dream was to own a land to till. In 1960, from his savings, he purchased a 10-hectare corn field. Every harvest, he saved more money. He wanted to own a lowland ricefield to minimize expenses for his family rice consumption. In 1972, he acquired a 13 hectare lowland rice field. In 1983, he added a ricemill and a utility vehicle to his assets. Later on, he subdivided his farm into 6 parcels. He alloted 5 parcels to his five children. He retained 1 parcel for his own sustenance. This, he converted into an integrated farm. He started as a chemical farmer like most farmers in his town until now. He no longer uses any pesticide as he used to. However, he uses small amounts of inorganic fertilizers but only in areas where yellowing of leaves is observed.

Seed Production as Source of Main Income

Bio experienced that the price of palay is erratic. On the other hand, the price of rice seed is always increasing. In 1985, he joined the Bukidnon Seed Growers Association (BUSGA). He started with 2 hectares for seed production. The income is good. So, he increased the area to 5 hectares. He harvests 100-120 sacks per hectare. He plants rice 2 times a year. Certified seed is sold at P500/40kg. Registered seed costs P600 while Foundation seed is P1,040. Bio is a well known seed grower. Hundreds of farmers buy seed from him every cropping season. He was an outstanding seed grower for region 10 for 2 consecutive years (1986 and 1987). He keeps 50 sacks per cropping season for home consumption.

Unusual rice planting distance

Three rows are planted at 10 x 10 cm in between rows and hills. In every 3 rows, he adopts a distancing of 60 cm. This is followed by another 3

rows of 10 x 10 cm. He claims that in his more than 40 years experience in planting rice and experimentation on planting distance, this is the most effective. The aeration created by the 60 cm. distance in between every 3 rows prevent diseases and insect damage.

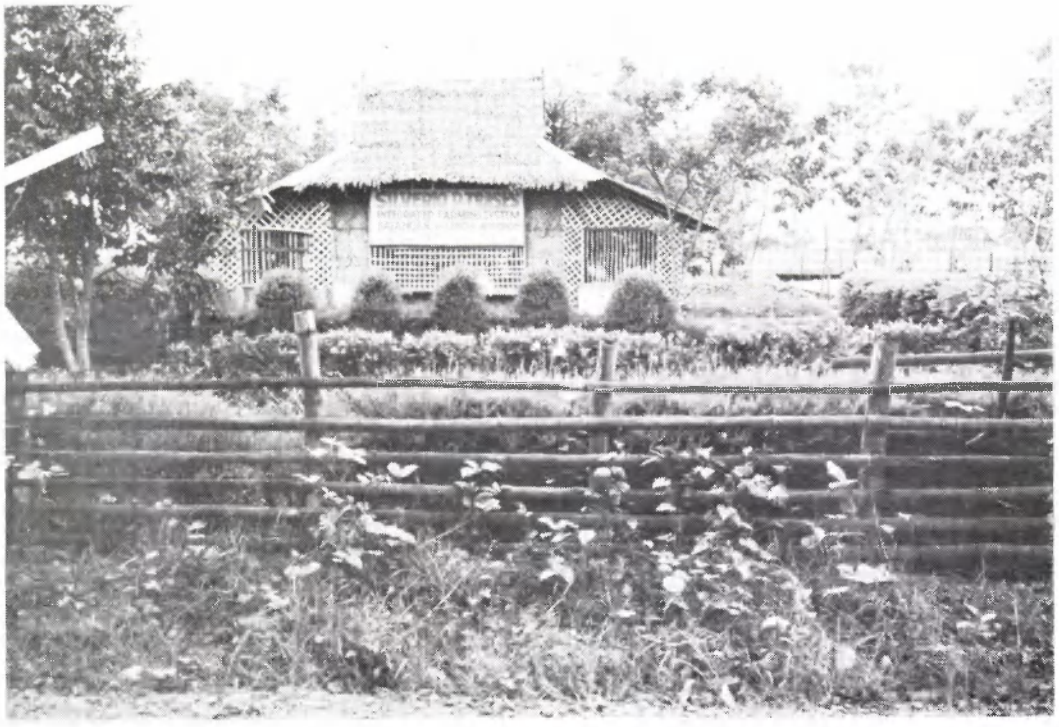
Avoidance of chemical inputs

Since 1989, he is putting back all the rice straws after every harvest. He also incorporates the waste of his farm animals. Although sometimes, he applies comercial nitrogen fertilizer in portions where yellowing of leaves is observed. Only spot application is done. He observed that too much inorganic fertilizer does not increase yield but rather increases pest damage.

He does not apply any pesticide. He further explained that early in the morning, he can observe several beneficial insects such as dragonflies, damselflies, spiders and wasps hovering around the rice plants and preying on destructive insects. He opines that the avoidance of chemical inputs assures a balance of friendly and destructive insects. They regulate each other. Hence, a major pest attack is avoided. This greatly reduced his farm expenses. Ever since he stopped using pesticide, he has not encountered any major pest problem unlike before. The pesticide sales representatives who approach him to use his farm as demonstration plot falls in argument regarding the detrimental effects of pesticide.

For golden snail control, he practices hand picking, draining of excess water and after harvest, he releases ducks to eat the snails and add fertility to the soil.

His farm has become a site for several farmers field schools on integrated pest management. Currently, his 1 hectare demonstration area is being utilized for the Philippines IPM Varietal Trials.



Bio's "bahay kubo"

In 1989, he constructed a small nipa hut (bahay kubo) in a 3,600 square meter area. Around the hut, he dug his fishpond. This made the hut cool during the day. Around the fishpond is his vegetable garden and a small portion for rice demonstration and medicinal plants. The vegetables are planted sequentially and are rotated around the plots. "We never buy vegetables. We always have steady supply of these," Bio said. Since he plants vegetables sequentially, he has always something to sell throughout the year. These insures him steady additional income for other household food expenses. On the vegetable plots are string beans, tomato, okra, bitter gourd, horse radish, eggplant and amaranthus. He also planted gabi, kangkong, beans, corn, banana, and citrus around the dikes of his fishpond. Bio uses only farmyard manure and azolla as fertilizer for his garden. He does not use any pesticide. He believes that pesticide will not only increase pest damage but will also endanger the health of his family.

He never use medicines for minor illness. He utilizes the medicinal plants in his garden. He has oregano, mayan (Coleus sp.), mansanilla, sambong, lagundi, and kasla.

The perimeter is planted with fruit trees such as starapple, jackfruit, guava, papaya and banana. He also raises livestock and poultry. He has cattle, pigs, native chicken, ducks and turkey.

Azolla as animal feed

He does not have much problem on animal feeds. The rice bran, broken rice and weed seeds from the paddy cleaner from his rice mill is mixed with kangkong, gabi and azolla. The azolla comes from his fishpond and ricefields. For poultry and pigs, azolla is mixed at 50%. He claims that in this way, he was able to reduce feed cost by 80%. Moreover, he saves on fertilizer cost by incorporating the animal waste in his garden and ricefield.

Fish culture

He has approximately 1,800 sq.m. of fishpond. It is U-shaped surrounding his bahay kubo. It is 1.25 meter deep. He raises tilapia because they are very prolific and easy to care. He utilizes rice bran as feed. Bio said that tilapia raising significantly reduced their daily expenses for buying fish in the market. The fishpond also functions as azolla source and to create a conducive micro-climate for his nipa hut.

Civic work

Silverio Traces is the president of the Batangan Catholic League, a member of the Knights of Columbus, one of the directors of the Farmers School on the Air Alumni Association, and the marketing director of the Bukidnon Seed Growers Association.

by Apollo Pacamalan

3.2.12 The Four Year Rice Straw Revolution of Dodong Alfoja

Is rice straw incorporation alone enough to get good yields? Armando "Dodong" Alfoja says yes! Others claim that the soil will soon be depleted since the grain has been taken out from the system. Based from his experience, Dodong insist otherwise.

First, a chemical farmer

Dodong started farming in 1986 in Dumaraet, Balingasag, Misamis Oriental. He believed that he could earn more income by rice farming. He was a former automotive mechanic. He started with "high yielding varieties". He was a heavy chemical fertilizer and pesticide user. In the beginning, he was using 4 bags chemical fertilizer until he reached 8 bags per hectare (4 bags urea; 2 bags 16-20-0 and 2 bags 0-0-60). His pesticide application is 4 quarts per hectare (1 quart herbicide; 1 quart for golden snail; and 2 quarts insecticide). One time he applied DDT (a banned pesticide) mixed with Nuvacron. The highest yield he got was 120 cavans per hectare at 45 kg/cavan. The lowest was 15 cavans/ha. when it was infested with tungro. Despite farming 7 hectares, he found out that his income was becoming less.

The shift to organic

In 1990, to lower his cost of production, he tried incorporating rice straw combined with chemical fertilizer. The result was better compared to previous years.

In 1991, he was introduced to the MASIPAG Program (Magsasaka at Siyentipiko sa Pag-unlad ng Agrikultura) - a farmer based rice breeding program. He conducted varietal trials on 10 MASIPAG lines. In the trial they only used rice straw incorporation as fertilizer source and without any pesticide. He was impressed by the results. With the A-18 line, they got 6.2 tons/hectare or 137 cavans at 45 kg per cavan. This motivated Dodong to try the MASIPAG organic rice production technique.

How does he do it?

"My soil fertility management is very simple. As simple as ABC. Incorporate the rice straw, weeds or anything that can be found growing in the ricefields. Rice straw could rehabilitate the rice pond in 3 years. Rice straw alone is enough provided you use low-external input varieties. First, you have to conduct varietal trial on what is applicable to your field condition.", Dodong said. He also grows azolla & incorporates this in his ricefield.

Dodong's harvesting is very fast. As much as possible, he sees to it that on the 3rd or 4th day from the start of harvesting, the palay is ready for milling. He then immediately put back the rice straw to the field. He needs 3 man-days to put back the rice straw per hectare. According to him, you must put back the rice straw immediately, otherwise it will be a more difficult job. He does not do "out of the field" composting. After putting back the rice straw, he soaks the straw for 1 week by irrigating the field then dries it for 5 days. He puddles the field with his "hydro tiller" called "turtle" in Mindanao. This makes the decomposition of the rice straw faster. He does not see any bad effect of the decomposing rice straw.

Is rice straw alone enough? He said it is enough. The microbial fixation is enough to replace the grain extracted. He said, "This is not 1 + 1 = 2. But maybe 1 + 1 = 5. This is maybe due to the increase in microbial population in the soil as a result of the straw incorporation. My yields over a 5-year period is an indicator".

He tried different planting distances (40 x 10; 30 x 10; and 20 x 20 cms). The 40 x 10 cm is the best. The east-west planting line orientation allows the sunlight to reach the base of the rice plants from morning to afternoon. This results to a more stiff rice stem and better air flow within the row which is important in the prevention of diseases.

Without the application of chemical nitrogen and pesticide, he experienced no significant loss due to pest or disease in a perioc of five years. According to him the proper color of the rice leaves is pale green, "mala cogon" not dark green. When dark green, there is too much nitrogen which makes the rice plants prone to insect pest attack. Since he ceased to use chemical fertilizers and insecticides, he can now observe fishes and frogs in his ricefields. The population of insects also increased but with no significant damage. He claims that now there is ecological balance of insects.

When we did some samplings during a visit to his field, there were 5-10 spiders per square meter, a very extra-ordinary one.

He is now averaging 110 bags yield per hectare at 45 kg/bag. He makes 5 croppings in 2 years.

Other practices

Dodong controls rats by planting cassava along the dikes as trap crop. He observed that rats will concentrate on eating the cassava planted along the main dikes first before the rice. He has not experienced significant rat damage even during severe attacks in neighboring fields.

He times his seed sowing and transplanting to start or be done on a Tuesday or Friday. This may sound superstitious but it is interesting to note that Hera Foundation in Germany have demonstrated the effect of cosmic forces on crop performance when planted on a specific time.

A farmer breeder

He uses 3-5 varieties of MASIPAG every cropping season. He changes variety every cropping. In 1994, he conducted trials on 102 MASIPAG lines where he preserved the top 20 performers. He was also able to breed one variety which he calls "dong red", a variety of rice being sold to health conscious consumers as far as Metro Manila. He is now the main seed source of the varieties being planted in the neighboring villages.

He earns more now

He sells his rice as organic, unpolished rice. He gets premium price, P1,200 per bag of 50 kg. rice. That's the farm gate price. Unpolished rice gives him a milling recovery of 75-80%. Instead of the 16% becoming the rice bran which P6.00 to a kilogram, this becomes P18/kg because it is intact with the unpolished rice. His computation shows that his net income (P9,000/ha) is twice as much as his earning before when he was using chemical fertilizers and pesticides. He is saving around P4,000 worth of chemical fertilizer and pesticide/ha/cropping.

Impact to the community

So far, 5 farmers in the community have followed Dodong's rice farming technique. Almost 90% of the farmers in the area are now using traditional and improved varieties sourced out from Dodong's farm. Xavier University Sustainable Agriculture Center estimated that there is 50% reduction in the use of chemical fertilizers and reduction of pesticide application from 4 times to 1- 2 applications per cropping in the community.

by Apollo Pacawalan & Hil Padilla

3.2.13 Direct Conversion to Chemical-Free Rice Farming

Most often, when farmers convert from chemical based to organic farming practices, they suffer from yield reduction. Hence, most farmers do the conversion gradually. Most often however, they remain using the combination of inorganic and organic fertilizers because this gives the highest net income. By nature, Philippine soils are highly deficient in nitrogen. Hence, small applications of nitrogen fertilizers like urea dramatically increases yield. Combining it with organic fertilizer also reduces nitrogen fertilizer losses due to volatilization and leaching. In this way, the small amount of nitrogen applied is more efficiently utilized.

However, Jeronimo "Imong" Villa, a rice farmer from Paitan, Quezon, Bukidnon in Northern Mindanao claims otherwise, based from his experience. Imong used to apply 8 bags of chemical fertilizer per hectare (4 bags urea, 2 bags ammonium sulfate, and 2 bags complete). He usually applies 4-5 quarts of pesticide, herbicide and molluscide. His total expenses for chemical inputs alone ran to P5,000 per hectare. For his 7-hectare rice farm he was spending P35,000 per cropping. He always availed of loans for his cropping needs. His average yield is 3.5 - 4 tons/hectare.

Direct Conversion to Organic Farming

In October 1994, Imong Villa attended a training on MASIPAG Rice Production Technology conducted by the Sustainable Agriculture Center of Xavier University. After the training, he acquired 20 lines of MASIPAG Rice Varieties from Dodong Alfoja and Xavier University. He conducted a variety adaptability trial in a 0.9 hectare area. The result was very interesting. He got 3 tons from the 20 lines planted in the said area. From the trial, he selected the top 5 varieties. He then decided to convert his 7-hectare rice land into chemical-free farming. He was able to harvest an average of 3.9 tons to a hectare using Wag-wag, Elon-elon and M-1 varieties. His savings around P40,000 otherwise used for chemical fertilizers, pesticides and HYV seeds. From then on, he maintained such good yields.

Soil Fertility Management and Pest Control

Imong incorporates rice straw, azoila, weeds and animal manure during land preparation. He has 1 carabao, 2 cows, 6 pigs and around 30 chickens. He uses all the manure in his ricefield. He plants 1-2 seedlings per hill in an east - west orientation. The spacing is 40 x 10 cm. He makes sure to plant 3-5 varieties in every hectare.

According to him, the intermittent draining of water prevents pest and diseases. This also oxygenates the soil and makes the rice plants sturdy against lodging. As much as possible, he avoids flooding the field for prolonged periods. He claims that these techniques combined explains why he has not encountered any major pest problem ever since he converted.

There are already 35 farmers in his village who have adopted the MASIPAG varieties and its technology. They have also been incorporating the rice straw. Before, they used to burn it. However, some of the 35 farmers are still using chemical fertilizers.

In his own reflection, Imong said, "As long as you do it with faith, it will succeed. There is no reason why you can not do rice farming without using chemical fertilizers and pesticides."

By Apollo Pacamalan

3.2.14 Ramonito Manejero: The Farmer Extension Worker on Sustainable Agriculture

Ramon Manejero is a valued farmer resource person on Sustainable Agriculture. He is talkative and highly enthusiastic to share his ideas. Farmers like him because he talks based on his own farming experiences. His farm is 2.5 hectares. It is located in South Poblacion, Maramag, Bukidnon in Mindanao.

Ramon, 35 years old, came from a poor family. He grew up helping his mother in the farm because his father was seriously ill. When he was in high school, he asked his parents to allot 0.9 hectares for him. He used the income to finance his schooling. He got married in 1984 and continued tilling the 0.9 hectare upland farm. He raised some pigs. From the income, he was able to buy half hectare lowland ricefield. He planted high yielding varieties of rice and applied inorganic fertilizers and pesticides like most of his neighbors were doing. But for 2 consecutive seasons, his rice was infested with tungro. He was not able to recover his cash inputs. Hence, he had difficulty paying back his loan from a usurer.

Due to financial constraints, he was not able to apply any chemical inputs the following season. To his surprise, his ricefield was not attacked by pests. No tungro. Moreover, he got yields comparable to what he was getting during the non-tungro infested croppings and when he was still using inorganic fertilizers and pesticides. From then on, he refrained from using any chemical inputs.

In 1993, he was introduced to the Xavier Agriculture Extension Service and became a cooperator of their Sustainable Agriculture Program. Ramon had no difficulty implementing the sustainable agriculture techniques because he was no longer using any chemical fertilizer and pesticide. From the ideas he got, he further diversified his farm by growing more vegetables, fruit trees and more animals. He also improved his nutrient recycling system. From such system he was able to earn more. From the savings, he was able to increase his lowland farm to 1.6 hectares.

Ramon is being tapped by NGOs in sustainable agriculture trainings while using his farm in intra-farm study tours. He was also hired by the Canossian Sisters to work as farm manager of the Blessed Bakhita Farm in Maramag, Bukidnon. Aside from managing the farm, he also trains the local farmers. He renders 90 hours per month managing the farm of the sisters. He is given a monthly compensation for the job which adds to his own farm income. He teaches the farmers how to develop and manage their farm ecologically. He trains them how to make compost including pest control techniques he is using like the hanging of dead frogs to attract rice bugs, light traps, and biological controls using trichogramma.

MASIPAG Rice Technology

Ramon is using the MASIPAG technology to produce rice. He uses 3-5 MASIPAG rice varieties which are responsive to low levels of fertilization. A 40 x 10 cm planting distance, east to west row orientation, 1-2 seedlings per hill, rice straw incorporation, compost application, and non-use of chemical fertilizers and pesticides are among his other techniques. He uses the manure of his animals as fertilizers. He observed that the population of friendly insects have increased. Occasionally, he encounters problems with rice bugs.

Pest Control Methods

In their vegetable garden, pests are handpicked. In the rice crop, he did not encounter any major problem except rice bugs. To control rice bugs, he hangs dead frogs around the area which attracts the bugs. In the afternoon he burns the frogs along with the bugs using a torch. He also uses an oil lamp as a light trap with a basin full of water underneath. This attracts the moths to the basin. In his corn field, he uses trichogramma sourced from the Regional Crop Protection Center in Region 10 of the Department of Agriculture. The trichogramma eggs which are mounted in cards are placed in strategic locations within the cornfields. This will hatch and become adult wasps. The trichogramma will then lay its eggs on the corn borer larvae. The parasitized eggs of corn borers will eventually die.

Vegetable Garden and Fruit Trees

Aside from corn and rice, Ramon also plants vegetables in his kitchen garden and in the dikes of his ricefields. In this way, the ricefield area is maximized. He plants stringbeans, lettuce, eggplant, mustard, pechay, tomato, okra, cowpeas, spinach and gabi. He also sells the extra vegetables that are produced.

Around his farm, he planted mango, marang, guava, santol, star apple, guyabano, jackfruit, banana and papaya. This helped in diversifying their source of food.

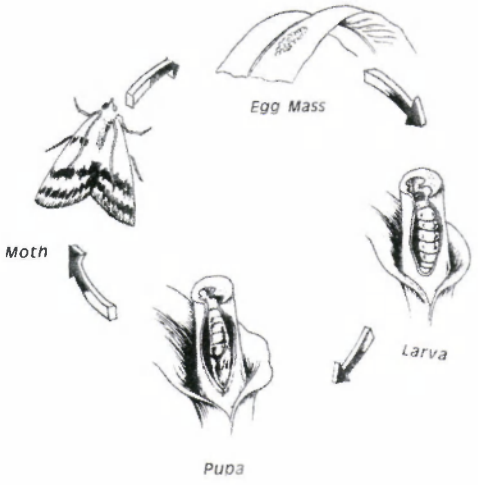
Backyard Animal Raising

Ramon raises 300 quails, 80 ducks, 19 chickens and 7 pigs (6 sows and 1 boar). The boar is also hired by other farmers in the community for breeding purposes. From the eggs of quails and ducks alone, he gets around P3,500/month. The sale of piglets is also a major source of income. It is from livestock raising that he gets more cash income. Aside from this, the manure which he uses to fertilize his crops enabled him to cut down crop production cost. The protein requirement of his family has also been met.

by Apollo Pacamalan and Hil Padilla

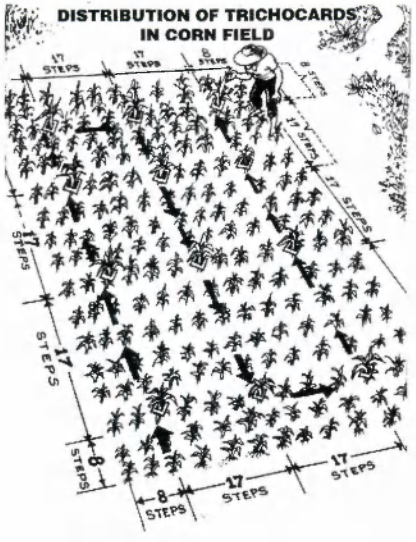
3.2.15 The Tiny Parasitic Wasp and the Corn Farmers of Bukidnon

Trichogramma species are tiny wasps. They are less than 1 mm in size. They parasitize the eggs of a wide variety of insect pests, including the corn borer.



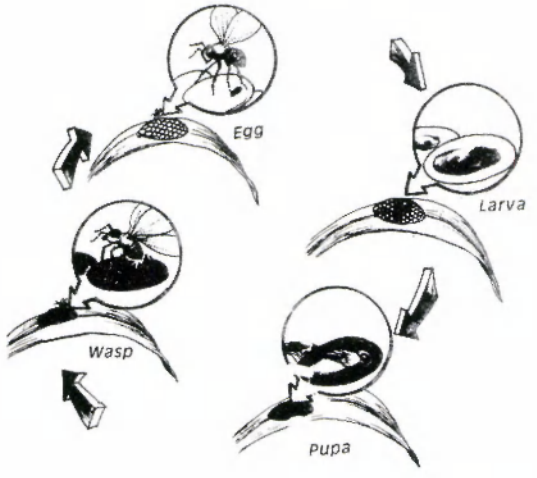
In European countries, *Trichogramma evanescens* has long been used in controlling corn borer.

The Trichogramma that are used in corn fields are produced in laboratories of the Regional Crop Protection Center (RCPC) of the Department of Agriculture. The RCPC mass-rearing laboratory in Region 10 is located at Bangcod, Malaybalay, Bukidnon. About 1500-2000 Trichogramma eggs are glued onto cards about 2 x 2 inches in size. This trichogramma-carrying cards are placed in the corn field following a certain distribution pattern. The Trichocards are hung on corn plants.



Corn Farmers in Bukidnon Adopt Trichogramma

Yellow corn is a major cash crop in Bukidnon. Recent investigation showed that pesticide use in corn have been increasing through the years. Corn borers have also developed resistance to pesticides, requiring higher doses for effective control. However, some farmers like Elsie Aguilar (10 ha.), Remigio Reclita (4 ha.), Celeste Canama (10 ha.), Eulogio de Guzman (5 ha.) and Gregorio Orboc (4 ha.) were able to get rid of pesticides. Instead, they use Trichogramma. They buy Trichocards from the RCPC at P1.00 per card. They use 100 cards per hectare. The cards are released in the field 25-30 days after corn emergence.



How it Works

The Trichocards contain Trichogramma eggs which will hatch to produce its adult stage. These wasps then mate and look for corn borer eggs to parasitize.The Trichogramma wasp lays eggs into the eggs of the corn borer. After a day, the Trichogramma eggs develop into larvae within the host. The larvae feed on the contents of the corn borer eggs. Thus, the corn borer eggs are destroyed and no corn borer larvae develop. This is why Trichogramma is called a parasite.

Some 3-4 days after, the Trichogramma larvae that have developed will change into pupae. At this stage, the whitish corn borer eggs turn black indicating that they have been parasitized by Trichogramma.

The adult Trichogramma, or the wasps, emerge from the parasitized corn borer eggs 7-8 days after Trichogramma oviposition. These newly-hatched Trichogramma wasps mate and then search for fresh corn borer eggs to parasitize. The process of parasitism is repeated and the cycle goes on.

A corn borer egg mass contains about 30-40 eggs. A Trichogramma wasp is capable of parasitizing 60-70 corn borer eggs.

One Trichogramma generation succeeds another as long as it could find corn borer eggs to feed on. Many of the Trichogramma die after the corn cropping season due to the absence of corn and corn borer. Some survive by feeding on eggs found on grasses and crops such as sugarcane and sorghum.

Source: Trichogramma: Manual for Farmers' Training
Phil.-German Biological Plant Protection Project
Department of Agriculture, 692 San Andres St., Malate, Manila 1004
Tel. No.: 59-31-41 or 58-62-06

3.2.16 Fruit Salad in the Backyard

A tall, meztizo looking man, in his early 60's is still active doing his farm activities. His farm work however, is no longer that backbreaking. He has no more land preparation. The work is basically occasional planting, slight weeding and harvesting. His system is orchard mixed cropping. He is Mr. Isagani Gorre, Sr. of Mambuaya, Cagayan de Oro City. His 4 hectare land is an award from the Agrarian Reform Program of the government. He succeeded to earn respect not only in his family and community but also in the field of farming where he gained various recognitions. He was selected as Outstanding Farmer of the Year by the Department of Agriculture. He occupied various positions in the barangay council and in people's organization. Right attitude pays.

Multi-storey orchard

In his hilly backyard, he established a multi-storey orchard. The top layer is occupied mainly by jack fruit and mango. The second storey is occupied by guyabano, pomelo, american lemon, papaya and cannestil. The lower level is planted with pineapple, sugar cane and some shade loving vegetables. The pineapple is planted as hedgerows along the contour lines.

The multi-storey orchard has given more than enough benefits to the whole family. "Look at my granddaughter. She was born premature but look, she is very healthy," beams her wife Marie. She attributes the health benefits from the year round, readily available fruits in the backyard which are all organic. Customers and visitors are always welcomed with variety of fruits with distinguishable taste, really different from the chemically grown ones in the market. The taste of his pineappie is extra ordinary. He harvests around 500 pieces of fresh pineapple in a month. At an average of P5.00 per fruit, he earns a rough P 25,000 pesos monthly. That is only for pineapples. Much more if you take into account the other fruit trees. Marcotted seedlings of american lemon and pomelo is another source of income. They sell the seedlings at P75.00 each. "Farmers could also send their kids to college but they should also have clever ideas" Manang Marie adds.

Fertilization and animal integration

He dumps large amount of corn cobs. It comes from his nearby cornmill. It is spread out all over the area. The native chicken, ducks and astray pigs which serve as one component of his multi-storey cropping, helps in spreading the corn cobs. The spongy corn cobs retains high amount of moisture. His soil is dark and contains a lot of organic matter. Ever since he used corn cobs as mulch, his soil quality dramatically improved. The native chickens, ducks and pigs further add to the soil fertility. They also consume the rotten fruits and the small insects they get in scratching. Hence, feed cost is minimized. His system of livestock raising requires minimal labor compared to pen type housing. " This system of farming is only laborious in the establishment stage, but after that you could relax. Unlike in annual crops where you have to do plowing year in, year out", Mang Gani concludes.

By Rey Canunayon

3.2.17 The Zero Tillage Farm of Neil Fraser

Neil Fraser is a 49 year oid Australian married to a Filipina. He has a 1.1 hectare farm in Malaubang, Ozamis City in Mindanao. He started to develop his farm in 1988 following the farming principles of Masanobu Fukuoka.

Since 1979, he has been producing excellent audio visual materials on sustainable agriculture. He also conducted trainings and seminars. Later, he stopped. He observed that only a few among the participants responded to do something about their farm. He learned that talking and showing videos are not very effective in convincing farmers. It is more effective if they see something already working which can be implemented in their own situation. It was for this reason that Neil started his farm in order to show what will work. It was also a medium to try out the very unconventional farming principles and techniques he has been reading from the book of Fukouka.

Zero Tillage with Mulching

Since he started farming, he did not plow his field. He cut the weeds, applied compost on the surface, covered this with mulch and then planted the seedlings. In his experience, application of compost for 3 years is enough for the soil to heal. After that, farmers may stop composting. The population of soil microorganisms is already enough to sustain the fertility. However, mulching should be continued to provide continuous food supply for the microbes. He utilizes all the plant waste materials in his farm. Microorganisms consume carbon. The mulch is carbon rich. The mulch protects the soil microorganism from the scorching sun in the dry season. It also conserves moisture necessary for the survival of the microorganisms. According to him, corn stubbles which abound in Mindanao and most of the time burned, give one of the best humus when decomposed.

In his extension work, farmers had strong resistance to the adoption of zero tillage. Hence, he modified it to minimum tillage which earned a more favorable response. It was experienced by other farmers in Luzon that zero tillage works if the soil is already very rich in organic matter. In the beginning, Neil buys the manure from the farmers but now they no longer sell it. They are using it in their own farm. In every mutual aid work in their reforestation activities, each farmer is encouraged to bring home weeds to be used as mulch or to be made into compost. Now, the farmers he is working with no longer burn their crop waste. Even tomato stubble is now being used to mulch their crops. They have realized the value of farm waste.

Mix of Different Trees

His farm is mainly tree plantation with a small portion for his annual crops. The cropping of annuals is done without tillage as described earlier. The tree plantation is actually a mixture of different timber and fruit trees. They are randomly planted as espoused by Fukuoka. They were planted with no definite direction and spacing. He has more than 100 plant species. For Neil, there is no bad tree. It is the system of planting the tree like monocropping or plantation type that makes it bad. Thirty percent is fruit trees. Since he planted mainly fruit trees, he also changed his main diet to fruits. He experienced that this is more healthy. He started a fruit diet in 1989. He even participates in the 24 km. run in the province. Changing the food diet is also a good tool in promoting food diversification and less dependency on grains. Fruit trees are the most efficient in terms of input and calorie output. He says that it is

the option for grains that is more destructive to the soil. This line of thinking is also followed by the founder of permaculture, Bill Mollison. He advised that carbohydrate rich crops that can grow under the trees should be explored. Examples of these are gabi, cassava, and bananas. In Samoa, these are the staple crops.

One can feel the coolness in Neil's farm as a result of the trees that were planted. He conducts seminars and trainings in the farm. The trainees stay in his farm for a week or two. He admits that food crop in such a system is a problem in the beginning but as time goes on, it becomes stable.

Finding the right person to plant trees

Neil Fraser believes that there is a right person to plant the trees. In his observation, the trees planted by a particular person was always more robust compared to those done by others. He claims that it is not just the manuring that makes the plant grow well. There is more than meets the eye. There is a relationship between the person's and the plant's energy flow that makes the plant grow well. He showed that the fruit trees near his house are a lot robust than those planted away from his house. This may seem unfounded but others like Bishop Manguiran can relate this to his own experiences.

Other extension activities

Neil conducts observation trials with the farmers. They learned that silt taken from river banks is a good source of inoculant for beneficial microorganisms. They observed that mungbean applied with silt produced more nodules. They also observed that soil along contour strips planted with bananas became black after a certain period of time. Neil attributes this to the potassium contributed by bananas to the soil. They also tried a moving pen for pigs within the strips. Their learning was, although the area was not maximized for production, but it became more productive compared to the strips that did not get the pig pen treatment. They concluded that the pig contributed a lot to restoring microbial activity in the soil. The farmers now appreciate the value of making the soil alive with microorganisms.

Neil works with the Pipuli Foundation. One of the foundation's programs is the rehabilitation of the denuded hills of Mt. Malindang National Park in Misamis Occidental. This is accomplished by mobilizing the Subanen tribes. Farmers who are interested to join the program undergo 2 weeks orientation in the Bukagan Ecological Institute (Malaubang, Ozamis City, P.O. Box 177). Farmers who decide to become members are required to plant their lands with stewardship titles. Each farmer must plant 2 hectares per year under the program. Farmers plant the seedlings in the reforestation sites without paying back the foundation. It means that they will derive the fruits of their labor fully. Farmers work in teams of five with their neighbors. They are led by a Pipuli team leader. For planting, farmers receive P60/day allowance. A one day "in service" seminar is required each month. They learn sensitivity to nature and techniques in seed collection and nursery management. Seed collection is done by a farmer seed collector. He gathers seeds from the remaining forest and delivers them to the central nursery of the Bukagan gardens in Ozamis City. The seeds are immediately bedded within a week. So far, approximately 200 to 500 hectares have been planted to more than 140 different tree species. Approximately 90 of the 140 are indigenous to the Mt. Malindang forest. More than 40 species are fruit trees. Tree survival is 84%.

Farmers carrying seedlings and marked stakes on their way to the reforestation site.

They also have forest guards composed of Subanen farmer volunteers. They also maintain a mangrove sea sanctuary in Baliangao, Misamis Occidental. They are encouraging students and volunteers especially those with knowledge in taxonomy to help them in species identification. The reforestation project receives financial assistance from Community Aid Abroad of Australia and Novib of Netherlands. This investment from Novib and Community Aid Abroad may have more far reaching effects and maybe more cost effective if one would take into account the expenses for road and infrastructure repairs caused by floods due to forest denudations.

3.2.18 The Farmer Bishop

Bishop Jose Manguiran of the Diocese of Dipolog in Mindanao is more than a bishop. He is a farmer, a botanist, a blacksmith and an engineer. He is versatile, simple and approachable. He hails from Bukidnon where he practiced his priesthood for 20 years. He was ordained as a bishop in 1988 and was assigned in Dipolog. He is famous environmental activist as parish priest and vicar general of the Diocese of Bukidnon. When he was assigned in Dipolog, he established an 11 hectare demonstration farm. The farm is called the Diocesan Agricultural Center for Emancipation (DACE).

Planned diversity

The DACE farm has a well-planned species diversity. Approximately 6 hectares were planted mainly with indigenous timber species collected from the forest. There are also exotic trees like Acacia mangium, Acacia aurecauliformis, Gmelina arborea, Ficus species, etc. The under storey also abounds with different ornamental plants. In the backyard of the bishop's house is a collection of more than 10 kinds of Ficus species, different kinds of bamboos plus a wide array of different indigenous and exotic ornamental plants. The remaining part of the farm is planted with different fruit trees like mango, bananas, santol, citrus, papaya, etc. Underneath the fruit trees are pineapples.

According to the bishop, the purpose of the forested area is to make it as a site for trainings, camping, retreats and other related activities on the environment. The DACE farm is ideal for picnic and "nature walking."

"Down to earth" Bishop

The bishop wherever he is assigned allocates most of his time for farm work. He makes sure that almost all of the plants, fruits and forest trees, are planted personally by him. He believes that a person handling the planting activity greatly affects the growth and development of the plants. In planting the seedlings, he sees to it that the hole is big enough so that the roots could extend fully without interference. He observed that the bigger the hole the better. This will allow the plant to produce more lateral roots. Lateral roots are mainly responsible for nutrient uptake. The more lateral roots the faster it will grow and bear fruits. The based of the fruit trees are mulch with different farm wastes within the farm. He opines that household plant nursery is absolutely necessary to develop agroforestry farms.

He also made his own farm tools e.g., double handled-double bladed bolo, multi purpose shovel that can also be used as holing bar. He has a golf club like tool that is very effective in cutting weeds. He sees to it that every farm tool should be sharp, easy to use and multi-purpose in nature.

He also assembled his four wheel drive car suited to the rough terrain. He also writes his experiences in farming combined with his theological reflections. He regularly produces a Visayan dialect pamphlets on ecology entitled "Lugas" which means grains.

By Apollo Pacamalan

3.2.19 Herbal Veterinary Remedies

Farmer-partners of OFFERS- Mindanao easily accepted herbal remedies for several livestock diseases and pests. These alternatives to expensive commercial veterinary drugs were found to be cheaper and effective.

The following are herbal veterinary medicines prescribed and found effective by OFFERS - Mindanao:

A. Powdered dried mangosteen peelings

Indications: Piglet Diarrhea

Dosage: For two weeks to one month old piglets, give one teaspoon of the powder dissolved in 5 - 10 ml. Water orally three times a day. For two to four months old piglets, give three teaspoons of the powder dissolved in 5 - 10 ml. water.

B. Powdered Coconut Shell Charcoal

Indications: Piglet Diarrhea

Dosage: Orally administer to each piglet 25 grams of the powder dissolved in water three times a day.

C. Avocado, Guava and Caimito leaf decoction

Indication: Diarrhea

Preparation: Boil 10 mature leaves each of avocado, guava and caimito in 16 oz. of water.

Dosage: For piglets, give 10-12 ml. of the decoction orally. For goat kids, give 20-25 ml.

D. Black Pepper Berries

Indications: Prevention of fowl fox in Chicken

Dosage: Feed each chick a berry of black pepper per day from one week old until it reaches 21 - 30 days old.

E. Green Papaya and Rice-Tiki-Tiki (Fine Bran) mixture

Indications: Sow agalactia (Lack of milk in lactating sows) or scanty milk let down.

Preparation: Boil green papaya fruits until tender, mix with rice tiki-tiki just before feeding.

Dosage: Give as feed three times a day to milking sows.

F. Water and Vinegar Mixture (50-50)

Indications: Antipyretic (for lowering fever) in livestock

Application: Mix equal amounts of warm water and vinegar in a clean container. Wet a clean rag or sponge with the mixture and rub on the entire body of the animal.

G. Mayana or malunggay (Horse radish) leaves

Indications: Wound disinfectant.

Preparation/Application:
Cleanse the wound with soap and the sap of freshly pounded mayana or malunggay leaves. Repeat daily until wound is healed.

H. Makabuhay vine

Indications: Control of stomach worms and liverflukes in mature cattle, carabao and horses.

Dosage: Drench each animal with the sap of mature makabuhay vine mixed with sufficient water.

I. Coconut Milk, Tobacco leaves and Sulfur liniment

Indications: Control of ectoparasites in animals

Preparation/Application:
Boil 2 glasses (8-ounce glass) of coconut milk, 3 chopped dried tobacco leaves and 1 tablespoon sulfur powder until the mixture becomes oily. Let it cool. Clean the affected skin of the animal and apply the liniment once a day for 3 - 5 days.

Source: EFP Bulletin
July - Dec. 1991
Vol. 4, No. 3-4

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