



Farmers access seeds through seed banks, without depending on external agencies.

Adapting to change with a blend of traditional and improved practices

In Dhala, farmers have been blending traditional and “improved” farming practices to adapt to the changes in climate they are experiencing. By including practices like mulching, new seeds or vermicomposting in their agricultural systems, yields have improved. This has also shown how NGOs can assist communities in the dryland areas to reduce their vulnerability to climate change.

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As a result of climate change, agriculture in the world’s drylands is being seriously threatened by rising temperatures, changes in rainfall patterns, or the increase of drought. This is directly linked to reduced soil productivity, and to a higher incidence of pests and diseases. Food security is an increasingly important issue for the rural communities who rely on agriculture to meet their subsistence needs. Adaptation to climate change is thus a major concern. Several efforts are underway to identify approaches and measures to reduce the vulnerability of rural communities to its impact. This article presents one of these efforts: the combination of traditional and “improved” practices, as facilitated by Seva Mandir, an Indian NGO.

Traditional adaptation

Dhala is a beautiful tribal settlement found in the mountainous region of Udaipur, in southern Rajasthan (a state in north-

western India). This region has a low and highly erratic rainfall pattern, with periods of drought almost every three years. Most farming households own less than two hectares of largely fragmented land. Farming is primarily rainfed, as irrigation systems are poorly developed. By the end of the previous century, farmers in Dhala, like those in the other rural and tribal communities in Udaipur, were facing many difficulties, like land degradation, low water availability, a lack of knowledge and resources to invest in improving their agriculture. As a result, they had low yields and low incomes.

Climate variation is common and quite a natural phenomenon in the drylands of Udaipur. Farming systems in the region have consistently had to adapt to these variations. Farmers in Dhala, for example, have adapted by regularly adjusting their farming practices. In this process, various simple, resource-efficient and locally apt practices evolved on the basis of their experience, trials, resources and skills. Many of these practices, like those which follow below, are now essential components of the local agriculture systems.

Intercropping or mixed cropping

Intercropping refers to two or more crops grown at the same time in the same field. In Dhala, farmers grow maize together with various legume crops like chickpeas, black gram (*Phaseolus mungo*) or *sismum* (*Sesamum indicum*). Intercropping is done in different combinations: one row of maize and one of legumes, or one row of maize and two of legumes and again one row of maize. Selection of a particular combination depends on soil conditions, the topography and the specific requirements of the farmer. These different

combinations reduce the risk of crop failure in a bad monsoon; if maize production is affected, farmers can rely on legumes, with a lower water requirement, for earning. In addition, intercropping allows households to use their land optimally by taking different crops at one time. Legumes, for example, fix high quantities of nitrogen, supporting the growth of the maize plants, while also reducing the presence of pests and diseases.

Green manuring

The use of chemical fertilizers has been favoured in recent years, through governmental subsidies and by other external factors. In Dhala, however, the traditional practice of green manuring is still widespread. Green manuring involves the cultivation of Sunn hemp (*Crotalaria juncea*), a forage or leguminous crop with a high nitrogen content. This crop is grown during the monsoon in the fields that will later be used for wheat or other cash crops. The plants are cut before flowering and are incorporated into the soil, improving soil fertility and structure. To some extent, the practice also controls pests, diseases and weeds in winter crops. Farmers in Dhala have mentioned that the yields of wheat are quite good in those fields where hemp was grown. Many of them are in favour of this practice. The major constraint is the need to dedicate land (and energy) for the cultivation of Sunn hemp during the monsoon, which is the main cropping season.

Mulching

The optimal use of available water is a top priority for the farmers in this area. Mulching is used to reduce evaporation, as well as to prevent soil erosion. Mulching enhances water infiltration, and helps prevent the topsoil being washed away by high winds or water run-off. In Dhala, mulching is used when growing tuber crops like turmeric (*Curcuma longa*) or ginger (*Zingiber officinale*). Fields are covered with the leaves of *khakhra* (*Butea monosperma*) after sowing, and these are left until the plant grows. This practice has also generated an additional use of *khakhra*, an abundantly available local tree species which can also be considered as a green manure.

Introducing “improved” agricultural practices

Seva Mandir is a development organisation which has been working with more than 600 rural and tribal communities in Udaipur for the last 40 years. Its various programmes include development of natural resources, health, education, women and child, and the local institutions. For almost two decades the organisation has been working in Dhala, during which time various development interventions have taken place in the village. During the first half of the current decade, we implemented an integrated watershed development programme with the purpose of improving the productivity of the land and water resources. We were also interested in helping farmers cope with an erratic rainfall and frequent droughts. In the process, we promoted various “improved” agricultural practices, involving both rainfed and irrigated farming.

Improved seeds

Agriculture in Dhala needs to withstand the impact of low rainfall and frequent droughts. Moreover, the availability of irrigation water in sufficient quantities is definitely a luxury for the villagers. Hence, most farmers either restrain from growing crops which require more water, like wheat, or spend ample resources on irrigation. In order to address these concerns, we promoted crop varieties which mature early and are drought-

tolerant. The introduction of these “improved” seeds started with two farmers in 2006, and is expected to reach around 60 families this coming year.

Vermicomposting

This is a widely accepted organic practice used in dryland agriculture. It is used to improve the nutrient content and water holding capacity of the soil. Its preparation involves composting cattle dung with biomass like neem leaves or fodder residue, and using worms to decompose it all. This practice was also introduced three years ago, and now more than one hundred farmers have adopted it.

Crop diversification

Depending on only one or two kinds of crops considerably increases the vulnerability of farming households. Crop failure can easily increase food insecurity, especially for small-scale and marginal farmers. The diversification of crops in Dhala intended to help farmers secure an income, as well as food, even in the case of extreme events. As part of this process, farmers were encouraged to cultivate vegetables on small sections of their fields, and to plant saplings on their individual wastelands (as areas which are otherwise only used to provide fodder for livestock).

Seed banks

Selective breeding, and collecting seeds for planting in the coming year, are age-old traditions in our country. Nevertheless,



Photo: Seva Mandir

Local practices are combined with new ideas, but only after trying them out on a small scale.

the development of a centralised seed supply system and the proliferation of hybrid seeds have considerably eroded these practices over the last three to four decades, increasing farmers' dependence on external agencies. A seed bank is an attempt to revive the old system of seed availability at a local level, in a refined way. With the support of Seva Mandir, a seed bank started in Dhala two years ago, grouping the 17 farmers who received new seeds of wheat and gram. At the moment, this bank has 45 members, who have also started storing maize seeds.

Response from the community

For centuries, farmers in Dhala have followed many traditional, locally apt and sustainable agricultural practices, most of which are now well integrated into their farming systems. The adaptation of new practices has been gradual over the last few years, with approximately half of all farming families now trying at least one of these practices. The results from these new practices have been encouraging.

For instance, the introduced wheat seeds require watering only twice during the whole season, in comparison to the five or six times that are normally needed. More importantly, the productivity of this "improved" wheat is almost the same as that of the old varieties. This means that the money spent on pumping water (an average of Rs 1200 per acre) is a net saving. In addition, farmers are giving one and half times the seeds received from Seva Mandir to their seed bank, storing them for the coming year. The community is thus becoming less dependent on external seeds.

Regarding vermicompost, the families who have been trying this out have been able to obtain considerable quantities of compost (approximately 1300 quintals among all involved households), all of which is being used in their vegetable plots and farmlands. By diversifying the crops grown to include food crops, vegetables and fruits, more food is available during the year. This has also possibly lessened the need for physical labour.

Certainly, the adoption of improved practices has not meant a divergence from old wisdom, and Seva Mandir has never intended to do that. Farmers comprehend their old practices very well, and they are most certain to accept new practices only after a satisfactory assessment. Farmers in Dhala took both groups of practices to be complementary. Accordingly, once persuaded of the benefits, farmers effectively and appropriately started to integrate the new practices with their tested old techniques.

A plausible approach for climate change adaptation

The different interventions in Dhala were planned to address the village's livelihood difficulties by increasing the productivity of local agriculture. This, as the results show, is progressing reasonably well, and will meet the expectations substantially. Adaptation to climate change was not an expected outcome. Seen in terms of climate change, however, the interventions clearly reflect many adaptation measures, both in terms of "coping" in the short run, and as a long term adaptation for building resilience.

The experience in Dhala has shown a plausible approach to community-based climate change adaptation. Recent climate change debates, which increasingly focus on the need to adapt, are pushing for approaches that can simultaneously meet development needs and help in adapting to the change. A few years ago, adaptation to climate change was considered to be a totally separate activity, and adaptation measures were not seen to be part of the on-going development programmes. However,

evidence has shown now that adaptation cannot be separated from the current development agendas, and it is necessary to look for ways to approach both challenges together.

It is recognised that dryland agricultural systems in villages like Dhala are used to climate variations, and show enough resilience to withstand the impacts of change. Traditional knowledge, and the farming practices based on it, are a vital ingredient in the current need to adapt to climate change. Nonetheless, we are all witnessing that the pace of climate change is much faster than the natural climate variations, and the impacts are expected to be more severe. Local agriculture systems are already facing difficulties because of climate change, and old methods might not be sufficient to withstand the impacts. Gradual adaptation to variation will not be a viable alternative, and farmers will have to prepare themselves for drastic changes in advance.

The idea of blending traditional and "improved" agriculture practices, as it is happening in Dhala, has shown a way for reducing the gap between vulnerability and the resilient capacity of the existing systems. On the basis of their own judgement and needs, farmers in Dhala are blending different old and new practices, with positive results: "This year we could sow seeds late and rain has been near to average, yet still our maize fields are almost ready for harvest (which is earlier than usual) and the yield will be more than what we used to get..." In the near future, farming systems in Dhala will have different combinations of old agriculture practices, like intercropping and mulching, and new practices, like vermicompost and improved seeds, being used. We believe that such blending will increase the adaptation capacity of local systems. The blending will also reduce the buffer period. The system will need to acclimatise to the changes, and at the same time, it will have the advantage of the modern knowledge on impacts and risks of climatic variations.

The way ahead

Recognising that drylands are highly vulnerable to the effects of climate change, Seva Mandir is now planning to promote different adaptation measures among other partner communities throughout the region. The approach followed in Dhala has shown us a way forward. The organisation has worked with around 80 communities on agricultural development, in all cases working together with the village *samuh* (a membership-based local organisation). Seva Mandir also firmly believes that bottom-up approaches are most suitable for development as they are closer to communities, and increase the sustainability of interventions. Hence, efforts shall always be underway to identify other trends emerging locally that can provide approaches for climate change adaptation. ■

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