MASIPAG's rice seed struggles in the Philippines: supplementary selection of empirical developments

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Contents

Introduction

This document provides supplementary material for the manuscript entitled "*Seed Activism on four fronts: MASIPAG's rice seed struggles in the Philippines*". It describes various aspects of the farmer-led network MASIPAG, its seed-related work, insights from three farmer organisations, and the Philippines country context. Descriptions are generally based on empirical data from interviews and (non-) participant observation, generated during twelve months of fieldwork between March 2019 and February 2023 (see appendix A of the manuscript). Own material is enriched with existing documentation by MASIPAG and substantiated with references to existing academic literature where possible, particularly when referring to the Philippine context. The document concludes with a bibliography.

1 Genesis: MASIPAG as a response to the Green Revolution in the Philippines

Historically, the emergence of MASIPAG and the roots of their struggles around seed, organic and agroecological farming, and the wider agrarian political economy are closely tied to resistance against the agricultural programmes of the former authoritarian President Marcos (Mendoza, 2004; Bachmann et al., 2009). The Philippines, effectively, were ground zero of the Green Revolution rice packages as the country was their breeding ground and target population (Stone and Glover 2016). Under the auspices of the *Masagana99* agricultural programme, President Marcos facilitated the introduction of Green Revolution technologies in the Philippines (Chandler, 1979). The primary goal of *masagana99* was to achieve national self-sufficiency in rice by drastically raising productivity with the help of modern agricultural technologies. The name of the programme reflected this aim, *masagana* being Tagalog for 'bountiful' and the number 99 being a reference to a bountiful harvest of 99 cavans per hectare.

National self-sufficiency in rice has been pursued by several governmental administration over several decades, but is considered an elusive dream by critics (REF?). *Maagana99* was initially successful as yields increased and the country was able to survive without rice imports in 1976 and 1977. This success, however, was short-lived and productivity decreased again and the farming population continued to be hungry, poor, and increasingly indebted (Tolentino 2006). Rising debts were not only problematic for farmers themselves as farmers' inability to repay their loans led to problems in the subsidy scheme of the programme and (nearly) bankrupted the country's rural banks (REF). While the programme did not meet its targets, it was very successful in promoting adoption of modern varieties like IR6 and IR8, especially in the major rice growing areas of Northern Luzon.

In the 1980s perceptions of failure increasingly circulated among farmers and other political interest groups, initiating a search for alternatives (Mendoza, 2004) and fuelling resistance against the President's agricultural policies (Santos, 2011). Filipino farmers had been experiencing food insecurity and accumulating debts, often resulting in landlessness. Existing analyses ascribe these consequences to two defining features of the *masagana99* agricultural programme: 1. The ecological unsustainability of Green Revolution technologies, and 2. "the dominance of transnational corporations in local production" (IATP and AFA, 2011:4). Farmers found it increasingly difficult to afford the seeds, synthetic fertilizers, and pesticides necessary to cultivate the modern varieties in their fields. Farmers were unable to continue farming without relying on external inputs, as they did not have access to varieties that grew well without chemical inputs. The traditional and landrace varieties they used to grow had disappeared in favour of modern varieties.

Concerned farmers, scientists, NGOs, and government officials gathered in 1985 – on the eve of the people power revolution[i] - to discuss these issues in an unprecedented forum called the BIGAS conference. The BIGAS (*Bahanggunian Hinggil sa Isyu ng Bigas*, or Conference on Rice Issues) national conference, is now considered the birth moment of the organic movement in the Philippines.

The conference attendants concluded that the government-backed Green Revolution technologies were responsible for the problems experienced by small farmers. Its most prominent outcomes are the farmer's "Declaration on the root cause of our problems" (ACES Foundation 1985, Frossard 1994) stipulating those conclusions, and the birth of MASIPAG as an organic rice breeding project whose first assignment was to develop an inexpensive, farmer-focused alternative to Green Revolution technologies (Bachmann, et al., 2009).

MASIPAG started out as a rice breeding project, "to revive and improve traditional rice varieties that would not require imported inputs and generate appropriate technologies attuned to farmers' problems and needs" (Bachmann, et al., 2009:xiv). These varieties would be owned and developed by farmers. Its first activities included the recollection of traditional varieties, testing their adaptability to different ecological circumstances, and finally developing improved MASIPAG varieties that were adjusted to different environments and performed well under organic farming conditions. Farmers and agricultural scientists from the University of the Philippines in Los Baños (UPLB) have been collaborating in these activities, combining their knowledge, capabilities, and assets to develop MASIPAG's farmer-led breeding approach and trial farm system. The name MASIPAG encompasses this cooperation as it is an acronym for a Tagalog expression – *Magsasaka at Syeintipiko para sa Pag-unlad ng Agrikultura* – that is translated as Farmer-Scientist Partnership for Agricultural Development (Bachmann et al., 2009). *Masipag* is also a common Tagalog word meaning hardworking and industrious, reflecting a second meaning and attitude embraced in the network.

MASIPAG since has grown into a nation-wide network of farmers organised in People's Organisations, scientists, and NGOs, which sees organic farming as a tool for farmer empowerment, food security, and food sovereignty (Bachmann et al., 2009). Its work consists of a variety of practical programmes around seed and breeding, organic farming and diversified livelihoods, technology development, processing and marketing, Participatory Guarantee Systems as organic certification, climate change resilience, and advocacy at different levels of policy making. The network's way of working, organising, decision-making and leadership are grounded in the farmer-led principle. The network holds annual regional assemblies and a national assembly every three years, during which important elections, decision-making, and programme strategy formulation takes place. Its National Secretariat, responsible for nation-wide operation, is located in Los Banos, Laguna. This location is of symbolic value for the movement, since it is also home to IRRI as well as UPLB where MASIPAG was founded. The network has three regional secretariats, responsible for supporting operations in the three major regions of the country – Luzon, Visayas, and Mindanao.

MASIPAG's seed work organises around three important principles, which include the conservation and development of genetic resources, appropriate technology development, and the farmer-led approach. They articulate MASIPAG's mission to work with an holistic, farmer-led, farmer-centred, and farmer-empowering approach to the deepening crisis of agriculture (Bachmann et al., 2009). MASIPAG's agricultural narrative provides an account of Green Revolution failure, mostly through critiquing how it has separated farmers from their means of production – seed, bio- and genetic diversity, cultivation practices/ inputs and machinery, associated knowledge, and land. MASIPAG considers its work is an ongoing critique of (inter-)national rice breeding programmes, the devaluation of farmer knowledge, environmental degradation, and biodiversity decline; as well as how these phenomena are firmly embedded in a capitalist agrarian political economy and international agricultural politics focusing on capitalist agrarian development through intensifying agricultural modernisation. The network is firmly positioned in national and international, Southeast Asian alliances for peoples-led food sovereignty and agroecology.

2 State agricultural and rice seed programmes in the Philippines

The agricultural programmes of the Philippine state are characterised by their on-going effort to increase rice production in order to ensure the population's food security. For several decades, this effort was oriented towards the goal of attaining national self-sufficiency in rice and strategies centred on continued modernisation to enhance productivity and efficiency. To understand Philippine agricultural and rice politics it is necessary to highlight that the archipelago of Southeast Asia was ground zero of the 1960s' Green Revolution, Golden Rice today (Stone and Glover, 2016), and an experimentation site of the World bank's market-led agrarian reform approach (complementing the government's state-led reform programme, see Borras, Carranza, and Franco, 2007). Despite being a major producer, the country has always needed to import rice to satisfy national demand. Civil society-, non-governmental-, and farmer organisations have challenged the state's approach to agricultural development since the country's independence in 1986, and employ alternative ideas about production, trade, and the position of farmers in food systems (Santos, 2011).

Agricultural modernisation through Green Revolution-technologies have been central to agricultural programmes[ii] from *masgana99* until today (Tolentino 2002, 2006; Cabigas and Morala 2011). *Masagana99* differs from the programmes that followed it in its focus on irrigation infrastructure and credit support. Agricultural programmes post-Marcos Sr. have been more market-oriented and generally provided seed and fertilizer subsidies of some sort to rice farmers. Tolentino (2006) remarks that the programmes generally varied in name[iii] but not in approach, despite differences in implementation. Agricultural programmes do not function in isolation, but are often integrated with longer-term and broader development plans and legislation, such as the Agriculture and Fisheries Modernisation Act of 1997 (RA8435-1997) that attempted to integrate agricultural modernisation with rural development and poverty alleviation.

The importance of seed programmes and subsidies are highlighted also by national scientists, who remark that the vitality of the national seed sector/ market depends on the seed programmes of the agriculture programmes. The varieties are developed almost exclusively in public research facilities, including the Philippine Rice Research Institute (PhilRice, established 1985), the International Rice Research Institute of the CGIAR (IRRI, established 1960), and a few public universities, most notably the University of the Philippines of Los Banos (henceforth UPLB) (Hernandez 2013). They are grown by private seed growers and distributed mostly by the Department of Agriculture as well as traders. The commercial rice seed sector that has developed under these programmes develops and circulates mostly modern, inbred varieties. Surveys of PhilRice show that despite the continued presence of farmer- and traditional varieties, the majority variety classification grown by farmers between 1996 to date are modern, inbred varieties (PhilRice 2016). At the same time, 'market participation' in each season fluctuates but remains low, which means that farmers continue to save seed of modern varieties rather than buying or otherwise acquiring new, certified seed.

While the majority of varieties developed are inbred, high-yielding varieties, hybrid rice is on the rise. Initially, hybrid rice in the Philippines was developed by the public sector and in cooperation with Chinese experts. In 1998 the government introduced a commercialisation programme that incentivised private sector involvement. Between 2001 and 2014, 24 of 44 hybrid varieties developed came from private sector facilities (Sombilla and Quilloy 2014), a mix of transnational corporations and Philippine subsidiaries.[iv] However, adoption rates remain low, at 4% of surveyed farmers in 2012 and 10% in 2016 (Sombilla and Quilloy 2014; Palaystat). Hybrid rice has gained renewed attention under the current President Marcos Junior (in office since 2022). Promotion of hybrid rice is central to his administration's agricultural programmes and considered the crucial step to enhancing productivity and finally attaining national self-sufficiency in rice production (Philstar 2023, Philippine Information Agency 2023). Within the commercial seed sector there is a tendency for a task division between public and private breeding centres developing modern inbred and hybrid varieties respectively.

The agricultural programmes of former Presidents Aquino III (2010-2016) and Duterte (2016-2022) both contain features that set them apart from other programmes. They are also most relevant to the research and analysis in question because they were in effect at the time of fieldwork.[v] The 'Food Staples Sufficiency' agricultural programme (DA 2012) largely fits in the country's heritage of focusing on modernisation but it also deviated from common approaches in important ways. For example, it expanded the focus of self-sufficiency to all key staples, it actively referred to the organic sector as a possible contributor to its goals, and its seed programme deviated from a long tradition of providing seed subsidies for modern, high-yielding varieties. Instead, the programme focused spending on improving vital infrastructure and promoting a community seed banking programme wherein local government units facilitate a municipal-wide seed exchange among farmers and PO's. Hence during fieldwork in 2019 many farmers reported receiving what they considered 'free' seed from the government. They then further described it as a 'one for one' scheme, in which they received one sack of seed and returned the same amount of seed after their harvest. Within POs or communities the seeds were distributed by the PO chairperson or the barangay captain and farmers needed to be registered in order to join the scheme.

The Rice Competitiveness Enhancement Programme (RCEP) was introduced in 2019 in tandem with the Rice Tariffication Law (RA11203-2019) that codified how the country lifted its import restrictions in accordance with WTO requirements. Rice imports were no longer restricted and instead subjected to tariffs whose percentages differ according to the country of origin. The funds derived from the tariffs go to the Rice Competitiveness Enhancement Fund (RCEF) and are used to sponsor the RCEP's key programmes attached to the fund, such as the seed and fertilizer subsidies, farm mechanisation, and trainings programmes on, for example, livelihood development. Here the programme assumed that farmers who can no longer remain competitive in the sector are better served developing livelihoods outside of agriculture. The programme took effect in 54 out of the country's 82 provinces.

The RCEF seed programmes are public procurement programmes for modern, high yielding and hybrid varieties. In the 42 provinces that are considered low to medium yielding rice producers, the public procurement programme promotes the uptake of modern, high-yielding varieties. The Department of Agriculture considers production gains in these provinces to be dependent on the proper and full adoption of modern varieties and application of recommended rates of fertilizer and pesticides. In these regions, the use of certified seed during each season was limited prior to the programme, meaning farmers did not buy or make use of subsidies to obtain certified seed every cropping season. Application rates of fertilizers also remained below recommendations. The 12 high yielding rice producing provinces are included in the hybrid rice promotion programme. Productivity gains in these provinces are to be achieved by switching to hybrid rice varieties. In the remaining 28 provinces, rice production is not considered a major agricultural activity requiring programmes to boost productivity. In these provinces, rice seed production and distribution remains a privately organised market in which growers sell directly to farmers, or indirectly through their cooperatives or traders.

In the current RCEF public procurement programme, seed of modern inbred varieties is produced by private growers, often organised in associations or cooperatives, who get their foundation- and registered seed directly from PhilRice, the Bureau of Plant Industry, or foundation seed growers, and who contract their production to the procurement programme. The kind of varieties requested and amounts required for the programme are regionally established through a combination of different parameters. They include the results of two different testing and trial procedures, farmer's preference, market demand, and outputs of consultations with key stakeholders (PhilRice 2021). As much as possible, production and distribution sites are closely clustered, to minimise transportation cost. Seed is distributed to farmers through the offices of the City- or Municipal Agriculturist. Farmers need to register, and comply with a number of criteria for registration. The programme allocates 1 bag of 20kg of seeds per 0.5ha of farmland. However, the programme is unable to service all eligible famers in each municipality due to funding constraints.

An important success of civil society contestations of state approaches to agricultural development and modernisation is the recognition and promotion of organic agriculture starting in the early 2000s that lead to the Organic Agriculture Act of 2010 (RA10068-2010). In the late 1990s, the Organic Certification Centre of the Philippines was established to perform third party certification in the country. Its establishment was a joint effort by MASIPAG, whose farmers recognised the advantages of certification, and the Organic Producers and Traders Association (OPTA). OPTA's aim was to offer Third Party Certification within the country to make it easier and cheaper for organic producers that exported, for example to the EU. These efforts led to the government recognising Organic Agriculture as a business niche and the start of efforts to develop the sector. The Organic Agriculture Act was issued still under President Macapagal-Arroyo (2004-2010) and authored by the House Representative Alcala who would become Secretary of the Department of Agriculture under Aquino III. The Act provided some recognition of organic agriculture entails concrete support at local levels through associated programmes, often in the form of trainings, providing suitable tools such as composting facilities, or incidental supplies of certified organic fertilizers. However, the programme's budget remains limited to 1% of the DA budget (Salazar 2014).

While considered an important success, Organic Agriculture Act of 2010 has remained subject to continued contestations. An important critique addressed the initial lack of recognition of PGS certification; PGS was recognised only temporarily to offer a transition period until third party certification could be obtained. The Act was amended in [2022?] to permanently recognise PGS, however, entailing a heavily bureaucratic and state-facilitated PGS structure that deviates from existing PGS groups' structures and approaches. Others critique the Organic Act for its 'conventionalised idea' of organic as a value-added business strategy, niche sector, and input-substitution approach; and its representation of a farming sub-sector that barely existed and failing to acknowledge different types and classes of organic farmers, particularly the more subsistence-oriented and marginalised farmers who represent an important segment of MASIPAG's constituency. While the Law mentions the development of input markets as part of the organic sector's development and earlier studies point to this necessity as well (Salazar 2014, Cabigas and Morala 2011), neither IRRI nor PhilRice develop rice varieties explicitly suitable for organic cropping systems. Hence, seed work and varietal development for organic systems is mostly done by groups from the civil society.

3 MASIPAG's farmer-led seed work: rice breeding

MASIPAG's seed work consists of two key elements: a farmer-led approach to rice breeding and varietal development, and the trial farm system that facilitates farmer seed networks locally, regionally, and nationally (section 4). Grounded in scientific principles and techniques of plant breeding but tailored to the opportunities of small farmers, MASIPAG developed a farmer-led breeding approach that has yielded almost 1500 rice varieties – more accurately "selections" – thus far. In the following we describe the process in more detail, based on existing documentation prepared by MASIPAG (Vicente et al. 2009) and conversations with three experienced farmer breeders. The purpose of reproducing these descriptions here is to reflect MASIPAG's rationale of how key considerations – maintaining genetic diversity and being practicable for farmers – have informed the process. They are contrasted with insights and perceptions from IRRI (public documentation, interview 2022). I conclude this section with a sketch of farmer-breeders an their contributions to MASIPAG's seed network approach.

3.1 Key considerations for breeding and selection

MASIPAG's breeding approach aims to integrate scientific principles and techniques with a process that is practicable for farmers to execute and that yields varieties distinctive from modern ones in their genetic diversity. These key considerations are reflected in the breeding proper (setting objectives and

crossing) that employs hybridisation techniques and the modified bulk-selection that maintains more genetic diversity than the selection procedures of modern rice breeding.

Breeding objectives are set by farmers at the start of the process, determining the characteristics of the crop to be achieved. Maintaining the trial farm is an important condition to enable breeding as farmers select parent material from the trial farm where they observed the varieties' characteristics for several seasons. MASIPAG has established 16 plant traits that generally guide selection of parent material. The next step is to determine what variety will serve as the mother (female counterpart) and the father (male counterpart) in the cross. Female counterparts generally contribute 60% of genetic material while the male counterpart contributes the remaining 40% (Vicente et al. 2009). Hence, farmers choose the female parent based on what plant already has the most desired characteristics.

A key characteristic to know regardless of desired traits are the varieties' flowering dates. The flowering dates of parents to be crossed need to be synchronised in order to enable pollination. This means that as the breeding process commences, parent plants are sown and planted the exact number of days apart needed to ensure simultaneous flowering in the field. Because rice is a self-pollinating crop, combining traits from two plants requires crossing by hand. The mother plant selected for breeding is potted and brought to the shade for emasculation (since each flower contains male and female parts for self-pollination) one day prior to pollination. Removal of the male part (anther) happens in the afternoon. To remove the male part, a healthy panicle with partially exposed flowers is selected. The top and bottom flowers of the panicle are removed, leaving the flowers in the central part. Then, moving upwards along the panicle, each flower is cut open to remove the anthers and covered in a glassine bag before moving on to the next seed to prevent contamination. The bags are labelled with the name of the cultivar and the breeders initials. The next day in the morning, when pollen shedding begins, flowers from the designated male part are cut. The emasculated flowers of the female plants are pollinated one by one, using at least two flowers by tapping and shedding their pollen. The pollinated parts of the female plant are covered and the name of the male parent and pollination date are added to the glassine bag. Pollination may be repeated the next day.

The first filial generation (F1) develops from the seeds that are formed in the cross-pollinated panicles. They mature in about 28-30 days after pollination. After harvest, they are sundried in the glassine bags for three days and are ready for sowing after 2-3 weeks. Whether the cross pollination was successful becomes apparent in the various stages after pollination up until the F1 generation is planted in the field and maturing. Seed of the F1 is germinated and raised in petri dishes before planted into fields, transplanted per single plant alongside one row of the mother variety.[vi] If the cross was successful then firm full seeds will form, germinate, grow to maturity and bear flowers and seeds of their own, and bear distinct differences from the mother plant in observable traits. If the plants of the F1 generation indicate that the cross was successful, then the seeds of the ten best plants are harvested and bulked for the next planting of the F2. Selection in the F2 and F3 happens by maturity rate and plant height respectively. From the F2 crop, seed of the ten the best plants are harvested and bulked around harvest time (when the majority of plants are ready). After 10 and 20 days respectively, two more selections are harvested and saved. In total, three selections are saved separately, representing early, medium and late maturing selections of this cross. In F3, each selection – the early, medium, and late maturing – is planted in their own field and harvested in three bulks according to short, medium and tall varieties. One single crossing[vii] has now yielded 9 selections that differ in maturity rate and height. From F4 to F7, further selection happens according to other distinctive traits that address the earlier established breeding objectives and ensuing preferences. Farmer-breeders meticulously document all information and traits of their bulks and selections. Information about the key traits for which a variety was selected are passed along to the Backup Fam when the selection is included in MASIPAG's collection. This happens generally after F7 (commonly between F7 – F12) when the selections have become relatively stable. In case selections are the outcome of a collective PO-level breeding effort they are first verified in the plots of other farmers as well before being shared with the Backup Farm and included in MASPIAG's collection.

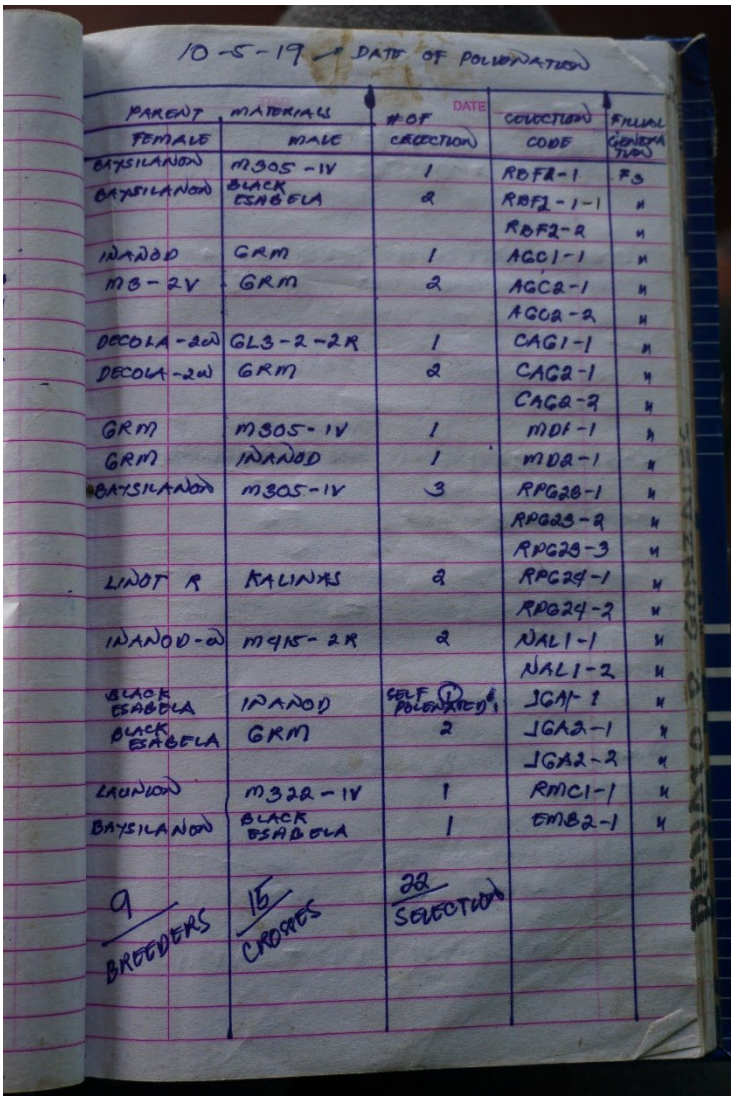
In naming varieties, MASIPAG nomenclature incorporates various pieces of information about the selection. Farmer-breeders choose a three-lettered initial as their own identification, while selections bred at the Backup Farm carry the single letter M. What follows is a number indicating the cross, bulk, and selection numbers. Vicente et al. (2009, 158) provide the example of M11-2-1, which "is the 11th cross done in MASIPAG, while 2 is the bulk number, and 1 is segregation group number". If a single cross yields selections of varying colours the respective letter is added to the end of the name, e.g. the red rice selection M105-2-1R.

Through the bulk selection method, one cross yields a variety of selections that can be maintained. Bulk selections may be considerably phenotypically uniform but maintains a level of genetic diversity. This is also evident from ongoing segregations within selections, hence requiring the careful selection of seed according to desired criteria (see for example picture 1 of a segregating selection grown in a PO trial farm). This segregation, however, is also a desired characteristic as it offers continuous opportunities to identify and 'sub-bulk' selections with desirable adaptations or traits as they emerge. This potential for ongoing selection is also one reason why MASIPAG's collection continues to grow. Bulk selection differs in process and hence in genetic uniformity/ diversity of the resulting varieties compared to the pedigree method that was common in formal rice breeding when MASIPAG was established and when Vicente et al. (2009) documented their process. The same differences still apply to today's single seed descent approach.

In describing the pedigree method, Vicente et al. (2009) highlight the fact that seed from individual plants are selected and planted separately (rather than bulked) in the following season. Plants are much more closely monitored and extensively documented, to identify the heritable and desirable traits, and to inform a careful selection that removes any variability and thus enhances uniformity. The result is a highly uniform pure line selection. In today's context however, the pedigree method is outdated and considered slow and costly. The labour and resources that made it unpracticable for farmers also rendered it less profitable for formal breeding. It was rendered wholly unsuitable in a context in which new varieties are developed at a faster pace to respond to ever-changing conditions and needs of farmers and entire sectors and to keep up with technological advancements that modify key steps in the breeding and selection process (Mackill et al. 1991). Today IRRI works with modified approaches of the Single Seed Descent approach, in which only one plant per family is selected from F3 onwards. This yields inbred lines that are, practically speaking, genetically pure and highly distinctive from one another, making it easier to select for desirable characteristics. The approach is modified with approaches that shorten the time to realise an established F6 generation and methods that aid selection of traits for a more targeted improvement of desired an complex traits. Other approaches include gene editing using CRISPR and genetic modification (IRRI 2019).

From the perspective of IRRI (interview July 2022), MASIPAG varieties or selections are considered 'relatively stable populations'; 'real purity' as we know it from modern, inbred varieties can only be obtained by selecting from one single plant. IRRI recognises the advantages of genetic diversity in the field for environmental-, climate-, and pest resilience, but genetic diversity in the form of the 'broad genetic base' that MASIPAG pursues through bulk selection is not considered desirable because plants continue to segregate. Hence, MASIPAG and IRRI seem to share a perception of advantage and resilience associated with genetic diversity in the field. They differ in views on how this genetic diversity should be achieved; proposing genetically diverse selections (MASIPAG) and the planting of several different but uniform varieties (IRRI) to enhance genetic diversity in the field.

Picture 1. A segregating farmer-bred line in a PO's trial farm, San Dionisio. Taken February 2023 by Lisette Nikol.



Picture 2. The notebook of a farmer-breeder from San Dionisio showing documentation of a crossing. Taken February 2023 by Lisette Nikol.

3.2 Cultivating farmer-breeders

The seed network and all its components rely on collective effort and MASIPAG's approach does not expect everyone to take on the same responsibilities. The key to its success and survival therefore lies in distributing contributions and effort among the entire group. It also acknowledges that not everyone has the same relation to seed, affinity with the technical or cognitive demands of breeding, or is in a position to contribute the required time, effort and labour. Key roles are taken on by farmer-breeders, either PO-based or taking care of the (National) Backup Farm.

MASIPAG has trained an estimated 60 farmer breeders in its 30 years of having a farmer-led breeding programme. Currently up to 20 are active, but they are ageing. Ageing farmer breeders are finding it harder to remain active since the process requires good eyesight and steady hands. While rice is often considered a male crop in the Philippines, farmer-breeders in MASIPAG are not exclusively men.[viii] The amount of varieties they develop varies between farmers, but the two most successful farmer breeders together developed about half of the farmer-bred lines. Becoming a farmer breeder takes a lot of learning, practice and time and for some these are reasons not to do it. A passionate farmer leader and trainer from Quezon decided not to pursue breeding, because it takes time away from other responsibilities that he wanted to take on within his PO and MASIPAG. Those who venture this path are generally active in their communities and in MASIPAG as leaders, teachers, and volunteers. One breeder interviewed had been barangay captain, barangay *kagawad*[ix], MASIPAG Board of Trustees

member and is still active in the Provincial Coordinating Body for his province. Another remains active in his area where he supports other PO's. Both also showed an eagerness to learn and to understand everything about rice and to share what they knew. They are meticulous in their observations, descriptions, and documentation in their notebooks. Both are in their senior years and grew up in a time when it was common for farmers not to continue school past the elementary level. One particularly emphasised being proud to take on responsibilities in the network and being able to share his own seeds with fellow farmers. Both breeders enjoyed the independence they have when it comes to seed. They are able to choose their own preferred characteristics and develop varieties that fit their priorities and preferences. Both also describe a change in their relation to seed because it is something they created themselves and they feel responsible for it, a deep feeling to take care and maintain them.

Aside from PO-based farmer-breeders, the caretakers of the Backup Farms are key to the seed work. They take on fulltime commitments to the conservation of MASIPAG's collections, conducting breeding activities and breeding trainings, and ensuring that the packets of seeds for the trial farms are prepared and distributed. A long-time caretaker of the National Backup Farm was Ka Perfecto Vicente, a farmer who also held a BS in Agriculture and who is considered the first farmer-breeder in MASIPAG. In his capacity, he developed many of the M-line selections bred at the Backup Farm and trained many fellow farmer-breeders in his days. After retiring from the Backup Farm, he continued maintaining a seed bank in his own farm and continued to train and educate the younger MASIPAG generations.

4 MASIPAG's farmer-led seed work: the trial farm system

The trial farm system is MASIPAG's seed system approach and a farmer-led seed conservation strategy. It encompasses a wide set of relations and processes to ensure its functioning according to a few established principles: in-situ conservation and farmer control. Its main roles and objectives include conservation of genetic- and agrobiodiversity, recognition of social production of seed, establishing farmer ownership and control of seed, facilitating collective access and collective organising, integration of farmer knowledge (generation) and scientific principles, and identification and development of climate change resilient varieties. Two key sites are the National Backup Farm where MASIPAG's entire collection of seed is conserved in-situ, and the PO level trial farms where 50 randomly selected varieties are grown and conserved. The PO-level trial farms are posed as an alternative to demo farms and prescriptive solutions. During the trial farm, farmers select varieties based on their location-specific suitability to key agro-climatic conditions.

On PO-level, farmers often refer to 'the trial farm' as the plot where the 50 varieties are being grown. However, it is important to consider it as a procedure, or a process, and not simply a farm, plot or location, because the key to this approach lies in the procedure itself. It can be hosted on a communal or individual member's plot and it is common for the trial farm to migrate between plots within a community over the years. The following briefly introduces the National Backup Farm, then describes the procedure as it is supposed to happen within communities, and summarises the different purposes that the trial farm process can fulfil.

4.1 The National Backup Farm

The 2132 varieties collected and developed in MASIPAG thus far are conserved in-situ in the National Backup Farm in Nueva Ecija. A smaller share of around 300 varieties is additionally conserved in a regional Backup Farm in Iloilo. The National Backup Farm in Nueva Ecija consists of 2.5ha of rice land. 1ha is allocated to the in-situ conservation of varieties, while the other 1.5ha serves the 'mass production' of MFGS-certified organic rice for sale. The profit funds repairs and improvements of the Backup Farm. Additionally, there are two buildings used by MASIPAG for meetings, trainings and workshops, or to host visitors. They also contain storage space for the rice harvest and the collection of seed. A large shed provides shelter to the farm's machinery and livestock. The National Backup Farm

further strives to develop a diversified, integrated farming system to actively implement MASIPAG's approach. The farm hosts a small vegetable garden in which a few rare vegetable varieties are conserved, fruit trees, a compost site, chickens, ducks, goats, and a carabao.

The in-situ conservation of more than 2000 varieties is undertaken by 2 fulltime staff at the National Backup Farm, and additional helping hands during peak moments like land preparation, transplanting, harvest, and post-harvest processing. The planting of the varieties is planned and mapped carefully each season, to ensure proper labelling and documentation of locations. Varieties are labelled in the field with bamboo sticks, and an additional map notes down all locations of varieties. Varieties are clustered together according to key characteristics, the most important one being maturity rate, then height. Because panicles for saving as seed are selected in bulk, they are selected when 80% of the plants have reached maturity, to retain purity. The collections are stored sorted according to type of collection (traditional, M-lines, farmer-bred) and the stored seeds are replaced every 6 months after harvest. An amount of seed per variety will always remain in storage during the cropping seasons when the varieties are planted out in the field, as safety precaution against harvest failure. The collection is still growing, with contributions of newly developed farmer-bred varieties and seed from traditional varieties that had not yet been included. Backup Farm staff prepare the packets of 50 randomly selected varieties for the PO-level trial farms. These packets generally reach their destination by being passed along between staff and farmer leaders as they travel for meetings or activities.

Picture 3. The packets for a PO's trial farm procedure are prepared at the National Backup Farm. Taken October 2019 by Lisette Nikol.

Picture 4. National Backup Farm. In-situ conservation of MASIPAG's collection at the National Backup Farm in Nueva Ecija. Taken October 2019 by Lisette Nikol.

Picture 5. Seed-storage of MASIPAG's collections at the national Backup Farm. Taken October 2019 by Lisette Nikol.

4.2 The trial farm procedure

To perform the trial farm, a PO receives a random selection of 50 varieties from the Backup Farm, comprising 50 grams of seed per variety. Out of 50 random varieties, the only set criteria are that they consist of 20 traditional varieties, 20 MASIPAG varieties and 10 farmer-bred varieties. A PO can request for a new set of varieties every two years. The 50 varieties received are grown continually – meaning each cropping season they are planted and the procedure is repeated again – until the PO receives new seed. Thus, each set should not be grown only once during one cropping. Ideally, in those 2 years they are grown on average four times if a PO has two cropping seasons per year. The continuity of the process has different purposes. For seed selection and breeding, it helps to observe seasonal and annual variations in variety performance and adaptation. The continuity is also necessary for the trial farm procedure to serves as in-situ community seed bank and to support organisational strengthening (see 4.3).

The trial farm is hosted on a shared community plot or a plot that is volunteered for this purpose by one of the farmer members. The seeds are prepared and grown with organic cultivation methods: seed germinates in water for 24 hours, it sets for another 24 hours and then it is transferred into a puddled nursery. At all times, farmers must take care to keep seed and labels with their names together. Transplanting happens 21-25 days after sowing. Animal manure, green compost and animal-based amino acids are applied as basal and foliar fertilizers during crop growth. Weeding and pest management are done manually, using a rotary weeder, and predator animals (e.g. ducks against golden apple snails and their eggs, goats keep away rats). During all stages of crop growth, important agronomic characteristics and planting and transplanting dates are recorded by farmers in the Simplified Evaluation Sheets. The chores during crop growth as well as documentation of characteristics requires collective effort from the PO members. Trial farms are maintained collectively with the cultural labour sharing system or *bayanihan*.

When the crop is ready to harvest, this stage of the procedure is concluded with a farmer field day. As maturity rates of varieties differ, this is done when most varieties are ready or close to harvest which often means that not all varieties are harvested on the same day due to variations in maturity rate (e.g. 90 days vs 120 days).[x] A farmer field day is organised for all MASIPAG-farmers in the PO to observe and evaluate the varieties, usually on the day when the majority of the varieties are harvested. The main purpose of the field day is to finalise the simplified evaluation sheets and to make a personal and a communal ranking of the ten preferred and locally adapted varieties. Final agronomic characteristics that are recorded in the simplified evaluation sheet are plant height, panicle length, amount of tillers, grains per variety before harvesting, and maturity rate (calculating the days between planting and harvesting). After they are noted, the plants are harvested and tied up in bushels together with the label of the variety. Milling, cooking and eating a small quantity is also part of this process.

After the harvest, farmers verify the performance of selected varieties from their preferred top 10 in their own fields. This accounts for differences in soil fertility and type, presence/ absence of irrigation and other ecological and environmental differences that occur between farmers fields. Farmers can keep the varieties they like and multiply the seed in their own fields, exchange with other farmers, or try another preferred variety after the next trial farm season. One farmer, either a farmer leader or the one hosting the trial farm on their plot, will store a selection of seed for the next season and the next trial farm process:

> *The varieties are carefully bundled, just a few tillers with enough grains to equal a handful – enough to grow another trial farm next cropping season. The other grains that had been harvested are in the homes and fields of other PO members. And of course they are carefully labelled, some with bamboo sticks and others with plastic-wrapped paper tags. My wonder and fascination with these bundles is met with a chuckle by the farmer (the same response I have gotten previously and will get again several months later). Still proud and valuing this gift, yet also a sense of normality, almost as if it was mundane. 50 diverse rice varieties, bundled, piled and wrapped in newspaper, stored safely under a peacefully napping cat in the living room,*

with dogs walking past and grazing the tips of the panicles that lose a few grains in the process. I learn that the seeds are usually stored in the cemented shed, together with the other seed and rice for consumption. I had encountered only a few cemented farm sheds, most others had been traditional nippa huts made of bamboo and palm leaves. But what all storage spaces had in common were the peacefully napping cats, protecting the safely stored goods from rats. (fieldnotes, June 2, 2022)

Picture 7. On the right hand side the trial farm of PO AOFA is recognisable by the lower planting density and greater variation in plants, especially compared to the planted field on the left. Taken October 2019 by Lisette Nikol.

Picture 6. Trial farm nursery of PO ALFA. Several varieties have been transplanted already while others still remain; in the centre a few bushels of seedlings are lying in the water ready to be transferred. A few have not germinated properly (bamboo sticks remain in the field in the lower half of the picture without a clear cluster of seedlings) and will not be transplanted. Taken July 2019 by Lisette Nikol.

Picture 8. Preparing for transplanting, trial farm PO ALFA. Taken July 2019 by Lisette Nikol.

Picture 9. Members of PO ALFA are transplanting during the trial farm. Taken July 2019 by Lisette Nikol.

Picture 10. Farmer field day in San Dionisio: PO members are documenting the final characteristics in the SES, documenting their personal preferred varieties, and harvesting the varieties that have matured. Taken February 2023 by Lisette Nikol.

Picture 11. Farmer field day in San Dionisio: harvested varieties are collected in the shade. After a short lunch break farmers will continue documenting the final varieties in the SES – counting the number of tillers and grains. Taken February 2023 by Lisette Nikol.

4.3 The purposes of the trial farm procedure

The trial farm has several functions aside from the very obvious and important strategy through which MASIPAG farmers access planting material. For example, it allows for varietal adaptation. By growing 50 varieties in the same location for at least four consecutive cropping seasons, farmers will be able to observe locally adapted selections, which means those that are able to dynamically adapt to the changing circumstances of the location. From MASIPAG's understanding of varieties that have a broad genetic base and therefore constitute a dynamic population able to withstand changes over seasons, the processes of selection, adoption, and multiplication should only happen after a several rounds of cultivation when these dynamic characteristics can be observed.

Second, the trial farm process supports variety characterisation and varietal development. During the trial, farmers identify crop characteristics of MASIPAG's collection, including traits for climate change resilience. During the trial farm farmers fill in the simplified evaluation sheet (SES), systematically collecting information on a number of important crop characteristics. In principle, the SES is shared with the National Backup Farm that keeps a record of all varieties' characteristics and adaptabilities. This has particularly aided the identification of a range of selections with characteristics that make them resilient in the context of climate change challenges, such as salt water intrusion, flooding, drought, extreme pests, etc. Hence, the trial farm is key to supporting community-based breeding as well as the network's wider farmer-led scientific work.[xi]

Third, trial farms are also community seedbanks. While all trial farms are considered 'living seed banks' by MASIPAG, a number of POs consciously maintain their trial farm – in combination with the varieties the farmers actively maintain in their own fields – as community seedbanks. These community seedbanks serve as foundation for resilience especially in the face of adversity. They enable communities to rehabilitate (themselves and others) following disasters or other adversities that wiped out harvests and individual seed stocks. They also offer a gene pool in which to search for particular traits if the need arises, for example in the case of emerging pests.

Fourth, farmers engage in active knowledge generation and practice scientific principles through experimentation and systematic observation. It requires from farmers to observe their rice crop and to select based on observation. Farmers evaluate their varieties based on their own active knowledge-generation rather than following recommendations from extension officers or input supplier.

And lastly, the trial farm requires – and therefore stimulates – collective work in the form of cultural labour sharing. Selecting locally adapted selections is a collective endeavour as different farmers prioritise different crop traits. In MASIPAG's strategy, a well-functioning PO also has a well-functioning trial farm and vice versa. Because it provide access to seed, the trial farm procedure is something that farmers are often eager to get started with, or re-start after being discontinued. It is therefore a practical exercise through which collaboration and organisational processes can be strengthened. It requires not only collective effort, but also coordination, collaboration, and diligent management strategies to ensure proper documentation, labelling, and storage.

5 Seed network dynamics in the PO's

5.1 Introduction of the field sites and PO's

Fieldwork was carried out in three communities where farmers were organised in a People's Organisation (PO) affiliated with MASIPAG. Kiday Community Farmers Association (KCFA) is located in sitio Kiday of barangay[xii] Pesa; Anoling Organic Farmers Association (AOFA) is located in barangay Anoling. Both are located at the foot of the Sierra Madre mountain rage, in the municipality of General Nakar. General Nakar belongs to Quezon Province that spans along the eastern coast of the country's largest island Luzon. Barangay Anoling is located near the centre of the municipality and hence easily accessible and relatively well-connected. Farmers grow their rice on irrigated lowland plots. Relatively more farmers here have the status of tenant and access their rice land through tenant

agreements. Few have space around the homestead for additional agricultural activities. Sitio Kiday is a 30 minute motorcycle ride from the municipal centre of General Nakar of which the last stretch involves a rocky and hilly road. An alternative access point is a small ferry operated be the PO, that crosses the Agos river to an access point in Magsaysay, also around a 20-30 minute drive to General Nakar. Rice lands are located on elevated riverbanks and qualify as irrigated lowland fields. However, in Kiday and Anoling irrigation also depends on rainfall ensuring adequate water supply. A few farmers in KCFA did not have access to rice lands in the sitio and instead cultivated lands elsewhere (e.g. Infanta, a neighbouring municipality) as tenants. Most members of KCFA had individual land titles for their lands, although frequently still in a deceased parent's or relative's name. A relatively remote place at the foot of the mountain, farmers have access to additional plots for vegetables close to the settlement or larger forest areas they can reach by foot.

The third PO is Alojipan Farmer's Association (ALFA) in barangay Alojipan that is part of the municipality of Culasi in Antique Province. Antique Province is stretched between Panay's western coast and the Central Panay Mountain Range. Alojipan is located in the mountains, connected to the municipality only by a narrow motorcycle-road that crosses three bridges and passes a frequently eroding hillside. Access to the community is more difficult during the rainy season and is regularly obstructed as typhoons and heavy rainfall destroy bridges or erode the unhardened path along the hillside. Farmers here cultivate their rice on terraced hillsides. Most farmers depend on rainfall and a few have access to irrigation. Their rice lands were relatively larger compared to the other two POs. All farmers also have access to land that they use for vegetable cultivation and livestock raising, as well as to the wider environment of the mountain forests that they forage for edible and usable plants. For example, farmers here forage leaves of the *madre de cacao* tree that are rich in nitrogen and therefore commonly used in compost or directly worked into the soil during ploughing.

ALFA and KCFA have been affiliated with MASIPAG since the early 2000s, while AOFA became a member in 2013. PO KCFA and ALFA already existed before becoming affiliated with MASIPAG. As a result, not all members of the PO are also MASIPAG practitioners. Some remain conventional farmers that do not attend any MASIPAG related meetings and trainings. This is not the case for PO AOFA, that was specifically established to organise farmers who were already practicing organic or intended to do so. In this field site, I included conventional farmers from the barangay that I approached through the farmer leader of PO AOFA.

Both provinces, Quezon and Antique, are included in the RCEF programme. The municipality of General Nakar, additionally, has an ordinance to promote organic agriculture and is an active member of the League of Organic Municipalities and Cities of the Philippines, but this is not the case for Culasi. This means that both municipal agriculture offices offer different kinds of support to their farmers. For example, the municipal agriculture office in General Nakar provides a variety of projects, subsidies, and programmes to support organic farmers that fall under their discretion to develop autonomous programmes alongside the nationally coordinated ones. The municipal administration at that time was also reluctant to promote chemical fertilizers and pesticides, but both continued to be available under implementation of the RCEF programme.

Picture 12. Terraced upland rice fields of PO ALFA in a valley of the central Panay mountain range near Mt Madja-as. The rice is late for the time of year since the planting of this (second) crop was delayed due to a severe typhoon that struck the island in August. Taken February 2023 by Lisette Nikol.

Picture 13. The lowland fields of PO KCFA at the start of the wet season crop. A few nurseries are visible and most fields have been readied for transplanting; a few fields in the centre-right have been transplanted already. The river Agos flows between the rice fields and the forest hill in the background. Taken July 2022 by Lisette Nikol.

5.2 Local farmer seed networks

The seed networks at PO level – in terms of relations, varieties, and changes therein – are outlined in section 2.3 of the manuscript. Here we supplement those descriptions with observations and anecdotes of practices that provide insight into a few conditions and particularities that informed farmer seed relations and varietal diversity and circulation in the PO's. An important observation that stands out from the material is the relatively greater diversity of MASIPAG varieties compared to modern varieties in all three PO's. In PO ALFA, the limited number of modern varieties grown is parallelled with an extreme popularity of one specific modern variety among conventional farmers, particularly in the season in 2019 when we conducted the first visits and interviews. Farmers in KCFA mentioned growing seven different MASIPAG varieties, farmers in AOFA six different ones, and farmers in PO ALFA mentioned growing thirteen different varieties. The lists are incomplete as several farmers could not recall the names of one or more varieties. The MASIPAG varieties named included a mix of traditional varieties, M-lines and farmer-bred selections in all three PO's. An interesting fact is that within all three POs, farmers were growing different selections of one particular farmer breeder. At the same time, almost all conventional farmers in PO ALFA reported growing the modern variety RC10. Some only grew one variety and a few grew a second variety alongside. As popular as RC10 was in 2019, because of its robust and steady yield even under drought, it had nearly completely disappeared in 2023 when farmers were growing other varieties they received through RCEF seed subsidies. Another observation regarding varietal diversity was the amount of varieties grown at the same time, during one cropping. In PO ALFA farmers generally grew two to four varieties during one season but in different plots. In the other two POs this was generally lower and limited to 1 to 2 varieties per season (with exceptions provided by the farmer leaders), but farmers would alternate the varieties grown in consecutive cropping seasons.

The difference in how diversity manifests in the communities has several explanations. For one, PO KCFA and AOFA have one wet season and one dry season crop. This means farmers select varieties suitable to the wetter and dryer climatic conditions that the seasonal differences entail. However, most farmers in PO ALFA do not have access to irrigation and therefore grow two consecutive wet season crops for which they use the same varieties. They will however – and this has to do with the second explanation – rotate the plots on which they sow the different varieties, meaning no plot will be sown with the same variety in two or even three consecutive seasons. Farmers who have a plot with access to irrigation are in a position to grow a third, dry season crop.

A second explanation that refers mostly to conventional farmers has to do with seed access relations. Most government programmes (the exchange programme farmers participated in in 2019 and the RCEF thereafter) will generally provide seed of one variety. In the case of ALFA, conventional farmers would save and re-use their RC10 seed and several farmers also participated in the seed exchange programme through which they accessed another variety (but sometimes also RC10). In Anoling however, conventional farmers also grew more than one variety because they got part of their seed stock through directly engaging in commercial relations in addition to receiving seed from the current government programmes (seed exchange and RCEF). While the programmes specify an amount of seed per ha to supply, they also have a ceiling of how much seed they would supply to individual farmers. In Anoling, the conventional farmers who participated simply had more land to plant. Hence, they would acquire the additional seed though saved seed or buying from local growers and suppliers. Conventional farmers in KCFA only started to structurally access seed from the municipal agriculture office when RCEF was implemented. The distribution site is on the opposing far-end of the municipality and only with the current subsidies did farmers consider the trip worth the cost.

The third explanation for on-farm varietal diversity in PO ALFA has to do with a particular set of practices among the farmers we encountered, particularly in 2019. Every farmer in this field site consciously rotated the plots on which a particular variety was grown. Hence, seed derived from the

harvest in plot 1 would be grown in plot 2 the next season and plot 3 in the season thereafter. If the rotation was complete, farmers exchanged the seed from that variety, preferring not to grow it in plot 1 again. Interestingly, farmers would also exchange their seed stocks of the same variety. Farmers consistently gave the same explanation for this practice stating "the soil wants another seed". One MASIPAG farmer shared an experience attesting to the consequences of defying this practice. He had developed the habit of continuously verifying and multiplying to adopt new MASIPAG varieties from the trial farm for his 1.5ha rice land. This PO's trial farm was hosted on a communal plot for a long time, but then had to move to an individual farmer's plot. This farmer then became busy with his duties for the barangay and so it happened that a few years went by without a trial farm being organised. This farmer was then left to continuously save and re-use his own seed. He also did not want to exchange seed, because he was rather particular about his preferences. In the seasons that followed the completion of his rotations, his yield started to decline. Also this practice had almost disappeared in 2023, alongside the seed exchange practices. It was no longer necessary for conventional farmers who received new certified seed at the start of the season. Many MASIPAG farmers also accepted the subsidised seed.

Another particularity of the seed networks worth elaborating is the occurrence of seed exchange alongside seed saving. Seed exchange in PO AOFA and KCFA generally happened rather occasionally and it was not a common or established practice. Farmers generally reproduced their own seed on-farm or used other, external access relations such as government programmes or commercial channels. Especially conventional farmers only saved as a safety measure. In Anoling, seed exchange among conventional farmers had long disappeared, amongst other reasons due to the differences in market value of seed from different varieties. Farmers also experienced a decline in seed stability resulting in less uniform – as they called it *lahok* – seed stocks of exchanged seed. MASIPAG farmers even rather opted for gifting small amounts, because they preferred to use seed that they had selected and stored themselves. In both communities, farmers have identified varieties suitable for each season, and they therefore did not experience any incentive to change. Gifting and sharing of seed was often curiosity-driven or social conduct if another farmer acquired seed from a far-flung place.

In contrast, seed exchange was lively and vibrant in PO ALFA. For one this seemed to be connected to the continuous need to change seed in response to the soil's demands. Seed would often be exchanged along strong social and kinship relations. Seed or *palay* – rice in its un-milled form in which it is stored and germinated – is also used as payment for harvest and post-harvest labour, as well as to pay for threshing services. Seed used as payment would frequently be milled as rice, but several farmers would use it as seed in their farm. This was also how two conventional farmers ended up growing MASIPAG varieties, albeit with chemical fertilizer and pesticides. Hence, the effects of subsidised seed distributed under RCEF here resulted in substantial changes to seed network relations and the ways in which seed circulated. It also led to the disappearance of a highly popular variety and a decline in varietal diversity in 'conventional' rice fields.

Exchange relations among MASIPAG farmers in PO ALFA, however, were not as straightforward. In theory, because seed exchange was such a common practice in this place the MASIPAG farmers were more predisposed to exchanging seed. However, exchanges still did not happen as structurally because these farmers had stricter preferences. For one, they preferred MASIPAG varieties, which limited their possible exchange partners. Secondly, and more importantly, farmers who were cultivating fully organic rice were rather reluctant to exchange with farmers who also had plots with 'conventionally' grown rice or who combined organic soil fertility management practices with synthetic fertilizers within the same field. They wanted to be sure that their seed came from several generations of organically cultivated crops. For some this was a principle (despite these farmers not being certified) while others argued that their harvest would suffer as a seed of a variety grown with chemicals would do less well in an organic system compared to a seed of the same variety that had been cultivated without fertilizer or pesticides.

Lastly, I want to illustrate the role of individual farmers within a collective set of relations such as the farmer seed network that relate to differences in MASIPAG practitioners' relations to seed.

Farmer leaders often had one of the higher diversity of varieties in their own fields, were meticulous in maintenance of their own varieties (other farmers will fall back onto them if they have difficulties), took on responsibilities to keep the trial farm going, and facilitated the longer-distance exchanges of seed with their travels for MASIPAG. The farmer leaders I encountered were generally in a position to make time for these additional responsibilities that would benefit their PO or the entire network. This means they did not have responsibilities to earn income through waged labour, had sufficient rice land (in relation to how many mouths they had to feed), and could rely on family members to take over farmwork in their absence. They were also people with a high sense of commitment and care towards others, and reflected about societal and political issues at a higher level. Oftentimes, key events in their lives inspired their attitudes: one lost their spouse to cancer that was likely caused by pesticide use; another had lost everything in a flash flood two decades ago and was able to bounce back and build their farm's resilience through MASIPAG's seed conversation. But aside from farmer leaders, there were also individual farmers who constituted key persons in the POs seed network through their individual practices. They took care to meticulously maintain their MASIPAG varieties and were therefore equally responsible for a continuous presence of MASIPAG varieties in the PO. Oftentimes they had relatively larger rice lands, livelihoods based in agrarian activities to a greater extent, and a few were able to sell a regular surplus which in some cases was certified organic through MASIPAG's participatory guarantee system. Kinship ties were important support networks for farmers and several farmers who were explicit in their dedication to maintain MASIPAG seed came from families where several other relatives were also MASIPAG practitioners.

5.3 The challenges of the trial farm

> *Rain is pouring down hard into the mud as tatay E. is handing me bundles of seedlings ready for transplanting, together with the bamboo sticks that marks their variety name. The mud of the rice field reaches halfway up his calves, just like with the other farmers who are busy (trans-)planting the seedlings one by one in the new plot. Every time they finish pushing the seedlings deep into the mud in a swift, skilled motion, they also place the bamboo stick in a strategic place to mark the seedlings as belonging to this variety. I have a hard time figuring out the system behind the placement and quickly lose oversight over which seedlings belong to which bamboo sticks in the freshly planted field. It's a good thing that I have a simple task: tatay E. places the bundles of seedling with their bamboo marker on the edge of the field, and I carry them, one bundle in each hand, and lay them down on the edge of the field into which they are transplanted. It feels like a child's task but it saves the other farmers doing the transplanting from crossing between fields as they work. Kuya N is ploughing the remainder of the field in the background. There are five farmers doing the transplanting, including the local farmer leader and his wife, and the wife of the farmer who own the plots hosting the trial farm. The other two helping out with the transplanting are sons of non-MASIPAG practitioners. They are good friends with kuya N. It strikes me that of those present, five are farmers belonging to four MASIPAG member households, and two are from families who are not MASIPAG-practitioners. This seems telling for this PO's challenges with the trial farm. (Fieldnotes August 2, 2019)*

MASIPAG's trial farm system poses particular requirements that farmers may sometimes find difficult to meet. This means that in reality, some individual farmer members or entire communities do not continuously perform the trial fam procedure. In the three communities visited for this research, we encountered a variety of challenges with the trial farm.

Some challenges were collective, where PO's struggled with continuity of the trial farm because of its location and due to difficulties finding volunteers. Where KCFA and AOFA succeed in organising their trial farm every cropping season, thus twice per year, the trial farm in PO ALFA has suffered some

irregularities. It became temporarily homeless after the community plot was reallocated to a different purpose and the farmer who agreed to host it became too busy with other responsibilities. Other times, they had difficulties to acquire or germinate seed. In all three PO's the organisation of the trial farm highly depends on the initiative of farmer leaders and careful scheduling and communication to ensure involvement of the PO members. Two out of three PO's actually have difficulties arranging volunteers for the trial farm, but for different reasons. In KCFA farmer labour is often tied up in other livelihood activities, such was waged labour (men) and social reproductive labour (women). Farmers carefully choose and plan when they attend collective or other organisation activities. One farmer expressed his disappointment in the fact that spontaneous help, which used to be part of the bayanihan spirit, is seldom offered anymore.

In PO ALFA, various factors seemed to explain the relatively small and shrinking group of farmers actively participating. Several farmers expressed a general feeling of dissatisfaction around the trial farm and particularly with the one-tablespoon rule. They preferred to receive larger amounts of seed so they could immediately plant their entire land. Others were unhappy with the attitudes of their fellow PO members or they were not informed about an upcoming trial farm in a timely manner. These dynamics reflected general ongoing dynamics within the organisation, which experienced problems with communication, participation of members, and intra-PO representation. These problems intensified during the pandemic and the PO found itself in a phase of reflection and re-strategizing towards the end of my fieldwork in 2023. Through these events I was able to observe and illustrate what various MASIPAG farmers, staff and scientists had repeatedly emphasised about the importance of the 'organisational health' of the PO for their success in engaging with MASIPAG's programmes. The organisational-level struggles of the farmers are mirrored in the challenges with the collective effort required by the trial farm procedure.

In all PO's, individual farmers also reported individual challenges and experienced difficulties with the process. It can take months and sometimes years to find a variety that farmers deem suitable and to have a sufficient quantity to plant their fields. Some farmers have limited access to land and therefore limited space to multiply their seed next to producing rice for consumption. In both instances these things are experienced as constraints because of farmers' urgency to convert to organic or the precarity of their livelihoods. For these farmers it is often more convenient to request a small amount from another farmer who has a suitable variety, to exchange, or to steal seed. I encountered farmers who explained how they resorted to stealing seed from another farmer because they felt they did not have the time to wait and observe. Another farmer noticed that a few single plants from his field had been harvested, and he claimed to know it was a particular fellow farmer who had stolen seed this way. In all cases, the farmers in question did not mind the stealing. Only small quantities of seed were stolen and they often emphasised that the other farmers must be in difficult positions to resort to these practices. In other cases it became clear that farmers relied on one of the farmer leaders to supply them with seed, while saving their own just as a precaution. While there is no clear explanation for this other than the leader's assessment that it is out of convenience, it contributes to an image of farmers struggling with various aspects the trial farm system in one way or another. It creates the impression that it is easier to engage in the trial farm procedure and adhere to its rules and procedures for some farmers, like the organic farmers whose livelihoods are almost fully grounded in agrarian activities, and more difficult for those who struggle to survive off of farming. These latter households had more precarious livelihoods, and often heavily rely on waged labour or have farm wives fully occupied with child care duties and therefore unable to spend much of their labour on farming or other income earning.

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Endnotes

[i] This happened at a time when resistance against Marcos was growing and civil society was organising mostly underground because they were forbidden under the dictatorship. Civil society organisations are attributed a significant role in Marcos' downfall (Abinales and Amoroso 2017). Together with the seriousness of what was at stake for farmers, the circumstances under which activist-minded people were organising during the height of martial law are key to illustrating the times in which MASIPAG emerged. A founding scientist-partner of MASIPAG described the circumstances in which the conference took place as follows (interview, May 2019): Farmers had organised a protest march in the days before. A group of activist scientists had arranged a permit from the University of the Philippines of Los Banos (UPLB) to use an auditorium on their campus, a stone's throw away from IRRI. In recollecting the events, she remarks how she had actually not heard or understood all discussions that took place since she had been in a vigilant state, moving around and keeping a look out for presence of military. On the third and final day of the conference she recalled a rather heated discussion between farmer participants and a representative from the Department of Agriculture, during which a representative from UPLB approached her stating he would revoke their permit. She believed that he was afraid participants would start revolting. The conference concluded later that same day, as planned.

[ii] Another interesting and typical feat are the frequent changes in the Agriculture Secretary post. The DA secretary is one of the most important posts in the cabinet, which can be explained by the political importance of rice, as well as hunger and poverty as policy issues. It is a common saying that rice politics can make or break even a Presidency. Few secretaries have completed the entire term of their administration. Particular highlights among this trend over the last 30 years are: the record six secretary

changes within the nine years of Macapagal-Arroyo's administration; Secretary Alcala of the Aquino 3 administration as the only Secretary in nearly 50 years to fulfil his entire term making him the longest sitting Secretary; and President Marcos Jr. filling the post himself for little over a year following his inauguration as President because there was nobody else he deemed suitable. This trend can be traced back all the way to 1971, as documented by Tolentino (2006).

[iii] This observation could be reconsidered. In his analysis, Tolentino (2006, 164) refers to a 1987 programme that had "been revived and relabelled at least five times". This programme was called the Rice Productivity Enhancement Program – RPEP – and its successors indeed differed substantially in their names. More recently however its name was largely revived along with its approach in Duterte's agricultural programmes and policies: the Rice Competitiveness Enhancement Programme (RCEP), his administration's agriculture programme, and the Rice Competitiveness Enhancement Fund (RCEF) created through the Rice Tariffication Law (RA11203-2019).

[iv] They include: Bayer, Corteva Agriscience (DowDuPont), Syngenta, Longping High Tech, Advanta, BIOSEED, and Pioneer Hi-Bred. Philippine companies developing hybrid rice are SL Agritech corp, Leads Agriventures, and Seedworks Philippines (NSIC 2024).

[v] When fieldwork began in March 2019, President Duterte was halfway through his term (2016-2022). The agricultural programme his administration had developed was about to take effect in the course of that year. Since the interviews with farmers took place between May and October and the cropping season started in June, they do not yet refer to Duterte's RCEF and rather reflect the seed programme developed under the agricultural programme of Duterte's predecessor, President Aquino III (2010 – 2016).

[vi] This is different from regular cultivation where seedlings are often transplanted jointly in small bunches.

[vii] Vicente et al (2009) describe a single cross scheme, but also mention several other possibilities for crossing schemes that farmers could perform.

[viii] Exact numbers – to indicate a gender balance – were not available.

[ix] The local term for an elected official or councillor of the barangay.

[x] A variety is harvested when 80% of the plants are matured.

[xi] Identifying variety characteristics and particularly their climate change resilience are an important precursor to identifying parent material for farmer-led breeding that fit breeding objectives.

[xii] A barangay is the smallest administrative unit in the Philippines. A sitio is a smaller settlement that is part of a barangay but located at some distance from the main settlement and centre of the barangay. In the case of sitio Kiday, it takes circa 15 minutes by motorcycle to cross a rocky and hilly road to reach barangay Pesa.