



POLICY BRIEF

A publication of the Policy Advocacy Group (PAG) of the Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD)



Role of Women in Developing Climate-smart Seed Systems in the Philippines

(Image credit: ICS Project Team, 2018)

The seed system is one of the pillars of agricultural development and food security. Just like other systems in agriculture, it is vulnerable to adverse impacts of climate change. One strategy gaining much traction in underdeveloped and developing agricultural economies is enhancing the role of women in the development of climate-smart seed systems. The literature is filled with evidences that more equitable gender roles lead to higher productivity and more sustainable development.

Research showed that where there is gender inequality, there is food insecurity. Understanding the role of women in various agricultural systems, such as in developing climate-smart seed systems, has therefore become imperative if a more climate-smart agricultural development is to be achieved.

The paper examines the role of women in the seed system and attempts to pin-down specific research and development (R&D) and policy initiatives that may be pursued to enhance such roles.

The first section defines and describes the seed system and the challenges brought about by climate change. The second section presents the roles of women in the seed value chain and identifies areas for enhancement. The third section shares some of the initiatives of the Department of Science and Technology (DOST) and the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development of the DOST (DOST-PCAARRD) toward



A formal seed system activity—distribution of certified inbred rice seeds in Sultan Naga Dimaporo, Lanao Del Norte. (Image credit: DA-Region 10 2020)

a more gender-equitable agricultural development. The final section identifies R&D and policy initiatives that may be pursued toward enhancing the role of women in developing climate-smart seed systems in the Philippines.

THE SEED SYSTEM

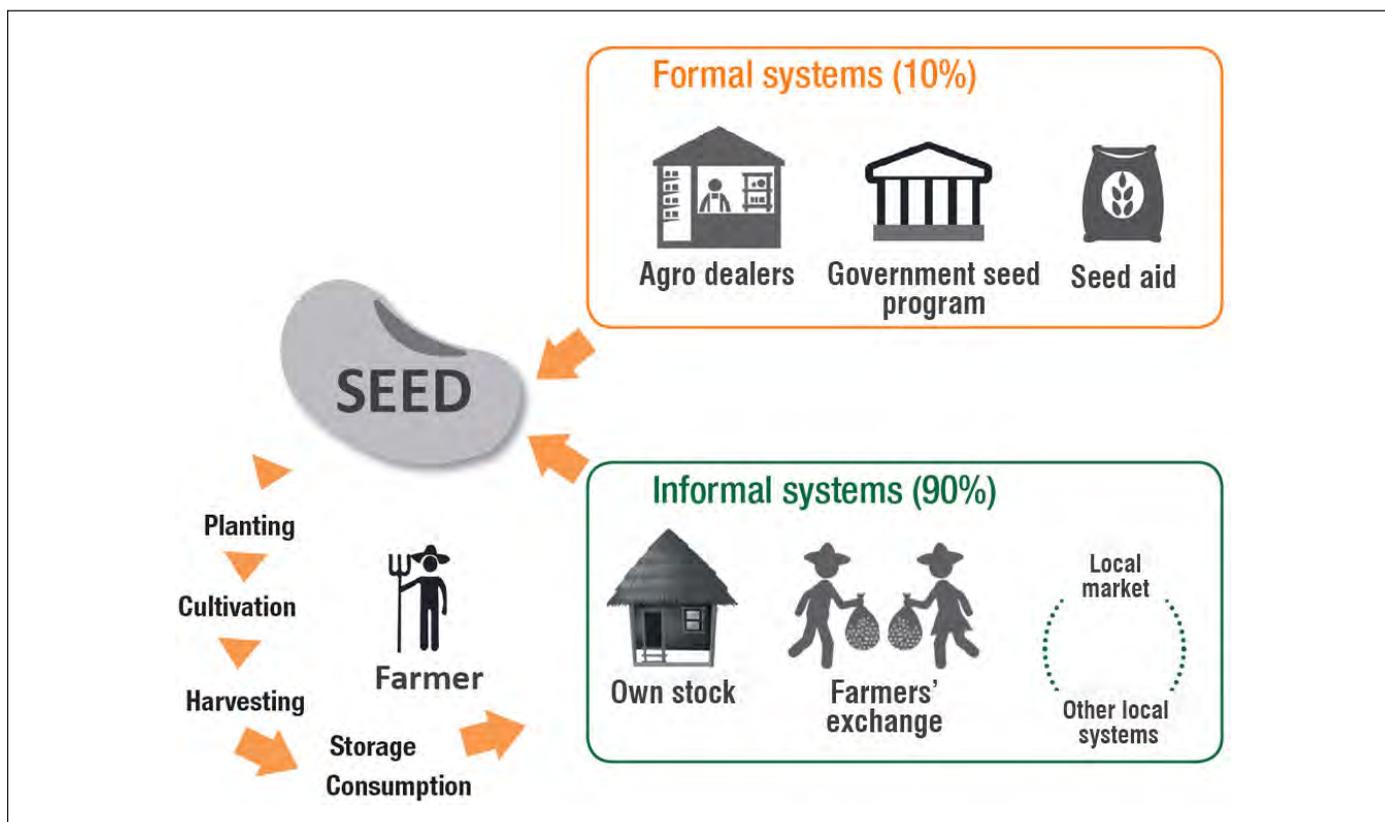
The seed system allows local farmers to obtain their desired high-quality seed of new crop varieties (CIAT 2019). It entails the entire chain of activities in the production, postharvest processing, and distribution of seeds carried out by different entities such as households, cooperatives, research and academic institutions, and other government agencies which bear the mandates of ensuring a sustainable seed flow for all

sectors of the society (FAO 2004). It also includes various private corporations and organizations that are involved in the production (e.g., collection and breeding), multiplication, processing, and marketing of seeds. A viable seed system ensures the production of affordable crops and quality seeds of a wide range of varieties accessible in time to farmers and other stakeholders (FAO 2020). The seed system in the Philippines consists of formal, informal, and integrated seed sectors.

The formal seed system is a systematic system that is constituted by a chain of activities designed to ultimately produce certified seeds of verified varieties. The production chain starts with seed selection and deliberate plant breeding that

lead to a myriad of various types and hybrids, then devising mechanisms for the promotion, release, and maintenance of seeds with recognized formal varieties. This formal system works on the underlying principle of maintaining the distinct identity and purity of plant varieties to ensure the production of high-caliber seeds with optimum physical and physiological quality. Marketing and distribution of certified seeds are operationalized through a limited number of seed outlets officially recognized to conduct commercial sale of such products (Launio et al. 2012). In the formal seed sector, private entities also aim to satisfy consumer preference for high-value seeds of different hybrids.

Meanwhile, the informal seed system, also sometimes called



Difference between formal and informal seed system.

(Image credit: ICRISAT 2021)

the local, traditional, or farmer seed system, covers activities that tend to be locally organized and integrated. The informal system is mostly characterized by other ways in which farmers access, produce, and distribute seeds. These different ways may come in the form of directly producing and disseminating seeds from their harvest, through exchange and barter among relatives, neighbors, and other farmers in the community, or alternatively through local grain markets. The informal seed sector dominates the seed production system in the country, producing 70 percent (%) of the quality seed. Approximately 80–90% of all planting materials used and promulgated is primarily derived from farmers' own-saved seed or informal seed sector (Mula 2014).

The integrated seed system is an approach to seed production, distribution, and breeding that has elements of both the formal and informal seed sectors, and conveys some level of coordinated actions between both seed sectors. This system practically reflects the interdependence of formal and informal seed systems and the dynamic relationship between such systems with each reacting and influencing the other in different ways. Integrated seed system has been the subject of recent studies, and has shown significant potential for enhancing seed production, particularly to small-scale farmers (Sperling et al. 2013).

However, any seed system requires a legislative regulatory framework or a seed policy. This regulates an expanding and

increasingly diversifying seed sector for the benefit of farmers and other stakeholders engaged in the seed production system. Republic Act No. 7308 or the Seed Industry Development Act, became a law in 1992, which empowers seed growers and fortifies the local seed industry. This law prohibits the voluminous importation of seeds that are being produced in the country, except for seeds that are inherently hard to propagate or cannot be produced adequately to meet 90% of their perceived demand at competitive prices. Administrative Order No. 4 s. 2009 of the Department of Agriculture also explicitly dictates that only seed varieties approved by the National Seed Industry Council and passed the standard national cooperative trial are allowed to be imported in commercial quantities.

To date, there are ongoing house hearings on the proposed amendments to the Act.

CHALLENGES IN SEED SYSTEM AMIDST CLIMATE CHANGE

Agriculture is suffering the consequences of climate change. There has been an evident increase in the frequency of extreme weather conditions, which is one of the adverse impacts of climate change (Singh et al. 2013). Crop production is affected by prolonged dry season and the occurrence of El Niño events. Severe soil erosion is another consequence brought about by an unusually high volume of precipitation during the rainy season, causing landslides and siltation problems. These extreme weather events are making small farmers extremely vulnerable to crop losses due to typhoons and droughts. To adapt to the current trends of ecological decline, farmers need to develop more ecological farming systems and seeds (Samson and Jensen 2006).

Agriculture and food production is at risk due to climate change

projected to increase in the future. Livelihoods, farmers' incomes, and ecosystems are at stake. By the year 2050, agricultural production will reduce by 2% and increase crop demand by 14% every decade. In South Asia, yields of major crops will face an average decline of 8%. Climate change will tremendously affect smallholder farming communities in the developing world (Hampton et al. 2015).

Furthermore, food security depends on seed security, thus the international seed industry must continue delivering the required quantities of quality seeds. Abiotic stress resulting from climate change, particularly elevated temperature and water stress, will reduce seed yield and quality (Frenck et al. 2011). The impacts of climate change and climate variability on seed production of arable crops, such as rice, soybean, cotton, and peanut impose several challenges to the continued production of quality seeds. Pre- and postfertilized arable crops are vulnerable, and when exposed to above optimum temperature,

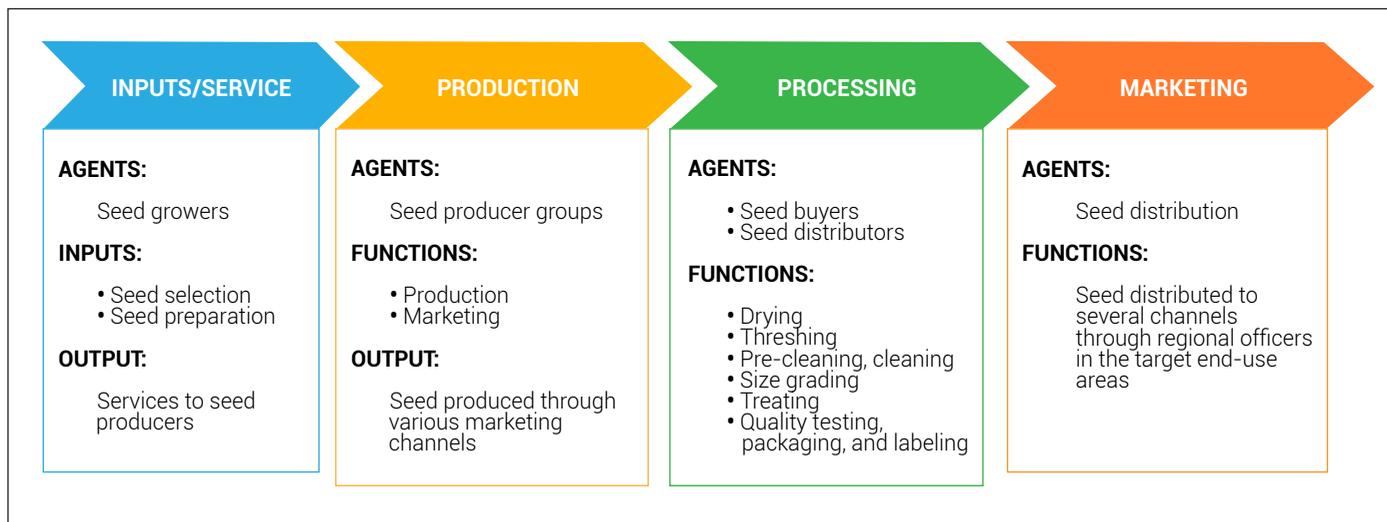
this result in substantial loss in seed production; moreover, the reduction in individual seed yield components takes effect depending on the timing and duration experienced by the species (Hampton et al. 2015).

THE ROLE OF WOMEN IN THE SEED VALUE CHAIN

Value Chain of Seed Systems

A value chain is a series of stages generally involving production, processing, marketing, and sales of a specific product or commodity (Fig. 1). It can also be defined as the chain of required activities from a product's conception to production (i.e., set of enhancements or physical transformations), delivery to final consumers, and disposal after consumption (Hellin and Meijer 2006). Common key players within the value chain include the inputs (i.e., suppliers), farmers, traders, processors, transporters, wholesalers, retailers, and consumers. In the case of seed systems, the value chain represents the general flow and transport of seeds from

Fig. 1. Value chain of seed systems.



seed growers to seed producer groups, seed agents, and target end-users.

Role of Women in Seed Value Chain

As the international arena places greater focus on food security, sustainable development, and climate change, there is an increasing recognition of producer organizations as central players. Focused attention on staple food value chains, small-scale producers, especially women, tend to be more active. For example, in the majority of sub-Saharan African countries, women are considered the main pillars of the rural economy. Almost 80% of women in Africa are economically active (Manuh 1998 as cited by Mulate et al. 2018). Furthermore, nearly 70% of food production in Africa is attributed to women who are part of the agricultural workforce. They provide support in agricultural activities as family members of men or participate as the head of their households. Either way, rural women play important roles in the development of agriculture and the attainment of food security.

Food and Agriculture Organization (FAO) claimed that there is an existing gender gap in agriculture. The main gaps identified are access to land, access to financial assistance and services, employment in agriculture-related jobs, social capital, and technology adoption. Such gaps exist predominantly in Latin American, African, and Asian countries. In terms of access to land, cultural norms generally dictate that



A woman harvesting sweet potato. (Image credit: DOST-PCAARRD 2016)



Women beneficiaries of Farmers Entrepreneurship Program of Jollibee Group Foundation.
(Image credit: The Manila Times 2018)



men own and inherit the land in Latin America, sub-Saharan Africa, and Asia (FAO 2011). In Latin America, daughters are much less likely than sons to inherit the land of their parents. Moreover, Asian women often struggle to assert their existing rights to land ownership. Lastly, community leaders prioritize men over women in terms of land allocation in Sub-Saharan Africa.

While there are attempts from these regions to address the gender gap in land access and ownership, such efforts are not always able to combat legal and cultural practices that still favor men (FAO 2011).

According to FAO, women are less likely to have access to financial assistance due to a lack of financial literacy. Financial products and delivery channels specifically designed to empower and satisfy the needs of women are limited.

Women bear almost total responsibility for household tasks and at the same time play a notable role in food production. They participate in the other stages of the value chain such as preparation of seeds, planting, harvesting, postharvest, processing, and marketing of their products. Women play a distinct role in planting, weeding, postharvest operations (e.g., threshing, seed management, selection, cleaning), and storage (FAO 2011). Most women select seeds for self-saving and household consumption (Wekesa et al. 2017).

In the Philippine farming system, the role of women has been increasing. Women have a dominant role in farm decision-making. They are in charge of purchasing inputs, managing farm activities, seed selection, and seed storage (Sison 1988). The role of women in rice agriculture, particularly in the Cordillera region, is mostly seed selection and management of varietal diversity. These tasks are considered light tasks that women can handle (Sajise et al. 2012).

The roles of women in the seed system, especially those involved in rice-based farming, have been captured by the studies of Paris (2011), Mula (2014), and Sajise et al. (2012). Generally, women in the household are responsible for seed management. They often share or have complete responsibility for the seed selection, seed storage, and pre-germination tests. They are also highly involved in the cultivation, drying, and husking. But aside from farming responsibilities, rural women have the primary responsibilities for domestic care (Paris 2011). Given these roles, which can be difficult and time-consuming, they can lose their capacity to sustain their families' farming.

Gender Equity in the Philippine Seed Systems

While there are limited specific studies that examine the roles and challenges faced by women in the various seed systems in the Philippines, available studies that examined gender equity in agriculture, in general, provide some

indications of empowerment of women in these systems.

Various factors affect the gender gap in agriculture in the Philippines. In 2011, FAO discussed that in terms of agriculture-based employment, men are more likely to get agriculture-related employment than women. Moreover, FAO stated that there is a low degree of participation among women in agriculture-related groups due to factors such as lack of time, trust, and interest.

Women empowerment in agriculture in four Southeast Asian countries namely, the Philippines, Thailand, Indonesia, and Myanmar, were examined through a qualitative assessment using the Women's Empowerment in Agriculture Index domains. In all countries, division of labor in rice farming appears reasonable where men are doing the seedbed and land preparation and fertilizer and pesticide application, while women help in transplanting, weeding, manual harvesting, and postharvest activities (Akter et al. 2017). Women farmers in the Philippines also participate in relevant farm decision-making. The study also found that husband and wife jointly own the resources, purchase, and sale of land, house, or major family assets. The pooled income of the husband and wife, in most cases, is managed by the wife. In addition, decisions about huge expenses are agreed upon together.

Women farmers in the Philippines are also active members of female-only and mixed

agricultural and non-agricultural organizations. In the Philippines, women play important leadership roles in these organizations.

Women in Philippine agriculture also have direct contact with the extension officers. They are relatively empowered, unlike those in Africa or South Asia. Enhancing the role of women in the development of climate-smart seed systems should no longer be about empowerment (traditional strategy in Africa and South Asia), but on capitalizing on their current role and creating an enabling policy environment and system to do so. In the Philippines, rural women appear to have relatively greater access to and control over income, better membership and leadership of rural organizations, and better access to extension service. These can be developed as effective means by which women can participate in the development of climate-smart seed systems in the Philippines. Related policies and their implementation should also be revisited and improved to enable and have a more appropriate system for this development.

DOST AND DOST-PCAARRD INITIATIVES TOWARD GENDER EQUITABLE AGRICULTURAL DEVELOPMENT

DOST-PCAARRD has long recognized the need to integrate gender in agriculture, aquatic, and natural resources (AANR) R&D. Therefore, it has pursued various initiatives that are presented and discussed in Tables 1 and 2.

Table 1. R&D initiatives.

R&D Initiatives to Develop Seed System	Brief Background
Enhancement of Gender and Development Integration toward a More Inclusive R&D in AANR	Republic Act 9710 or An Act Providing for the Magna Carta of Women enacted in 2009, mandates all government offices, including government-owned and controlled corporations as well as local government units to adopt gender mainstreaming as a strategy for implementing the law and attaining its objectives. This project is a comprehensive assessment of the extent by which gender is integrated in PCAARRD R&D and devises integration strategies to incorporate gender in AANR research.
Enhancing the Sustainability of the Informal Soybean Seed Sector	This project advances farmer seed-saving techniques from seed selection to storage and developing sustainability mechanisms. It also aims to address the expanding governance in the informal soybean seed sector, the development of local seed business and its integration with the local soybean markets, and improving linkage with the formal seed system.
Disaster Risk Reduction (DRR) of Climate Change Impacts in Agricultural Farms in the Cordillera Administrative Region (CAR)	This project aims to capacitate farmers and barangay and municipal officials on disaster risk reduction and climate change adaptation and mitigation through Science and Technology Interventions at the farm and community levels in CAR.
Improvement of Peanut Seed Production Management System	The project aims to boost quality seed production of improved and adaptable peanut varieties and employ enhanced cultural management, which involves varietal selection.
Science and Technology Action Frontline for Emergencies and Hazards (SAFE) Case Study of Farmer-Leader Marina of Madaymen Kibungan "Climate Hazards"	Women are increasingly taking on leadership roles in government-assisted development projects, especially in the context of climate change, usually dominated by males. The study assessed the technological adaptations of farmers to climate hazards such as drought, typhoon, and recurrence of pests and diseases. It also aims to increase the adaptive capacity of farmers to cope with the effects of climate change through trainings on adaptation measures suitable for the farming communities.
Tublay SAFE Women Capacitating Pool of Champion in DRR— "weathering the storm" the case of Asita Mag-ili	Women are increasingly recognized to mobilize resources during the different phases of a disaster. This study seeks to introduce "climate-smart agriculture" to farmers in CAR to increase the sustainable productivity and resilience of farming systems to climate impacts. Farmers were trained to adopt modern technologies, techniques, and practices that are appropriate to changes in the environment.

Table 2. Legislative initiatives.

Legislative Initiatives	Brief Background
Policy Action Group of Socio-Economics Research Division	Member of Technical Working Group on the following amendments to the Seed Industry Development Act (RA 7308): <ul style="list-style-type: none"> House Bill (HB) 1935 by Rep. M. Romero - An Act Establishing a Continuing National Program for Hybrid and Other Quality Seed Production and Providing Funds thereof and for other purposes HB 3591 by Rep. S. Garin - An Act Enhancing and Promoting the Seed Industry in the Philippines, Amending for the Purpose Republic Act No. 7308, otherwise known as the Seed Industry Development Act of 1992 HB 3638 by Rep. M. Zamora - An Act Amending the Seed Industry Development Act of 1992 and for other purposes

R&D AND POLICY INITIATIVES TOWARD ENHANCING AND HARNESSING THE ROLE OF WOMEN IN DEVELOPING CLIMATE-SMART SEED SYSTEM

Any initiative that aims to effectively enhance and harness the roles of women in the development of climate-smart seed systems should recognize that the women farmers in the Philippines are relatively empowered. They perform key roles in agricultural activities, which means that the strategy should veer away from the traditional women empowerment development slant because that is a typical form of intervention in Africa and South Asia. In Southeast Asia, particularly the Philippines, strategies involving women should take advantage of



A cabbage farmer interviewed by a project staffer. (Image credit: ICS Project Team 2018)

the fact that they are substantially empowered, and building-up on their key roles are vital. The following specific R&D and policy recommendations may be worth pursuing:

Extensive research with gender dimension.

Designing a gender-responsive climate-smart seed system requires a holistic approach—one that involves mainstreaming gender equality into the planning down to the implementation. Despite the vast improvement in agricultural gender equality in

the Philippines over the years, the need for gender-disaggregated data is still significant (Bayudan-Dacuycuy 2018). Hence, extensive research with gender dimension on the Philippine Seed System and Seed Industry is timely and relevant. Studying the impacts of climate change on men and women is also relatively new in the country. These studies would give the necessary evidence in pushing for inclusive policy reforms.

Addressing barriers in technology adoption. As seed selectors, women must be actively

involved in the technology and knowledge transfer of climate-smart agriculture technologies. By understanding the role of women and gender disparities in the system, proper technology transfer mechanisms can be identified, which could potentially address the barriers in farm-level technology adoption. Thorough research on this topic shall identify the needed interventions, incentives, or changes in the approach of extension workers to ensure successful farmer adoption of technologies. The development and promotion of women-friendly



Women and men farmers participated in a DOST-PCAARRD-funded training. (Image credit: ICS Project Team 2018)

(i.e., less laborious, time-saving) and low-cost seed conservation technologies suitable for women with resource constraints could also further boost the productivity and resilience of the communities.

Gender-sensitive business models. One of the challenges, especially in far-flung areas, is the low availability of high-quality seeds (Bossuet 2020). Women also tend to avoid large packaging of seeds due to limited purchasing power. They also prefer small quantities of different seed varieties for diversity. Integrating

gender in marketing strategies will not only improve women's access to seeds but can also increase the revenues of seed companies (Adam et al. 2019). It is important to study and explore different business models for seed dissemination that shall cater to the unique needs and preferences of both men and women of different socio-demographics (Brearley & Kramer 2020).

Support for greater women participation in all aspects of seed value chain. Women play a major role in food production

and participate in the other stages of the value chain, primarily on seed management. Participatory Plant Breeding (PPB) entails the active participation of farmers in plant breeding. PPB is involved in defining goals and priorities, selecting or providing germplasm, hosting trials in their fields, selecting superior plants for further breeding, engaging in research design and administration processes, as well as commercialization of selected lines. They are among the widely-supported initiatives as it promotes community-

based agricultural biodiversity management and empowers women farmers. The goal now is to provide support and enhance PPB models to guarantee that those farmer breeders are well-assisted. A supportive framework for community-based diversity management initiatives (e.g., community banks) will also be beneficial, especially for women.

Basket of varietal options.

Although there are several existing studies on crop suitability, another best practice in ensuring seed system resilience in other countries is the exploration and expansion of seed repertoires. This involves the identification of different types of crops that farmers could plant under different conditions (Cordaid 2014). Plant breeders should develop a basket of varietal options from which farmers can choose varieties specifically adapted to different contexts and functions, changing a few best-bet varieties to best-fit varieties (GAFF 2019).

Other specific R&D priorities.

Among the critical components of climate-smart seed systems are shock-proof seed varieties. With the inevitable consequences of climate change on agriculture, much of the R&D investments are spent developing seeds that could withstand extreme weather events, temperature, and diseases. Fostering exchange and cooperation between public research and private partners is also seen as a good practice for the development of new varieties (Cordaid 2014). Other specific R&D priorities related to attaining climate-smart seed systems include the creation of evidence-based

agroecology and resilient seed systems, innovation and research on germplasm rights and inclusive markets that promote diversity, policy research on seed certification systems, including participatory guarantee system, research on the social and institutional components of resilient seed systems and assessment of farmers' access to national and international gene banks, among others (GAFF 2019).

Institutional Support and Policy Interventions

Promoting gender-sensitive approach in R&D and extension services. In conducting R&D and extension services, there is a need to have a deep understanding of the needs of women involved in the seed value chain. Projects or programs and technology that will be offered to them should be women-friendly, which means that these are appropriate and acceptable to women, and would address their specific issues and challenges in enhancing agricultural productivity (Paris 2011). These technologies also refer to those that "could reduce women's labor to free up some of the time being allocated to other tasks that hold up their productive engagement in agriculture" (Nyambaru 2015). Some of the rice and rice-related technologies considered as women-friendly are postharvest machinery for rice processing, rice huller, and integrated pest management (Paris 2011). These rice technologies increase the volume of rice being processed, save time, and provide flexibility, eliminating the harmful effect of pesticides on human health, among others.

Revisiting and/or improving agrarian-related laws and credit policies, and their implementation.

Despite being relatively empowered in terms of access to and control over income, better membership and leadership of rural organizations across countries, one of the major hindrances for Filipino women to actively participate in the seed sector is their relatively limited access to land and resources compared to Filipino men. Despite the Comprehensive Agrarian Reform Law and Magna Carta of Women providing and promoting equal rights of women and men in land ownership and land and water resources management, women's share in the total land ownership remains minimal and incomparable to men's share. In many instances in the country, men are still considered and preferred primary landowners over women. Lack of access to land does not only limit a woman's ability to independently decide and use the land for seed production or any other activities; it also affects her access to capital and credit, and her ability to seek assistance for inputs and extension services (Corral 2019). Many financial institutions and banks require married women to seek their husbands' signatures and consent in financial transactions (White and Case 2017). Also, seed certification and commercialization tend to favor those who have control over the land, which are men (Pyburn et al. 2019). To address these recurring circumstances, there is a need to revisit agrarian-related and credit policies, and/or investigate the system of monitoring and implementing the policies.



Granting of cash loan to farmer-beneficiaries in San Fernando, Pampanga.

(Image credit: Philippine Information Agency 2019)

Putting more gender lens to the Seed Law. As the key policy governing the seed sector, amending RA 7308, would largely contribute to enhancing the role of women in the development of the seed sector. While RA 7308 has been instrumental in the progress of the seed industry, in terms of seed certification, it has failed to look through the gender lens as a tool for the development of the industry. Some points that can be considered to improve the law are:

- **Explicitly include gender-sensitivity in the Declaration of the Policy.** There was no mention of anything gender-related in the RA 7308. To be more effective in embedding gender lens in the law, there is a need to explicitly include gender-sensitivity in its Declaration in Section 2, which may be read as follows: "It is hereby declared the policy of the State to promote and accelerate the

development of the seed industry and, for this purpose, the Government shall: ...f. promote a gender-sensitive seed system in the country."

- **Recognize and equally empower the informal seed system.** As discussed earlier, the informal seed system dominates the seed industry in the country. Most smallholder farmers, Indigenous Peoples, and women are in the informal system; hence, it is imperative to recognize and give equal importance to this system in the development programs and policies. Women effectively participate, as they benefit more, in a less formal system (Pyburn et al. 2019). However, it should also be noted that subjecting women farmers in the informal seed system to the seed certification procedure designed for the formal system may

undermine their access to quality seeds, and may threaten their social capital. They might not be able to secure all the requirements and documents needed for the certification, which may further hinder their participation in the seed sector. Nevertheless, it is still important that women have access to good quality seeds, which is said to be the main motive of women in the seed sector. A separate seed guarantee system should be designed for the informal sector that includes a framework and parameters on how a traditional seed can be guaranteed as a quality seed. HB 3638 under RA 7308, which aims to integrate and implement formal and informal seed systems, enhance the organizational structure of the Bureau of Plant Industry, and design appropriate penal provisions



Women and men farmers participated in a DOST-PCAARRD-funded training. (Image credit: ICS Project Team 2018)



should be amended. It is currently in the process of deliberation facilitated by the House of Representatives-Committee on Agriculture and Food.

- **Embed gender lens in the Seed Industry Development Program.** Gender-sensitivity should be part of the overall framework guiding the development of the Seed Industry Development Program. In particular, the program should also include provision for the following: improving women's access to quality seeds, technologies, and capacity building; creating a sex-disaggregated database for seed system; strengthening gender budgeting, auditing, targeting, and allocating a certain percentage to gender-responsive programs or projects (ADB 2013, Corral 2019).
- **Have a representation of women in the Council.** If possible, the National Seed Industry Council should have one representative from a women's organization associated with the seed business to ensure gender justice (Rengalakshmi et al. 2002).
- **Use gender-sensitive language.** To be consistent, terms and prepositions used in RA 7308 such as "chairman" and "he" should be revised into a more gender-sensitive language (i.e., "chairperson" and "he/she").

