Essentially derived varieties and the perspective of farmer-breeders

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Smallholder men and women farmers across the world have historically been the original plant breeders since the dawn of agriculture more than 10,000 years ago. For most developing countries, where most of the plant genetic resources come from, smallholder farmers continue to consciously or unconsciously breed new plant varieties with two motivations: attain food security for all, and increase agricultural biodiversity. On account of these farmers' enormous contribution, the International Treaty of Plant Genetic Resources for Food and Agriculture (ITPGRFA) obliges its 128 members[1] to develop and maintain appropriate policy and legal measures that promote the sustainable use of plant genetic resources for food and agriculture[2].

It is significant to note that more than two-thirds or 68% of UPOV's 71 members[3] are contracting parties to the ITPGRFA, and consequently they are enjoined to protect farmers' rights, which is articulated in Articles 9.2 and 9.3 of the ITPGRFA, thus:

> *9.2 The Contracting Parties agree that the responsibility for realizing Farmers' Rights, as they relate to plant genetic resources for food and agriculture, rests with national governments. In accordance with their needs and priorities, each Contracting Party should, as appropriate, and subject to its national legislation, take measures to protect and promote Farmers' Rights, including:*
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> *(a) protection of traditional knowledge relevant to plant genetic resources for food and agriculture;*
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> *(b) the right to equitably participate in sharing benefits arising from the utilization of plant genetic resources for food and agriculture; and*

[1] http://www.planttreaty.org/list_of_countries?field_cp_status_value_many_to_one=Yes&field_cp_contracting_value_many_to_one=All&field_cp_signature_by_value_many_to_one=All&field_cp_faoregionone_value=All&field_cp_faoregiontwo_value=All&field_cp_income_value=All. Last updated on 30 August 2013. Last accessed on 1 September 2013.

[2] Article 6.1 of the ITPGRFA reads: The Contracting Parties shall develop and maintain appropriate policy and legal measures that promote the sustainable use of plant genetic resources for food and agriculture.

[3] Status of UPOV members as of December 31, 2012. http://www.upov.int/export/sites/upov/members/en/pdf/pub423.pdf Last accessed on 1 September 2013.

(c) the right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture.

9.3 Nothing in this Article shall be interpreted to limit any rights that farmers have to save, use, exchange and sell farm-saved seed/propagating material, subject to national law and as appropriate.

It is also important to note that Article 6.2 of the ITPGRFA stresses the need to promote farmers' breeding efforts, to wit:

. *6.2(b) strengthening research which enhances and conserves biological diversity by maximizing intra- and inter-specific variation for the benefit of farmers, especially those who generate and use their own varieties and apply ecological principles in maintaining soil fertility and in combating diseases, weeds and pests;*

. *6.2(c) promoting, as appropriate, plant breeding efforts which, with the participation of farmers, particularly in developing countries, strengthen the capacity to develop varieties particularly adapted to social, economic and ecological conditions, including in marginal areas;*

6.2(d) broadening the genetic base of crops and increasing the range of genetic diversity available to farmers;

6.2(e) promoting, as appropriate, the expanded use of local and locally adapted crops, varieties and underutilized species;

6.2(f) supporting, as appropriate, the wider use of diversity of varieties and species in on- farm management, conservation and sustainable use of crops and creating strong links to plant breeding and agricultural development in order to reduce crop vulnerability and genetic erosion, and promote increased world food production compatible with sustainable development

SEARICE or the South East Asia Regional Initiatives for Community Empowerment, for more than thirty years now, have been partnering with smallholder farmers in at least five countries including Vietnam, which is a UPOV member, through governments, NGOs, and schools to implement these provisions on smallholder farmer participation in plant breeding, and in implementing farmers' rights; as well as advocating for the exclusion from patentability, PBRs and other proprietary rights, plants and other life forms; inasmuch as these proprietary rights limit the materials that smallholder farmers use in breeding. SEARICE also continues to develop *sui generis* systems with the aim of protecting farmers' varieties from exploitation and unconscionable appropriation. These efforts have led to the

recognition of farmer breeders and farmers' varieties that are adaptable to local conditions, varieties that can best meet their needs, and varieties that are resilient to shifting climatic changes and economic trends.

When UPOV 91 and the system of EDV was developed, nobody thought of possible impacts on the innovation system of farmers who are doing breeding by selection. And it seems that the knowledge on this has not improved since then. Nevertheless, UPOV 91 is widely promoted as the right system for developing countries where the informal seed sector and breeding by farmers play an essential role. There is a need to look into this. Moreover, since 68% of UPOV members need to implement farmers' rights and sustainable use of PGRFA, there is need to consider the following conditions in determining EDVs, whether in the technical or legal discourse:

1. Farmers' varieties, especially those bred in developing countries should never be considered EDVs or unprotected initial variety that can be appropriated by anyone. Farmers continue to develop varieties adapted to changing local conditions through evolutionary breeding and adaptive selection. For them, all PGR materials are raw materials for adaptation and development regardless if these materials are protected or not. The introduction of high yielding varieties has already displaced many traditional varieties and has tremendously reduced the diversity of PGR materials available for farmers breeding. EDVs will exacerbate the situation and this will have serious implications on farmers' capacity to adapt to all the challenges that they face including climate change.

2. Plant Variety Protection, like patents, are artificial monopolies on a public good. Although economists rarely come to a consensus, they agree on one thing: monopolies lead not just to inequities but also to major distortions in resource allocations. As a society, we tolerate this distortion in the hope that it will promote innovation that would, in the end, lead to social benefits that would outweigh the costs.[4] Plant breeders are given incentives through privatization of property not only to compensate them for their efforts and investment, but ultimately, to give society the benefits of new discoveries and the expansion of our collective knowledge. Therefore, in any policy issue such as this, the ultimate question that must be answered is this: does the social benefit outweigh the social cost? Given the important role of farmers in innovation and the adaptation pressures posed on them and our food supply by climate change, the costs to society of limiting farmers' ability to create so-called "essentially derived varieties" would be devastating and would far outweigh the benefits. For the regular consumer, the farmers and even the breeders, it is just not worth it.

3. Formal breeders do not have a monopoly on innovation. Innovation is done by the farmer every day. Indeed, in agriculture, necessity is the mother of invention. The farmer must invent new practices and breed new varieties because he or she must. New farming practices and new farmer bred varieties enable them to

[4] Joseph Stiglitz. "Economic Foundations of Intellectual Property", 57 Duke Law Journal 1693-1724 (2008).

adjust to environmental challenges, to put food on the family's table, and, we as non-farmers must always remember, to put food on the tables of the rest of humankind. Studies indicate that 60-70% of farmers in Southeast Asia use seeds saved on-farm, even though the government has been aggressive in promoting the use of certified hybrid seeds. The remaining seeds are obtained from local sources: government, seed exchanges, and, to a limited extent, private growers.[5] Within the same period of time, farmers breed or discover far more varieties than formal breeders. Formal breeders, on the other hand, source breeding materials from farmers who, in good faith, provide them with little or no restriction. All of formal breeders' discoveries were built on the hard work done by farmers, one way or the other. Many important so-called scientific breakthroughs in plant breeding are in fact not objective discoveries, akin to saying that Christopher Columbus "discovered" the Americas when the natives have made it their home for thousands of years.[6] The current trend of scouring the wild and small farmers' farms for native traits underlines the richness and potential of informal breeding. These original native strains were often grown in less than ideal environments and not surprisingly, are a rich source of traits such as cold tolerance or drought resistance.[7]

In short, farmers are an indispensable part of the innovation system that sustains formal breeders. Cutting off farmers from this process by restricting their right to freely generate "essentially derived varieties" from a protected variety is inequitable and unwise. It is inequitable because, as stated above, 1) all of formal breeders' breeding materials are derived, to some extent, from a farmers' variety, 2) these breeding materials are usually obtained from farmers with little or no restriction, not even a restriction against essentially deriving a variety from these.

It is also unwise, especially for the formal breeder and humanity in general, because farmers' use of a diverse set of germplasm is an essential component of on-farm conservation that ensures agricultural biodiversity. In restricting the farmers' right

[5] Improving Food Security Through Community-Based Seed Systems in Rainfed Rice Areas of Asia, SEARCA

[6] Writing in the journal Nature Genetics, a team led by Yusaku Uga of the National Institute of Agrobiological Sciences in Tsukuba, Ibaraki Prefecture, describes finding a remarkable gene in a rice plant cultivated in the dry uplands of the Philippines. This strain, also called cultivar, is called Kinandang Patong. Its big characteristic is roots that are deep and grow straight downward, boring into parched soil for water, as opposed to root systems that are shallow and grow out laterally in typical water-rich paddy fields. ("Roots breakthrough: drought resistant." Japan Times. Available at http://www.japantimes.co.jp/news/2013/08/05/national/roots-breakthrough-drought-resistant-rice/#.UikEFrsYy2U. Accessed on September 4, 2013) The RIL parent lines, IR64 and Kinandang Patong, were obtained by Dr. Yusaku Uga from the International Rice Research Institute (IRRI) and propagated in compliance with the Standard Material Transfer Agreement (SMTA). (Uga Y., K. Okuno and M. Yano (2011) *Dro1*, a major QTL involved in deep rooting of rice under upland field conditions. Journal of Experimental Botany 62: 2485-2494)

[7] Dr. James W. Friedrich. "Native traits: Technology Developed From the Natural Abundance of Ancestral Strains of Corn." Available at http://nativetraits.blogspot.com/p/introduction.html. Accessed on September 4, 2013.

to essentially derive varieties from protected varieties, one limits the potential of farmers to incorporate a protected variety's traits into the informal system and the local and indigenous genetic pool, which is recognized as an essential means of adaptation to the many varied effects of climate change that hits a locality. Plant breeding is not just the province of formal plant breeders. It has been done by farmers for millennia. It continues as a practice among small farmers, although the practice has been greatly eroded by the Green Revolution to the detriment of agricultural biodiversity and small farmers' survival. SEARICE seeks to revive and strengthen the breeding tradition through the Farmers Field School and by advocating Participatory Plant Breeding and Varietal Selection. Through this process, farming communities are able to adapt and survive the huge challenge of climate change. In Vietnam for instance, farmers are able to develop rice varieties that are saline tolerant through selection from promising lines and stable materials provided by our partner research institutions. Similarly, in Laos, farmers are able to produce drought tolerant varieties through adaptation trials. In Thailand, some very good rice varieties that are now popular in one region was developed by farmers through off-type selection and in Bhutan farmers are able to overcome the serious rice blast infestation through participatory varietal selection of rice blast resistant varieties from our partner research institution. In the Philippines, farmers, through evolutionary breeding are mixing even hybrid maize seeds with traditional varieties to develop varieties that meet their needs and preferences. There was even a case of a red rice variety, which is very popular in one of the islands in the Philippines, which was selected by a farmer and became popular in the island. It was selected from a plot planted with IRRI white rice variety so it resembles the IRRI variety except for the red color. Upon analysis, it was found out that the variety came from a hybrid between IRRI white variety and local red rice variety. The farmer had consciously picked and selected such red variety because of its combined traits of high yield of the IRRI white variety and the preferred taste of the traditional red variety. This could be a case of an essentially derived variety, and it is just inconceivable that the farmer who developed the high-yielding red rice variety which benefits many farmers in the island would be penalized for his innovation.

Intellectual property, particularly plant variety protection and patents, is not the only form of incentive for innovation. It may even be counterproductive because sometimes, the best or easiest way of making money is not to come up with a better idea but to form a monopoly or cartel and restrict competition.[8] Many developing countries have emerged as centers of agricultural biodiversity even prior to the introduction of plant variety protection or patents. A study done by the SEARICE Community Biodiversity Development and Conservation Programme on plant genetic resources diversity and seed supply system of Bohol[9] found that crop

[8] Joseph Stiglitz. "Economic Foundations of Intellectual Property", 57 Duke Law Journal 1693-1724 (2008).

[9] Community Biodiversity Development and Conservation Programme - Bohol Project. 2001. A Study on the Plant Genetic Resources Diversity and Seed Supply System of Bohol Island,

diversity was the result of both natural and human factors. On the human end, farmers' preferences and selection process play a key role. Crop varieties are selected according to factors such as cooking and eating quality, flesh texture, yield, early maturity, plant height, and resistance to pests and drought. Because most of their crops are used for personal consumption, a variety of crops are maintained by each farmer. Further, farmers can be driven by the quest for mastery and the delights of discovery, just as in basic research where free sharing of knowledge is the norm even if the discoveries later turn out to be profitable.[10] Moreover, farmers' innovation can be driven by the necessity of creating varieties that can adapt to the peculiar challenges of his or her farming locality and the effects of a changing climate thereon. Plant variety protection is a tool of private industry, to justify investments in capital. Therefore, it does not address the needs of farming areas where private seed growers find a limited market and few economic incentives. Where there is little chance for a return on investment, private seed growers cannot be relied on, much like the pharmaceutical industry's neglect of diseases that affect only a few people. Applying the EDV restriction to farmers in these areas again limits the potential for farmers to adapt protected modern varieties to local conditions and needs. Yet the varieties locally bred by farmers under very challenging natural conditions continue to be a source of livelihood for the farmers and a source of breeding materials for formal breeders.

Applying EDVs to farmers is an overreach. In the test of whether extending the protection to EDVs, particularly with regard to acts of farmers, leads to a net social benefit, it comes up short. In addition to the above social costs, the transaction costs that would be required for a small farmer-breeder to obtain a license would put it out of the small farmers' reach. Policymakers must not forget the collaborative nature of innovation. The marginal social return of having plant variety protection, especially given its low requirement of novelty and the absence of a requirement for non-obviousness, is only having innovation earlier than it otherwise would have been. The plant variety protection system does not reward people on the basis of the marginal social return of their contribution. It gives the individual or firm that is first the entire value of the innovation, which obviously can well exceed the marginal social contribution.[11] Policymakers must keep in mind that the design of an intellectual property system demands a balancing act, and that monopoly profit is justified only if it ensures a net social benefit. Therefore, before we even think of

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Philippines. Technical Report No. 1, Southeast Asia Regional Institute for Community Education. Quezon City, Philippines.

[10] Most important ideas are those that are generated in universities, and many of the most important intellectual advances are not covered at all by the patent system. Look at the basic idea underlying the computer, Alan Turing's "Turing Machine": it was not protected by the patent system.9 Ideas like asymmetric information are not covered by intellectual property. (Joseph Stiglitz. "Economic Foundations of Intellectual Property", 57 Duke Law Journal 1693-1724 (2008).)

[11] Joseph Stiglitz. "Economic Foundations of Intellectual Property", 57 Duke Law Journal 1693-1724 (2008).

implementing EDV rules, we need to reflect on its potential impacts to smallholder farmers and their innovation system.