

Revisit to definitions and need for inventorization or registration of landrace, folk, farmers' and traditional varieties*

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In recent times, certain definitions related with landraces, folk varieties, farmers varieties, traditional varieties are causing confusion. This situation has arisen because of inconsistencies and lack of agreement among the agriculture/plant scientists regarding their definition, while dealing with same or different material(s). Further, the recent legislations, namely Protection of Plant Varieties and Farmers' Right (PPVFR) Act¹ 2001 and Biological Diversity Act² 2002 also define them with a purpose of protection of farmers' rights and benefit sharing. Therefore, there is a necessity to properly understand and define them with consistency based on certain genetic principles. There have been no genetic guidelines for consistent classification of such related taxa and the people are not refraining from adding to the appalling list of terms in the literature. We propose here a genetic focus for the terms already in use. It is important for countries like India belonging to old civilizations where first domestication of many plant species occurred and the locals/farmers contributed significantly in the evolution of agriculture and agricultural products. This would help in enforcement of above legislations in the right spirit and empowerment of farmers to enable protection of their rights and ensure benefit sharing to farmers or farming communities, accruing from the commercialization of products developed using their basic products and knowledge, as envisaged by the Convention on Biological Diversity.

The term landrace generally has been used to designate all the genetic material collected from cultigens growing in farmers' field, however, at times they are also referred as folk variety or farmer's variety or traditional variety. Thus, there are several definitions available in the literature and glossaries published on technical terms (Table 1).

In addition, scientists have developed their own informal and intuitive definitions based on their experience.

As far as the national legislations are concerned, the PPVFR Act does not refer to landrace, but to the farmers' varieties in section 2(1), which have been defined as follows: 'Farmers' variety means a variety which – (i) 'has been traditionally cultivated and evolved by the farmers in their fields; or (ii) is a wild relative or landrace of a variety about which the farmers possess the common knowledge.'

The Biological Diversity Act envisages promoting conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of landraces, folk varieties and cultivars, domesticated stocks and breeds of animals and microorganisms and chronicling of knowledge relating to biological diversity. It explains cultivars, folk varieties and landrace in section 41(1) as follows: (i) 'cultivar' means a variety of plant that, has originated and persisted under cultivation or was specifically bred for the purpose of cultivation; (ii) 'folk variety' means a cultivated variety of plant that was developed, grown and exchanged informally among farmers; (iii) 'landrace' means primitive cultivar that was grown by ancient farmers and their successors.

Proposed classification/definition

In nature, distinct forms in a species may arise by natural selection, but in cultivated plants in addition to environmental and biological factors, the social, cultural and economic reasons contribute in precise selection of variability and its propagation. Most cultivars have been selected and cultivated because they meet human requirements and please the farmer. Furthermore, the farmers have developed and continue to help develop and maintain genetic diversity; they have been active in manipulating gene pools through repeated introduction or migration, which may be followed by natural or artificial hybridization, mutation and selection, resulting in development of closely related forms with various levels of hetero or homogeneity.

In order to provide genetic perspective and genetic basis for wild relatives and

cultigens cultivated at the farmer's field in crop species, we propose the following three categories: wild relatives, landraces and farmers' variety.

Wild relatives

This will refer to those species that are immediate ancestors of the cultivated species. They may fall in the traditional concept of the biological species and cross freely with cultivated species to give fertile hybrids and normal segregants. The biological species always includes spontaneous wild and weedy forms or races that got differentiated/isolated at various evolutionary stages, some remained in wild, while others came into agriculture without visible advantage for cultivation and use thus became weeds in field or around habitation. For example, in case of pigeonpea (*Cajanus cajan*), the freely crossable *C. cajanifolius* has evolved as a weedy type, while other cross-compatible and cross-incompatible taxonomic species of *Cajanus* are wild types³. But because the wild and weedy species are not being cultivated, they remain genetically distinct with typical undomesticated features, such as poor fecundity, low harvest index, shattering (example cereals) and constricted pods (example groundnut) and should not be confused with cultivated landrace or farmers' variety.

Landraces

This will refer to all those cultigens that are highly heterogeneous, but with enough characteristics in common to permit their recognition as a group. It might have originated in specific geographic region at some time in the history of crop. It has distinct cohesion of morphology, geographical distribution, agro-ecological adaptation and breeding behaviour, but has not been selected or maintained for genetic integrity (uniformity). This will include all cultigens cultivated without any specific nomenclature and value. A landrace identified with a unique feature and selected for uniformity over a period of

*The article contains the authors' own views and not of the organisation they represent.

Table 1. Various definitions referring to landraces and farmers' varieties used in literature

Definition	Reference
Race as 'a group of related individuals with enough characteristics in common to permit their recognition as a group. This of course can be said for any taxon'. A logical corollary to this would be that when a race is in equilibrium with a certain geography/ecology (land) where it develops, its distinctive features over a period of time evolves into a landrace.	Anderson and Cutler ⁹
'(Landraces) have a certain genetic integrity. They are recognizable morphologically; farmers have names for them and different landraces are understood to differ in adaptation to soil type, time of seed, date of maturity, height, nutritive value, use and other properties. Most important, they are <i>genetically diverse</i> (emphasis added). They are balanced populations – variable, in equilibrium with both environment and pathogens and genetically dynamic'.	J. R. Harlan ¹⁰
'they (Landraces) are crop populations in balance with their environment and remain relatively stable over a long period of time'.	IBPGR ¹¹
'(Landraces) farmer-developed cultivars of crop plants, which are adapted to local environmental conditions'.	Robin Pistorius ¹²
'(Landraces) farmer-developed varieties of crop plants that are heterogeneous, adapted to local environment conditions and have their own local names. In other words, landraces are farmers' varieties, which have not been improved by formal or private/NGO breeding programmes. Modern cultivars can be grown by farmers and over a period of time, especially when self-seed is used and selection is practiced, can 'evolve' into a landrace'.	Friis-Hansen and Sthapit ⁵

time for maintenance of the characteristic features of the population can evolve into a farmers' variety or even a modern cultivar as in many crops, for example, Maruti in case of pigeonpea⁴. Conversely, a modern cultivar grown over a time by the farmers and not maintained as per the principles of maintenance breeding can 'evolve' into a landrace⁵.

Farmers' variety

This will refer to those cultigens that are comparatively homogeneous and stable for specific trait(s) for which they have been evolved by the farmers/communities. They have been provided with unique identity with a vernacular name or a name (predominantly) describing their unique feature and are being continuously monitored (selected) for genetic integrity/purity. This would also include the folk, traditional, primitive varieties developed by innovative farmers or communities who have in their acumen selected or genetically manipulated through intervention for specific traits. For example, variety Sathia, and many medicinal and aromatic varieties of rice and dashhari, langda, benishan varieties of mango, etc.

Figure 1 provides steps involved in evolutionary history of a cultivated species that result in various biological forms with different levels of genetic heterogeneity due to progression for uniformity

and retrogression due to its degradation. The modern high yielding varieties (HYVs) have been developed over the last 50 years using genetic principles, facilitating introgression of specific genes from wild relatives, landraces and farmers' varieties and therefore, present a very low level of genetic heterogeneity even between them at the molecular level. They have wider adaptability and are dispersed through formal system of release and notification; in contrast, farmers' varieties are generally niche-specific and dispersed through informal system of seed exchange. In India, the informal system is the major contributor for maintaining on-farm diversity and seed supply. The new legislations should, therefore, be implemented in a way that they contribute for sustaining the informally developed farmers' varieties and seed system.

Implementation of Indian legislations

The Indian Government has developed a *sui generis* system for the protection of plant varieties in response to Trade Related Aspects of Intellectual Property Rights (TRIPS) agreement's Article 27.3(b) under GATT, and its successor, the World Trade Organisation⁶. This has three major characteristics: (a) flexibility, (b) better protection of farmers' rights, and (c) stronger researchers' exemptions,

meeting the social, ethical and cultural value of Indian ethos. The PPVFR Act strongly envisages, recognizing and protecting the rights of farmers in respect of their contributions in conserving, improving and making available plant genetic resources for development of new varieties.

The PPVFR Act as per section 14 has a provision for registration of extant varieties, including traditional and farmers' varieties, and wild relatives providing flexibility for registration of all the varieties of common knowledge *albeit* within a specified period of time. Under the provision for registration of essentially derived varieties, if basic variety belongs to farmers, consent of the farmers or group of farmers or community of farmers who have made contribution in the preservation or development of such variety is required as per sections 40, 41 and 43.

The registration of farmers' varieties is very much required for the empowerment of farmers, but in light of the above definitions and the basic requirement for registration, namely distinctness, uniformity and stability (DUS), relaxation may be needed with regard to uniformity in case of farmers' varieties, as they are being maintained without strict application of principles of maintenance breeding. The farmers' varieties and landraces may not have the same level of genetic and phenotypic homogeneity like the HYVs, to meet the stringent requirements of DUS testing

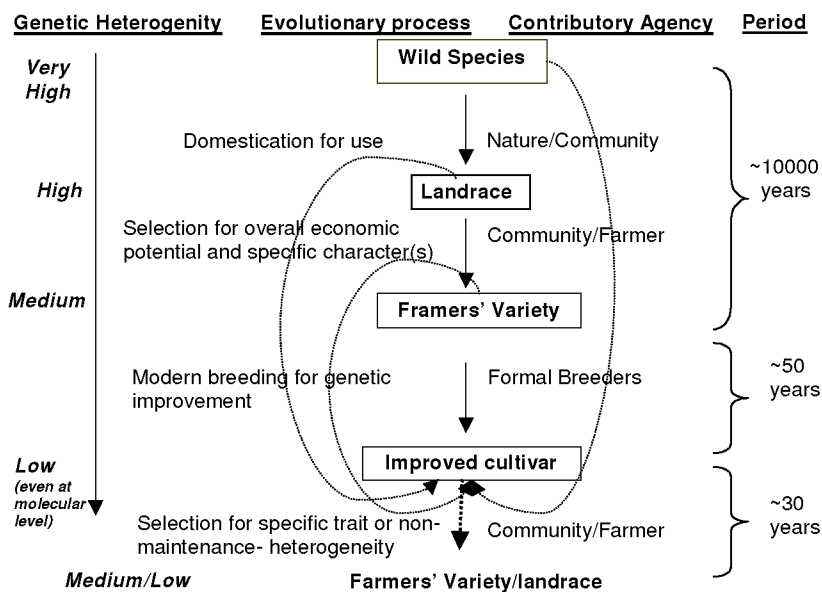


Figure 1. Nomenclature of cultigens based on evolutionary process.

as envisaged in legislation. However, even if some of them can be successful in fulfilling the strict regulatory criteria, the registration costs would constrain communities or individual farmers from formally registering them. Additionally, they would have a limited distribution and registration would not be a commercially viable proposal. Therefore, it would be difficult for any social or commercial group to promote registration of farmers' varieties⁷. It is, therefore, necessary to have flexibility in the implementation of these laws for registration of farmers' varieties. Exemptions may be granted for small-scale producers or community registration that would promote for seed production and marketing of seeds in a limited area. This would also help in maintenance of on-farm diversity negating the fears of vulnerability of HYVs. The wild relatives, though included in the definition of farmers' varieties are different from cultivated plants, require different treatment and should not be confused with landrace or farmers' variety. There is least probability that any wild relative will have direct cultivation value and hence nobody will be interested in protecting them under the PPVFR Act. However, the wild relatives are potential resource of genes and may be protected under the Biological Diversity Act, which controls the access to genetic resources.

The registration of farmers' varieties is also required as there is a provision to

invite claims from any person or group of persons or non-governmental organizations for benefit sharing, and after verification the authority would decide appropriate benefit sharing (Article 26, PPVFR Act). The Biological Diversity Act's component on 'facilitated access to plant genetic resources and equitable sharing of benefits' is an intrinsic part in recognition of role played by farmers in conservation of plant genetic resources and therefore, encompasses the inventorization of biological resources (biodiversity registers), including wild relatives of crop plants.

The genetic diversity-rich countries like India that have contributed significantly in development of varieties in a large number of crops to meet varied requirements of different ecologies and production systems, need to make concerted efforts for documentation/registration of farmers' varieties either with state support or through appropriate capacity building of local communities for which the initiative should come from PPVFR Authority. Documentation of the passport data and unique features of farmers' varieties in an easily retrievable database; clubbed with the biodiversity registers can be an effective tool in the hands of PPVFR Authority and National Biodiversity Authority, which can be used for authentication of information/claims and benefit sharing. This will help farmers' empowerment to realize the rights envi-

saged for them in the various national and international legal instruments and bringing the varieties of common knowledge into public domain so that there is no misappropriation of intellectual property rights. However, it would be difficult to register all farmers' varieties due to the large number involved, for example in case of rice around 30,000 varieties⁸. Hence, it would be prudent to prioritize the scope of inventorization/registration and use certain minimum criteria's, which: (i) Should have a unique vernacular name as identity, (ii) Should be associated with at least one specific highly heritable stable character(s), (iii) Should have been associated with a geographical or agro-ecological region/production system for sufficiently long time (over 50 years), (iv) Uniformity level should be sufficient enough for commercial value, (v) Have not been registered earlier in any form and (vi) Have a known history of farmers' involvement in development/selection.

To accommodate the various levels of variability, most agricultural scientists have been lumpers, clubbing landrace and farmers' variety, thus creating confusion. This has been clearly reflected by the various definitions cited in Indian PPVFR and Biological Diversity Act. Such use of one's own system would continue, no matter what the geneticists say. But under legislations the numbers involved are more than usual, hence it requires ex-

plicit elaboration. It is hoped that the definition proposed here using genetic principle would provide desired clarification regarding the scope of two legislations and use of provisions under them for the protection of national heritage of useful plant biodiversity, where locals have played a significant role in their identification/development and conservation.

1. Protection of Plant Varieties and Farmers' Right Act, Ministry of Agriculture, Government of India, 2001.
2. Biological Diversity Act, Ministry of Environment and Forests, Government of India, 2002.
3. Singh A. K., Singh Neeta, Singh, S. P., Singh, N. B. and Smartt, J., Pigeonpea. In *Plant Genetic Resources: Food Grains* (eds Dhillon, B. S. et al.), Narosa

Publishing House, New Delhi, 2005, pp. 222–237.

4. Ramanandan, P., Pigeonpea: Genetic Resources, In *The Pigeonpea* (eds Nene, Y. L.), CAB International, Wallingford, UK, 1997, pp. 89–116.
5. Friis-Hansen, E. and Sthapit, B., *Participatory Approaches to the Conservation and use of Plant Genetic Resources*, International Plant Genetic Resources Institute, Rome, Italy, 2000, p. 199.
6. Agreement on Trade Related Aspects of Intellectual Property Rights, Geneva Switzerland, World Trade Organization, 1994.
7. Tripp, R. and Louwaars, N., *Food Policy*, 1997, **22**, 433–446.
8. State of the Environment Report: India (<http://www.envfor.nic.in/soer/1999/chap5.html>), Ministry of Environment and Forests, 1999, pp. 1–12.

9. Anderson, E. and Cutler, H. C., *Ann. Missouri Bot. Gard.*, 1942, **29**, 69–89.
10. Harlan, J. R., *Science*, 1975, **174**, 468–474.
11. A Glossary of Plant Genetic Resources Terms, IBPGR Secretariat, Rome, 1980, p. 54.
12. Pistorius Robin, *Scientist, Plants and Politics – A History of the Plant Genetic Resources Movement*, International Plant Genetic Resources Institute, Rome, Italy, 1997, p. 133.

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Wastelands: is it time to rethink?

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Wastelands have recently been in news for a variety of reasons. When the Government of Tamil Nadu recently embarked upon an initiative to distribute 2.5 acres of land to the landless, the feasibility of 'sourcing land' was keenly discussed. Similar apprehensions were raised when establishment of satellite towns around cities like Chennai was mooted. To allay the fears, the Government declared that only wastelands and drylands would be acquired for the purpose. It was also mentioned that water resources, dwelling areas and forests would not be brought under the purview of this programme.

Tamil Nadu has 17303.29 sq. km of its land designated as wastelands, which is about 13.30 per cent of the total geographical area of the State¹, and it is rationalized that this quantum would easily meet the requirement of the Government. There are also suggestions that wastelands be utilized for establishing plantations, notably of *Jatropha*, for enhancing the prospects of the biofuel industry. While the need to move away from a fossil fuel based scenario to the more viable alternate energy initiatives is well taken, the increased focus on converting 'wastelands' into areas of biofuel plantations needs to be examined. For instance, it is being suggested that the wastelands in

Palani Hills, which is one of the last refuges for some of our endemic plants be planted with *Jatropha*, on a buy-back arrangement with the Indian Railways². In recent times, coastal areas, including those with small patches of mangroves, are also increasingly being left to be overrun by *Prosopis juliflora*, because of increased demand as fuel. These are also lands that have been classified as wastelands³. A five-year effort to protect a marsh of considerable ecological significance in south Chennai was hampered, because the marsh had been classified as a wasteland⁴.

There are apprehensions that 'wastelands' are at the risk of being reduced to a buzzword that appeals to donor agencies, along with the other well-entrenched notions such as 'involving local institutions, peoples' participation and gender equity'. But more worrying is the fact that we continue to cherish and practice the colonial legacy of land settlement and administration.

Wastelands are the remnants of the colonial construction of natural resources, which was primarily to foster an absolute control by the State over natural resources, notably land and minimize 'grey areas'. An effective imaginary disjuncture between the forest and agrarian landscapes was created by the Revenue

Settlement systems that the colonial administration enforced⁵. Strictly for reasons of management, the British used dichotomous classification and hence lands were categorized into forests and agricultural lands. Agricultural lands were further divided into productive and wastelands. An extension of this classification is reflected elsewhere too, with the ghats of peninsular India being classified as the Western and Eastern Ghats, forests being categorized into wet and dry forests, and people either belonged to castes or tribes.

Revenue settlement procedures that were followed in the Madras Presidency demonstrate this rather well. Until the advent of the British, village societies in south India were largely decentralized units, organized at the level of a *nadu*. The British however maintained that the conditions of the people was very unsatisfactory and a long series of governments, particularly under Tipu Sultan, had reduced the country into such a state that a rich farmer was nowhere to be found. It was also felt that the farmers were not earnest to pay taxes. With such assumptions, the British systematically subverted local systems of control and assumed absolute control by introducing revenue systems, chief of which were the Ryotwari and