

The European seed legislation on conservation varieties: focus, implementation, present and future impact on landrace on farm conservation

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Abstract After a brief presentation of the European Directives on seed marketing of conservation varieties, data relative to their implementation status are given and discussed in relation to on farm conservation of landraces. Although generally aimed to ensure *in situ* conservation and the sustainable use of plant genetic resources, the Directives focus on seed production and marketing instead of genetic resource conservation per se. At present, their application has only partially favoured the registration of landraces maintained on farm or preserved in *ex situ* collections. They can be estimated in thousands in Europe, while only a few landrace with a verified status (51 out of a total of 184 conservation varieties) are presently included in the Common Catalogue. Reasons for this scarce registration are discussed. The European Directives on seed marketing of conservation varieties are a tool to promote on farm conservation of

landraces that should be used to a greater extent than at present. Registration of landraces should be strongly and principally promoted by public bodies as a measure to give access to the genetic resources, preserve them on the long term and favour the economic profit of the farmers maintaining them.

Keywords Common Catalogue · Conservation varieties · Genetic resources · Landraces · Seed legislation

Introduction

Plant genetic resources (PGR) for food and agriculture include modern cultivars, breeding lines and genetic stocks, elder cultivars, ecotypes, landraces and crop wild relatives. While the first three components are largely already being *ex situ* conserved by plant breeders and gene bank networks, extant crop wild relatives, ecotypes and landraces are in need of an active conservation *in situ* so to allow evolutionary processes to continue, as several international documents underline.

In Europe, several conservation initiatives are presently carried out to maintain crop wild relatives *in situ* (Heywood and Dulloo 2005; Maxted et al. 2008; Iriondo et al. 2008), while landraces and ecotypes remain highly threatened and deserve

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immediate priority (Hammer and Laghetti 2005; Hammer and Diederichsen 2009). Landraces, also called ‘farmer varieties’, ‘local varieties,’ or ‘primitive varieties’, have been continuously maintained by people within their local biological, cultural and socio-economic context (Negri et al. 2009; Polegri and Negri 2010). *Sensu stricto* a landrace should be defined as a ‘variable population, which is identifiable and usually has a local name; it lacks formal crop improvement, is characterized by a specific adaptation to the environmental conditions of the cultivation area (tolerant to the biotic and abiotic stresses of that area) and is closely associated with the uses, knowledge, habits, dialects and celebrations of the people who have developed and continue to grow it (Negri et al. 2009; Polegri and Negri 2010). However, there is not a worldwide consensus on this definition (see a discussion on the matter in Negri et al. 2009).

Ecotypes are genetically and morphologically diverse populations that are naturally adapted to the environmental conditions of their regions (Turesson 1922; Boller et al. 2009). The term is usually referred to populations of wild species, but also of crops like forages (Lorenzetti and Negri 2009).

The recent legislative developments at European level (i.e. Commission Directives 2008/62/EC 20 June 2008, 2009/145/EC 26 November 2009 and 2010/60/EU 30 August 2010) on seed production and marketing opened a new way to safeguard landraces, as well as other variable populations, because they are aimed “to ensure *in situ* conservation and the sustainable use of PGR”, as their premise states.

In fact previous European seed regulation made impossible to commercialise landrace seed because the registration to the Common Catalogue required, beside distinctness and stability, uniformity, a trait that landraces do not have.

This paper is aimed to review the several focuses of this new legislation package and to evaluate the effects that its implementation has brought about up to now on landrace on farm conservation.

The European Commission Directives

The *Commission Directive 2008/62/CE of 20 June 2008 provides for certain derogations for acceptance* (i.e. for the registration of landraces and varieties in the Common Catalogue and the marketing of their

seed) *of agricultural landraces and varieties which are naturally adapted to the local and regional conditions and threatened by genetic erosion and for marketing of seed and seed potatoes of those landraces and varieties*. The derogations are addressed to the so-called “agricultural species” in the European seed legislation meaning (i.e. Directives 66/401/EEC, 66/402/EEC, 2002/54/EC, 2002/56/EC and 2002/57/EC) (i.e. most of open field crops).

Besides providing the definitions of ‘conservation *in situ*’, ‘genetic erosion’ and ‘landrace’, it defines criteria and requirements for the acceptance of landraces and varieties as conservation varieties, with particular regard to the historical linkage to their region of origin, and establishes rules for the marketing, certification and official post controls (see Suppl. Table 1). In particular, the Directive establishes quantitative restrictions of the seed yearly marketed for each conservation variety. Derogations are also foreseen in relation to denominations, because synonyms are admitted contrary to what established for conventional varieties in the Regulation CE n. 637/2009 on variety denominations.

Similarly to Directive 2008/62/EC, the *Commission Directive 2009/145/EC of 26 November 2009 provides for certain derogations, for acceptance* (in the Common Catalogue) *of vegetable landraces and varieties which have been traditionally grown in particular localities and regions and are threatened by genetic erosion and of vegetable varieties* (i.e. those covered by Directive 2002/55/EC) *with no intrinsic value for commercial crop production but developed for growing under particular conditions and for marketing of seed of those landraces and varieties* (see Suppl. Table 1).

This Directive is divided in two parts. The first one is addressed to the conservation varieties and it gives the same definitions and criteria of Directive 2008/62/EC with regard to the requirements for acceptance to registration, marketing conditions, denomination, certification and controls. Restrictions of seed quantities allowed to be marketed are foreseen, as established by Directive 2008/62/EC for agricultural species, but they are calculated with different criteria. The second part of Directive 2009/145/EC is addressed to the vegetable varieties with no intrinsic value for commercial crop production that have been developed under particular conditions, otherwise known as ‘amateur’ varieties. The disposals for this group are far less restrictive than those

established for conservation varieties (see Suppl. Table 1). In particular, there is no region of origin and, consequently, no geographic restrictions for their marketing. It is to be noted that the definition of ‘conservation variety’ given in both 2008/62/EC and 2009/145/CE Directives makes also old conventional varieties, deleted from the Common Catalogue since 2 years at least, eligible to be registered again as conservation varieties.

Finally, the *Commission Directive 2010/60/EU of 30 August 2010 provides for certain derogations for marketing of fodder plant seed mixtures intended for use in the preservation of the natural environment.*

This Directive has indeed an application ground different from the previous ones because it focuses on fodder ‘preservation mixture’ for the purpose of recreating and preserving natural habitats. It favours indeed the preservation of ecotypes in their environment of adaptation and also the preservation of some crop wild relatives. Differently from the other Directives, no registration of the mixture components and no certification of the mixtures is required. In addition, there is the possibility to include in a preservation mixture also forage species not covered by directive 66/401/EEC. Because of the derogation for the registration of the components of these fodder seed mixtures and the ground of application which is not addressed to the sensu stricto landraces, Directive 2010/60/UE will be excluded from further discussion.

Present status of Directives’ implementation

According to the deadline for the implementation, the Commission Directives 2008/62/EC and 2009/145/EC on commercialization of conservation variety and amateur variety seed should be already implemented across all of the Member States by now. This is certainly true for the fourteen Member States which have already registered conservation varieties.

184 conservation varieties are registered in the Common Catalogue up to now (European Plant Variety Database March 2013, <http://ec.europa.eu/food/plant/propagation/catalogues/database/>). Among them, 159 belong to agricultural species, the remaining 25 to vegetable species (Table 1 a, b). It is also notable that the 31st edition of the Common Catalogue of vegetable species (2012) shows 454 varieties registered as varieties developed for growing under particular conditions (i.e. amateur varieties).

Conservation varieties of agricultural crops (principally open field crops like cereals, potato, legumes, and *Brassica* spp.) have been registered by Sweden (59), Finland (17), Romania (15), Spain (13), United Kingdom (12), Austria (9), Italy (9), Germany (8), France (7), Estonia (4), Portugal, (4), Latvia (1) and Slovenia (1) (Table 1a). The most represented species are *Solanum tuberosum* L., *Triticum aestivum* L., *Zea mays* L. and *Pisum sativum* L. The conservation varieties of vegetable species include (in order of number of registered varieties) pepper, French bean, tomato, leek, curly kale, marrow, broad bean, celery, white cabbage, witloof chicory, cardoon and round pea (Table 1b). They have been mainly registered by Mediterranean countries [Spain (9), Italy (8), Portugal (3) and France (1)], with the exception of two varieties coming from Belgium and two from Sweden.

Most of the applicants for the registration of conservation varieties listed up to now in the Common Catalogue are scientific and public bodies, followed by farmer associations, private citizens and a low number of seed companies (7 for 10 registered conservation varieties). For example, NordGen Växter, a public institution dealing with biodiversity and safeguarding genetic resources of plants, farm animals and forest that was established in 2008, promoted the registration of agricultural varieties in Sweden (the Country which registered the highest number of conservation varieties). Public bodies and farmer associations promoted the registration in Romania, Spain, Italy and France, while private citizens are the maintainers of the most part of the conservation varieties registered by Finland.

For conservation varieties of agricultural species, the region of origin is generally the whole territory of the country, but Italy, Romania, Portugal and Spain registered conservation varieties associating them to a restricted geographic area within their own national territory. For vegetable species, all of the conservation varieties are linked to a geographic area of regional dimension, with the exception of *Phaseolus vulgaris* L. ‘Signe’ and *Vicia faba* L. ‘Solberga’ registered by Sweden, where the region of origin coincides with the national territory, and of *Capsicum annum* L. ‘Ñora’ (Spain), *Cyborium intybus* L. ‘Wilfama’ (Belgium) and *Allium porrum* L. ‘Selectie Akelei’ (Belgium) for which no region of origin is reported in the Common Catalogue database.

Further information was gathered comparing the list of the registered conservation varieties with the

Table 1 Landraces of agricultural (a) and vegetable species (b) registered as conservation varieties by each single country and in total

Country	Species	Total
<i>a) Agricultural species</i>		
Sweden		59
	<i>Pisum sativum</i> L. (partim)—field pea	16
	<i>Triticum aestivum</i> L.—wheat	14
	<i>Solanum tuberosum</i> L.—potato	14
	<i>Hordeum vulgare</i> L.	8
	<i>Avena sativa</i> L. (including a. <i>Byzantina</i> K. Koch)—oat and red oat	5
	<i>Brassica napus</i> L. var. <i>napobrassica</i> (L.) Rchb.—swede	1
	<i>Glycine max</i> (L.) Merrill—soya bean	1
Finland		17
	<i>Trifolium pratense</i> L.—red clover	7
	<i>Avena sativa</i> L. (including <i>A. byzantina</i> K. Koch)—oat and red oat	1
	<i>Hordeum vulgare</i> L.—6 row barley	1
	<i>Secale cereale</i> L.—rye	8
Romania		15
	<i>Triticum aestivum</i> L.—wheat	8
	<i>Avena sativa</i> L. (including <i>A. byzantina</i> K. Koch)—oat and red oat	2
	× <i>Triticosecale</i> Wittm. ex A. Camus -	2
	<i>Vicia sativa</i> L.—common vetch	1
	<i>Hordeum vulgare</i> L.—2 row barley	1
	<i>Hordeum vulgare</i> L.—6 row barley	1
Spain		13
	<i>Solanum tuberosum</i> L.—potato	8
	<i>Zea mays</i> L.—maize	5
United Kingdom		12
	<i>Solanum tuberosum</i> L.—potato	5
	<i>Brassica napus</i> L. var. <i>napobrassica</i> (L.) Rchb.—swede	4
	<i>Brassica napus</i> L. (partim)—swede rape	1
	<i>Hordeum vulgare</i> L.—6 row barley	1
	<i>Triticum aestivum</i> L.—wheat	1
Austria		9
	<i>Triticum aestivum</i> L.—wheat	3
	<i>Trifolium pratense</i> L.—red clover	1
	<i>Linum usitatissimum</i> L.—flax, linseed	1
	<i>Secale cereale</i> L.—rye	1
	<i>Sorghum bicolor</i> (L.) Moench—sorghum	1
	<i>Triticum spelta</i> L.—spelt wheat	1
	<i>Zea mays</i> L.—maize	1
Italy		9
	<i>Zea mays</i> L.—maize	8
	<i>Solanum tuberosum</i> L.—potato	1
Germany		8
	<i>Solanum tuberosum</i> L.—potato	4

Table 1 continued

Country	Species		Total
	<i>Triticum aestivum</i> L.—wheat	2	
	<i>Vicia faba</i> L. (partim)—field bean	1	
	<i>Secale cereale</i> L.—rye	1	
France			7
	<i>Solanum tuberosum</i> L.—potato	6	
	<i>Zea mays</i> L.—maize	1	
Estonia			4
	<i>Solanum tuberosum</i> L.—potato	3	
	<i>Beta vulgaris</i> L.—fodder beet	1	
Portugal			4
	<i>Zea mays</i> L.—maize	2	
	<i>Triticum aestivum</i> L.—wheat	1	
	<i>Triticum durum</i> Desf.—durum wheat	1	
Latvia			1
	<i>Pisum sativum</i> L. (partim)—field pea	1	
Slovenia			1
	<i>Zea mays</i> L.—maize	1	
Total			159
<i>b) Vegetable species</i>			
Spain			9
	<i>Capsicum annuum</i> L.—chili, pepper	3	
	<i>Lycopersicon esculentum</i> Mill.—tomato	2	
	<i>Brassica oleracea</i> L.—curly kale	2	
	<i>Brassica oleracea</i> L.—white cabbage	1	
	<i>Phaseolus vulgaris</i> L.—climbing french bean	1	
Italy			8
	<i>Capsicum annuum</i> L.—chili, pepper	3	
	<i>Allium porrum</i> L.—leek	1	
	<i>Apium graveolens</i> L.—celery	1	
	<i>Cynara cardunculus</i> L.—cardoon	1	
	<i>Phaseolus vulgaris</i> L.—climbing french bean	1	
	<i>Pisum sativum</i> L. (partim)—round pea	1	
Portugal			3
	<i>Capsicum annuum</i> L.—chili, pepper	1	
	<i>Cucurbita pepo</i> L.—marrow or courgette	1	
	<i>Phaseolus vulgaris</i> L.—climbing french bean	1	
Belgium			2
	<i>Allium porrum</i> L.—leek	1	
	<i>Cichorium intybus</i> L.—witloof chicory	1	
Sweden			2
	<i>Vicia faba</i> L. (partim)—broad bean	1	
	<i>Phaseolus vulgaris</i> L.—dwarf french bean	1	
France			1
	<i>Phaseolus vulgaris</i> L.—dwarf french bean	1	
Total			25

information present in several databases [i.e. GBIS_IPK (http://gbis.ipk-gatersleben.de/gbis_i/)], the several ECPGR Central Crop Databases (all available from http://www.ecpgr.cgiar.org/germplasm_databases/central_crop_databases.html), Eurisco (<http://eurisco.ecpgr.org/nc/search/>), European Cultivated potato database (<http://www.europotato.org/>) and Sesto (<http://www.nordgen.org/index.php/en/content/view/full/344>), looking for the same denomination reported in the Common Catalogue.

As for conservation varieties of agricultural species, merging the information from the different databases, 50 (31.4 % of the total) were recorded as ‘advanced cultivars’, 49 (31.0 %) as ‘landraces/traditional varieties’ while no information was recorded about the status of the remnant 60 (see details in Suppl. Table 2). As for the vegetable conservation varieties, it was possible to gather database information for only two of them that were verified as “traditional cultivar/landrace”.

Discussion

In just a few years from Directive publication, a significant number of conservation varieties of different crops have been registered in the Common Catalogue. Their number, that was 110 in January 2011 (Negri et al. 2012), presently (January 2013) is 184 and is likely to further increase in the next years. At least judging from the number of papers describing the European genetic resources in referenced journals and other publications (see for example, without being exhaustive, Hammer et al. 1999; Negri 2003; Laghetti et al. 2004; Laghetti and Hammer 2004; Hammer and Laghetti 2006; Laghetti et al. 2008; Vetelainen et al. 2009a; Thomas et al. 2012), the number of landraces and other varieties suitable to be registered is very high indeed. In addition, the request of seed of not uniform varieties from agricultural sectors like the organic agriculture or local niche product sector is increasing and particular attention to meet the food, natural resources and territorial challenges of the future is given by the future Common Agricultural Policy (Commission Communication 2010) which could drive further registrations.

The number of the species most represented in the Common Catalogue (*S. tuberosum*, *T. aestivum*,

Z. mays, and *P. sativum*) reflects the number of conservation varieties registered by Sweden, the Member State which registered the highest number of agricultural varieties (59 against 17 of the second Member State, Finland), with the exception of *Z. mays* varieties, principally registered in Italy.

Data in the consulted genetic resource databases possibly overlap due to germplasm and relative information exchange among genebanks in the past. However, they confirmed in equal measure the status of landrace and advanced/improved cultivars for two thirds of the registered conservation varieties. The others presumably are also either landraces or advanced cultivars in equal measure, but this could not be ascertained. The examination of documents concerning the applications in Italy (Spataro is an officer in charge of the matter) shows that all of the Italian maize conservation varieties are landraces, although they are not mentioned in any database. As for the others, it was not possible to gather exact information, not even by exclusion of varieties previously recorded as cultivars. The European Plant Variety Database does not show if a conservation variety is an old conventional cultivar (i.e. if it has been registered and deleted before the entering into force of the Directives on conservation varieties since two years at least).

Considering the number of registered conservation varieties in relation to the most represented species, it is likely that the typical population genetic structure of *S. tuberosum*, *T. aestivum* and *P. sativum* facilitated the access to the simplified procedure of registration more than it can happen for other species. They presumably are a pool of similar and sufficiently stable clonal (potato) or pure (wheat and pea) lines. The Directive derogations in relation to the uniformity are severe for those landraces with a very high morphologic variability (Suppl. Table 1). Different conclusions can be reached for *Z. mays*, the third mostly represented species in the Common Catalogue as conservation varieties. *Z. mays* is an outcrossing species with high variation within and among populations. The possibility to obtain varieties competing against the modern hybrids and answering the requirements of the European Seed legislation is possible only when the population representing a certain variety is characterized by a quite restricted genetic basis. This can be surely stated for the Italian conservation varieties of *Z. mays* that are cultivated

in a very restricted geographic areas and whose final product has a traditional use (polenta) and only a local market. Environmental and human selective pressure played a predominant role in the selection of certain allelic frequencies in populations of allogamous crops (Pallottini 2002; Bitocchi et al. 2009; Torricelli et al. 2013) and made the correspondent varieties not only sufficiently uniform to comply with the registration prescriptions of conservation varieties, but also compliant with the definition of landraces commonly accepted by the scientific community in Italy (Polegri and Negri 2010).

The difference in the number of registered varieties between agricultural and vegetable species is probably mainly due to the later issue and implementation deadline of the Directive concerning the latter.

However, it can also suggest that the seed marketing interest is higher for agricultural species than for vegetables. The agronomic, commercial, technical and industrial requirements asked by the vegetable production line is higher than for agricultural species. It asks for hybrids of vegetable varieties that are perfectly uniform, resistant to specific disease, suitable to be planted in glasshouses, cultivated with modern agronomic techniques and harvested at the same time (like in hydroponic cultures). It is obvious that landraces cannot satisfy these requirements because of their intrinsic diversity.

Paradoxically, instead, it is well documented that a high number of landraces belongs to vegetable species, especially in the Southern part of Europe and the Mediterranean area (Negri 2003; Laghetti et al. 2004; Laghetti and Hammer 2004; Hammer and Laghetti 2006; Laghetti et al. 2008; Vetelainen et al. 2009a; Galluzzi et al. 2010; Thomas et al. 2012). Most of these vegetable landraces are still maintained in a myriad of home gardens for family use and consumption and represent an inestimable richness in terms of genetic resources, but their existence is acknowledged with difficulty, because requires a capillary research on the territory (which has high costs in term of human and monetary resources to be dedicated).

At the same time, the high number of vegetables registered as amateur varieties suggests that a great interest exist for them. It is likely that registration as amateur variety is preferred because lighter restrictions in seed certification and marketing are foreseen for them than for conservation varieties (e.g. production and marketing of amateur variety seed are not

strictly linked to a region of origin). Unfortunately, it is not possible to assess if and how many of the registered amateur varieties are *sensu stricto* landraces, elder cultivars or other materials since the only information given by the Common Catalogue is the variety denomination and the registering Member State.

Although generally aimed to ensure *in situ* conservation and the sustainable use of PGR, the Directives focus on seed production and marketing instead of genetic resource conservation *per se*. At present, considering that one third of conservation varieties (at least) are old cultivars and that the landraces still cultivated across Europe can possibly be estimated in thousands (*ibidem*), their application seems to have only partially favoured the on farm conservation of landraces. In addition, a high number of landraces is maintained in *ex situ* collections that could also have been registered and reintroduced in cultivation. On the contrary, a wider registration of landraces than presently achieved could serve the growing seed request of variable populations coming from the organic farming sector and increase on farm (*in situ*) conservation activities of PGR.

Old conventional varieties certainly are important genetic resources, but landraces for their intrinsic diversity are most important. As for extant landraces in particular, their low registration number appears to be a loss of opportunities. On one hand, the registration of a landrace has a meaning when the seed is expected to be traded in large quantity; on the other hand it is also an official preservation of those landraces that have a limited seed market and commercial interest. This because the landrace is officially identified and permanently linked to a particular territory where it is maintained, even if not necessarily certified and, consequently, traded (*per se* the registration into the Common Catalogue does not force the seed marketing of any type of variety).

There are several reasons for the low number of landraces registered in the Common Catalogue. Their existence is seldom acknowledged, since complete inventories at national (and European) level are generally lacking, although inventories have been recognised as the baseline information needed for any effective landrace conservation action (Vetelainen et al. 2009b; Maxted et al. 2009) and some initiatives are currently funded by the European Commission under the frame of the VII Framework Program (see

“Acknowledgments”). Secondly, their utility in particular agricultural contexts (difficult edaphic and climatic conditions, organic agriculture, opportunity to obtain high added value products from them) is seldom acknowledged or scarcely documented. Thirdly, the administrative procedures of registration of conservation varieties are not uniform among the Member States, although the requirements for registration and marketing are well defined in the Directives. Finally, the little volume of business that can be obtained from the seed commercialisation of landraces (due to the restrictions in seed quantity and area where the landrace can be grown) probably discourages the private enterprises to register them.

The registration of landraces should be strongly and principally promoted by public bodies, in order to respect the principles of the Convention on Biological Diversity (CBD 1992) and FAO International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA 2001), with regard to the access to the genetic resources, their preservation and the profit of the farmers maintaining them. The case of Sweden should be taken as an example of how important and crucial could be the role of a public or scientific body in promoting the marketing and utilization of local genetic resources. Public bodies should play an important role also in the certification and trading phases, in order to make the preservation of the landraces effective when a renewed economical interest in them arises. In addition, the public intervention would also become a guarantee for Seed Companies, because public control would play a crucial role in differentiating and separating the marketing of conventional varieties from that of landraces, which should be exclusively aimed to the valorisation of genetic resources. In this view, a sort of bottom up process should be activated as suggested by Lorenzetti and Negri (2009): (a) in the first instance, sub-country level Authorities and Agencies should make ready data on number of landraces, their region of origin and level of threat, (b) secondly they should listen to the requests of people interested in their commercialization, (c) thirdly they should prepare a list of landraces that the Member State will be called to register. It is worth to remember that Directives on conservation varieties also accept unofficial tests and this allows to reduce registration costs or even make the registration free of charge, as it happens in Italy. A free of charge registration of landraces will favour their seed commercialisation and consequently be a further incentive for their on farm conservation.

In order to make the public action feasible and effective, the *status* of any PGR eligible to be listed in the Common Catalogue should be immediately and constantly identifiable. To this purpose, local and regional inventories on PGRs of each Member State should be easily accessible, coordinated each other and with other database (such as those consulted in this work). It would be also desirable that European Plant Variety Database were linked to other PGR databases and showed information about the *status* of the genetic resources listed in PGR databases and registered in the Common Catalogue. This particularly would avoid that *sensu stricto* landraces of vegetable species are registered as amateur varieties instead as conservation varieties. The former type of registration allows for a wide area of seed commercialisation, the latter for a much more restricted commercialisation and the maintenance of the variety within the region of origin. It is much more proper to preserve landraces in their historical area of origin than outside it.

Finally, considering what has been discussed above, it would be desirable that the definition of plant materials in articles 2 of Directive 2008/62/EC and art. 2 of Directive 2009/145/EC were revised so to clearly distinguish *sensu stricto* landraces from ecotypes, old conventional varieties and other plant materials. This should take into account not only the scientific definitions (Lorenzetti and Negri 2009) but also the definitions used in genetic resource inventories that are controlled by public bodies/institutions. In this way, a concrete and functional point of connection between the seed and the genetic resource safeguard legislation would be finally created.

Conclusions

The Directives on conservation varieties certainly are an opportunity to promote landrace on farm conservation through their seed commercialization. However, several actions are still needed to enlarge the registration of landraces as conservation varieties than presently achieved. The compilation of national inventories of extant landraces, the facilitation of the registration process (including the option of making it for free) under the control and supervision of public bodies and a legislation package revision that clearly distinguishes between *sensu stricto* landraces and old

cultivars for provided derogations would be highly recommended.

However, it is unlikely that the seed of all the surviving landraces will have the possibility to be commercialized with profit. The promotion of a different type of agriculture, where the local economy is based on landraces and food production is, at least partially, derived from local farms and home gardens, is needed to encourage on farm conservation of local diversity. To promote on farm conservation of landraces, a better education concerning the environmental issues, better awareness of environment services that can come from agriculture, a higher farmer empowerment and fostering farmer's pride in being the stewards of their own environmental resources should be actively pursued (Negri 2005).

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