THE LAW of the SEED

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SUMMARY

INTRODUCTION

Seed is the first link in the food chain and embodies millennia of evolution and thousands of years of farmers breeding as well as the culture of freely saving and sharing seed. It is the expression of earth's intelligence and the intelligence of farming communities down the ages.

The ecological and biological laws of the Seed draw upon the perennial laws of nature and evolution based on diversity, adaptation, resilience and openness. They also draw on principles of jurisprudence of human rights, public goods and the commons.

In contrast, the dominant legislation today, related to seed, is in total violation of the Law of the Seed and democratic processes without any basis in jurisprudence or science. An arsenal of legal instruments are steadily being invented and imposed that criminalize age-old farmers' seed breeding, seed saving and seed sharing. And this arsenal is being shaped by the handful of corporations who first introduced toxic chemicals into agriculture, and are now controlling the seed through genetic engineering and patents.

The scientific paradigm is also being transformed. From a vibrant holistic and ecological system, agriculture has been industrialized and compartmentalized into a fragmented and mechanistic paradigm where Nature's contributions and farmers' contributions do not enter into the equation.

This because these contributions cannot be made into commodities and commercialized by those corporate interests which, through patents, aim to get absolute power and absolute ownership over seed, circumventing all ecological and social responsibility of the impact of monopolies and genetically engineered seed associated with it.

When those that need to be regulated write the laws to get absolute power and absolute ownership over seed, which is life itself, while freeing themselves of all ecological and social responsibility of the impact of monopolies and genetically engineered seeds associated with it, we do not just have a crisis of food and agriculture, we have a crisis of democracy.

Monsanto wrote the Patents on Life clauses of the TRIPS agreement of WTO. In the US, Monsanto wrote and sneaked into the budget law, HR 993, a deregulation section 735, protecting genetically modified seeds from litigation in the face of ecological and health risks. In India, the government sneaked in the Biotechnology Regulatory Authority of India Bill (BRAI - India's Monsanto Protection Act) in Parliament on Earth Day, a corporate freedom law for deregulation of GMOs meant to replace the existing law for GMO regulation.

There are 3 aspects in the dominant system of seed related laws:

- Industrial Patents on Seed which treat seed as an "invention", and hence the "intellectual property" of corporations by merely adding a gene, artificially, into the organism;
- Breeders' Rights as in UPOV (The International Union for the Protection of New Varieties of Plants) which privilege uniformity and industrial breeding;
- Seed Laws extending industrial criteria of uniformity on farmers' varieties and open pollinated varieties, which are bred for diversity and resilience.

Corporations shaped the Global Intellectual Property and Patent Laws in the Trade Related Intellectual Property Rights (TRIPs) Agreement of the World Trade Organization, defining seed as their creation and invention, thus preventing farmers from sharing and saving their seed. This is how the TRIPs Agreement of the World Trade Organization was born. Article 27.3(b) of the TRIPs Agreement states: "Parties may exclude from patentability plants and animals other than micro-organisms, and essentially biologi-

cal processes for the production of plants or animals other than non-biological and micro- biological processes. However, parties shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof." Again, this protection on plant varieties is precisely what prohibits the free exchange of seeds between farmers, threatening their subsistence and ability to save and exchange seeds amongst one another.

The TRIPS clause on patents on life was due for a mandatory review in 1999, because the idea of "creating" and "inventing" life, and hence owning it, was so wrong. India, in its submission, had stated "Clearly, there is a case for re-examining the need to grant patents on lifeforms anywhere in the world. Until such systems are in place, it may be advisable to: - (a) exclude patents on all lifeforms;"

The African group too, stated "The African Group maintains its reservations about patenting any life forms as explained on previous occasions by the Group and several other delegations. In this regard, the Group proposes that Article 27.3 (b) be revised, to prohibit patents on plants, animals, micro-organisms, essentially biological processes for the production of plants or animals, and non-biological and microbiological processes for the production of plants or animals."

This mandatory review has been subverted by governments under the influence of corporations within the WTO: this long overdue review must be taken up, to reverse Patents on life and Patents on Seed.

Living organisms make themselves. Life forms, plants and seeds are all evolving, self-organized, sovereign beings. They have intrinsic worth, value and standing. Seeds are not invented by simply putting a gene into them. Adding a toxic gene should in fact be counted as "pollution", not as "creation", and furthermore, GMO seeds with toxic genes in them need to be regulated with biosafety in mind.

Uniformity is being pushed as positive criteria, in order to legitimize corporate control over seed, based on uniformity. Moreover, African governments are being pressured to adopt UPOV 1991 through regional harmonization of plant variety protection policies and laws.

Such laws are being framed everywhere, preventing us from responding to climate change, preventing us from making a transition from high cost industrial agriculture – which is leading farmers to being pushed off the land and, in extreme cases, committing suicide – to ecological agriculture.

The criteria for industrial breeding and industrial agriculture is 'DUS' – Distinctiveness, Uniformity, Stability – and is based on intensive use of chemicals, water and fossils. DUS ignores the need for diversity, nutrition and safety, and the need to create low cost sustainable livelihoods in the context of economic collapse and slow-down, and the consequent need to localize food systems:

- While farmers breed for diversity, corporations breed for uniformity.
- While farmers breed for resilience, corporations breed vulnerability.
- While farmers breed for taste, quality and nutrition, industry breeds for industrial processing and long distance transport in a globalized food system.

Industrial breeding has used different technological tools to consolidate control over the seed – from so called High Yielding Varieties (HYVs), to hybrids, genetically engineered seeds, "terminator seeds", and now, synthetic biology. The tools might change, but the quest to control life and society does not.

The deeper level at which the corporate law of the seed is undermining the very fabric of life is the ethical dimension of this issue. We are all members of the earth family, a steward in the web of life. Yet corporations are now claiming the role of creator. They have declared seed to be their "invention", hence their patented property. A patent is an exclusive right granted

for an "invention", which allows the patent holder to exclude everyone else from making, selling, distributing and using the patented product. With patents on seed, this implies that the farmers' right to save and share seed is now in effect defined as "theft", an "intellectual property crime".

Patents on seeds are legally wrong because seeds are not an invention.

Patents on seeds are ethically wrong because seeds are life forms, they are our kin members of our earth family.

Owning life by claiming it to be a corporate invention is both ethically and legally wrong.

It is in this context that the Working Group on the Law of the Seed of Navdanya International and the International Commission on the Future of Seed and Food bring to citizens and Governments of the world "The Law of the Seed", to put diversity and democracy, sustainability and people's rights, at the centre of the scientific and legal frameworks that govern the seed, in place of the current trend of monocultures and monopolies, uniformity and privatization, corporate control and criminalization of biodiversity and famers.

The Law of The Seed aims to bring back biodiversity and recognition of farmers' rights, to bring back democratic systems in society to shape laws as well as knowledge.

The Law of the Seed puts at its centre Seed Freedom – the freedom of the seed, of farmers and of citizens – in place of the illegitimate freedom of corporations to claim the genetic wealth of the planet as their property, and criminalize citizen freedoms. The freedom to save and exchange seed is vital in our time characterized by multiple crises – the biodiversity crisis, the water crisis, the food crisis, climate crisis, and the economic crisis, all of them part of a single crisis: a crisis of ethics and values.

The Law of the Seed comes out of an ecological and democratic imperative for the long term future of the planet and of its

inhabitants. Through it, we hope to sow the seed for a paradigm shift in seed, food and agriculture. Like the seed, this is a work in evolution. Adapt it, use it for your context. Its future is in your hands.

Note

The European Commission's newly approved proposed Seed legislation (6 May 2013) continues to disregard the imperative of protecting and enhancing agro-biodiversity and continues to put the global seed industry and corporations above the interests and rights of farmers and breeders.

We hope that this Law of the Seed document will help farmers and seed breeders in their demands that politicians uphold their rights as seed savers and producers and so too help convince politicians that agro-biodiversity must be at the heart of any seed legislation if they are to tackle the hazards of climate change and food security.

WHY AGRO-BIODIVERSITY IS IMPORTANT

Agricultural biological diversity, or more specifically, genetic resources for food and agriculture, are the storehouse that provides humanity with food, clothes and medicines. It is essential in the development of sustainable agriculture and food security.

Evolution is the process by which nature practices its capacity of selection; for selection to exist, nature needs diversity. Diversity is also the basis for the farmer, for the breeder and for the agricultural scientist in general. We need diversity to allow evolution and thus capacity of adaptation. We need diversity in order to be able to select the best characteristics for crops. This diversity has been developed over thousands of generations and our duty is to safeguard it for those in the future.

In spite of its vital importance for human survival, agricultural biodiversity is being lost at an alarming rate. It is estimated that some ten thousand species have been used for human food and agriculture. Currently no more than 120 cultivated species provide 90% of human food supplied by plants, and 12 plant species and five animal species alone provide more than 70% of all human food. A mere four plant species (potatoes, rice, maize and wheat) and three animal species (cattle, swine and chickens) provide more than half. Hundreds of thousands of farmers' heterogeneous plant varieties and landraces, that existed for generations in farmers' fields until the beginning of the twentieth century, have been substituted by a small number of modern and highly uniform commercial varieties. The loss of agricultural biodiversity has drastically reduced the capability of

present and future generations to face unpredictable environmental changes and human needs.

Also, meta-analyses published since 2005[1] have shown that, as a general rule, reductions in the number of genes, species and functional groups of organisms reduce the efficiency by which whole communities capture biologically essential resources (nutrients, water, light, prey), and convert those resources into biomass. Thus biodiversity increases the stability of ecosystem functions through time.

Feeding the world

The number of hungry people in October 2012 reached numbers never attained in the history of Humanity getting to one billion in 2010 and 925 millions in 2012 (almost 20% of the world population). Although today this number has slightly reduced, the reasons that caused the crisis in 2008 remain, and some have intensified. In fact, food prices were highest at the end of 2010 surpassing by 29% those of the previous year and a bounce back is expected in 2013.

Nevertheless, the problem is not the lack of food. According to FAO, there is sufficient food to feed up to 70% more of Earth's population, but the hungry have no access to it. Food in the international market is not available to those who are hungry, because hunger and poverty often go hand in hand. Lack of access is due to lack of food produced at the local level, on one hand, and also to lack of funds to buy it from those places where it is in excess.

If we take into account that most of the hungry population (75%) live in rural areas, promoting ´in situ´ production seems the most efficient and perhaps the only durable solution. Local production must be streamlined to provide more options to

[1] Cardinale BJ, Duffy JE, Gonzalez A, Hooper DU, Perrings C, Venail P, Narwani A, Mace GM, Tilman D, Wardle DA, Kinzig AP, Daily GC, Loreau M, Grace JB, Larigauderie A, Srivastava DS, Naeem S, 2012, *Biodiversity loss and its impact on humanity*, Nature 486: 59-67.

small scale farmers and rural communities, to improve quality and quantity. This means supporting small farmers and communities in the development of their own crops and agricultural systems. Unfortunately, technical assistance for the small farmer and international research to improve production in traditional low-input farming systems, including the genetic improvement of neglected crops and local varieties adapted to these systems, has been very limited and is often non-existent.

The FAO in its report «Pathways to success» (Nov. 2009) indicates that one of the best and most profitable ways to escape from poverty and hunger in rural areas is to support small farmers. Close to 85% of the world's plots of agricultural land are less than two hectares in area and small farmers and their families comprise some 2 billion people, a third of the world's population.

Genetic erosion puts at risk food production and sustainable agriculture

The concentration of population in urban areas and the rising demand for food has led, among other things, to a high mechanized production of standardized, homogeneous crops and plants to meet the demand. This in turn has led to the loss of many heterogeneous traditional farmers' varieties.

According to the State of the World's Plant Genetic Resources for Food and Agriculture (PGRFA), over 67% of the wheat fields in Bangladesh were planted with the same cultivar ("Sonalika") in 1983. By the 1990s in Ireland, 90% of the total wheat area is sown to just six varieties. Of the 7098 apple varieties that were documented in the USA at the beginning of the twentieth century, approximately 96% have been lost. Similarly 95% of the cabbage; 91% of the field maize; 94% of the pea; and 81% of the tomato varieties are lost. In Mexico, only 20% of the maize varieties reported in 1930 are known today; in the Republic of Korea, only 26% of the landraces of 14 crops cultivated in home gardens in 1985 were still present in 1993.

The loss of local species and varieties leads to the irreversible loss of the genetic diversity they contain, including the genes for adaptation to the conditions in which they evolved. This genetic erosion has dangerously shrunk the genetic pool available for the natural selection, and selection by farmers and plant breeders, with a consequent increase in the vulnerability of agricultural crops to sudden climatic changes, as well as the appearance of new pests and diseases. For instance, in the United States in 1970, the fungus Helminthosporium maydis, destroyed over half the standing maize crop in the southern part of the country. The crop had been grown from hybrid seeds obtained by cytoplasmatic male sterility from a common origin, which also carries susceptibility to this disease.[2] The problem was resolved by breeding resistant varieties using genetic resources obtained from Latin America and Africa respectively.

Any one country relies on crop genetic diversity from all over the world. No country is self sufficient in genetic resources for food and agriculture: the average genetic interdependency among countries for their most important crops is around 70%; however, the degree of dependency varies considerably between countries, and in general developed countries are much more dependant than developing countries.

The value of both farmers' traditional varieties and wild relatives of cultivated plants in crop improvement and agricultural development cannot be overemphasized. Indeed, the concept of 'usefulness' varies according to the needs and to the information available. For example: One local variety of wheat found in Turkey, collected by J. R. Harlan in 1948, was ignored for many years because of its many negative agricultural characteristics. But in the 1980s, it was discovered that the variety carries genes resistant to the fungus Puccinia Striiformis, 35 strains of Tilletia caries and T. foetida, and 10 varieties of the fungus T. controversa, and is also tolerant to certain species of Urcocystis, Fusarium. It then was used as a source of resistance to a whole array of diseases.

[2] Kronstad, W.E., *Germplasm: the key to past and future wheat improvement*, in Smith, El, *Genetic improvement of yield in wheat*, p. 41-54, Special publication 13, Crop Science Society of America, Madison, Wisconsin (1986).

Crop Genetic Diversity is indispensable to provide resilience to face unpredictable environmental and climatic changes, to adapt to variation in productions systems, to meet the needs of the expanding human population, to develop resistance to continuously evolving pests and diseases, to use in any plant improvement program, to provide greater production stability, to improve the living conditions of farmers, and to protect the natural environment.

Types of diversity and options

With the loss of plant genetic diversity, options have been lost for present and future generations. Losing these options reduces freedom to select what may be necessary or desired. This loss has occurred in different levels of diversity.

Intravarietal diversity:

The requirement of DUS, as a pre-requisite for seed registration in many cases, has led to very uniform varieties with practically no intervarietal diversity. Uniformity has then become a key feature. It should be noted however, that DUS could be applied only for very concrete and specific characteristics needed to characterize the variety, while maximizing heterozygosis in the rest of the genome.

Intervarietal diversity:

In the 20th century alone, hundreds of thousands of traditional varieties, substituted by modern commercial uniform varieties, have been lost forever. For many major crops, more than 90% of those varieties available at the beginning of the century have been lost forever. See examples above (Genetic erosion…).

Interspecific diversity:

According to FAO[3], more than 7,000 species have been used in the history of humanity to feed Humanity and meet basic human needs. At present only 30 crops constitute 90% of the calories

[3] First Report of the State of the World's Plant Genetic Resources for Food and Agriculture (1997). http://apps3.fao.org/wiews/docs/SWRFULL2.PDF

in the human diet, and only three species (rice, wheat, maize) account for more than half of the energy supply. There is then a wealth of species that have been neglected.

Uniformity increases vulnerability and reduces stability in food production

The dominant system of seed production is based on uniformity and homogeneity. This trend fits well with industrial agriculture's requirement for a uniform response to the application of chemicals to control pests, diseases and weeds, or to fertilizers. On the contrary, farmers have traditionally used crop and variety diversity as a way to adapt to diversifying risks, a concept that is very clear to the managers of financial assets who always advise clients who want to minimize risk to diversify their financial investments. This concept, which was, and still is, present in farmers' breeding, has disappeared from modern plant breeding, an activity which eventually affects food production and hence food security in a world where one of the major threats is climate change and its consequences including, among others, newly invasive pests and diseases.

"Anti-evolutionary" requirements in favour of private rights and the consolidation of monopolies

The tendency of plant breeding towards uniformity has been legitimated by the introduction of the DUS (distinctiveness, uniformity and stability) requirements. In a number of countries, registration of varieties (and the need to be registered to be "legally" cultivated) requires testing for DUS and, for some crops, for VCU (value for cultivation and use) for a minimum of two years. Distinctiveness means that the variety must be distinguishable by one or more characteristics from all other registered varieties. Uniformity means that all plants from the same batch of seed must be the same. Stability means that the plants must be the same throughout successive generations. VCU means that compared to

other registered varieties, the new one being registered offers a qualitative or technological advance.

The three concepts do not have a biological justification. Whoever decided to impose uniformity because it makes it easier to distinguish varieties from each other, probably ignores that in many countries farmers also grow heterogeneous landraces of the same crop that despite their heterogeneity are identified with distinct names and characteristics even if not uniform. They are kept in cultivation because they are much more stable (over time) than the Distinct, Uniform and Stable varieties.

Uniformity and stability seems to be the opposite of what is needed in the presence of continuously evolving pests and diseases and in the presence of a moving target such as the increase of temperatures and droughts because of climate changes.

Moreover breeding and so-called "field trials" are often done in agricultural research stations under "ideal" or artificial conditions and not on farmers' fields, thus ignoring characteristics that are actually beneficial to farmers. The interest of farmers is consistency of production over time (resilience) – while the interest of the seed companies is consistency of production over space. The two interests are therefore at opposite ends, and not only the plant breeding programs but also the registration procedures, which concentrate on irrelevant aspects such as DUS, are organized to respond only to the latter. Legal constraints therefore hinder the evolution of the system, which is hostage to the tool that was developed just to fulfill a good service to society.

Plant breeding opportunities to reconcile agro-biodiversity and the needs of farmers

It is possible to reconcile resilience, biodiversity and food quality with food security and production of sufficient food. Science and technology are powerful "tools" to serve society; however, they can be used in all directions (towards uniformity and towards diversity), and it is in exercising wisdom that most benefits can be harnessed.

For a while, commercial plant breeding has excluded local solutions, which could not be profitably exploited, thus ignoring local (indigenous) knowledge, regardless of whether this was formally documented or not, and has disconnected the people who are eventually affected by these technologies. Participatory research, in general, is defined as that type of research in which users are involved in the design – and not merely in the final testing – of a new technology. When the new technology is a variety, Participatory Plant Breeding (PPB) is defined as that type of plant breeding in which farmers, as well as other partners, such as extension staff, seed producers, consumers, traders, NGOs, etc., participate in the development of a new variety.

PPB is a dynamic and permanent collaboration that exploits the comparative advantages both of plant breeding institutions (national or international) that have the institutional responsibility for plant breeding, and of farmers and possibly other partners. In a true PPB program both the roles of partners and the extent and the manner in which they collaborate change with time. It is also important to mention that a truly participatory program is necessarily inclusive in relation to gender and has an empowering effect on the participants.

A PPB program has four important organizational features:

1. Most of the program takes place in farmers' fields (i.e. is decentralized);
2. The decisions are taken jointly by the breeder and the farmers, and other partners;
3. The program can be replicated in several locations with different methodologies and types of germplasm;
4. Selection is conducted by farmers and breeders in each location independently from the other locations.

The last difference is of particular importance because it is in this way that preference is given to specific adaptation which, on one side, maximizes yield and adaptation in individual loca-

tions, hence increasing production at global level, on the other increases agro biodiversity in space, because different varieties are generally selected in different locations. As a participatory program continues, there is also a rapid turnover of varieties thus increasing also agro biodiversity in time.

Participatory–evolutionary breeding programs can be constituted, for example in vegetatively propagated and in self-pollinated crops, by a mixture of segregating populations coming from a wide range of crosses. In the cross-pollinated crops, populations can be made by mixing experimental hybrids. These populations will be left evolving in a multitude of environments, chosen by the farmers and characterized by single abiotic or biotic stresses, or combinations of stresses, and under different types of agronomic management with the expectation that the frequency of genotypes with adaptation to the conditions (climate, soil, agronomic practices and biotic stresses) of the locations where each year the population is grown will gradually increase.

The simplest and cheapest way of implementing evolutionary breeding is for the farmers to plant and harvest in the same location. It is also possible and actually desirable, to plant samples in other locations affected by different stresses, or different combinations of stresses, by sharing the population with other farmers. The key aspect of the method is that, while the lines are continuously extracted, evaluated and exploited, the population is left evolving for an indefinite amount of time, thus becoming a unique source of continuously better-adapted genetic material directly in the hands of the farmers – a sort of evolving gene bank.

IPR Rules based on an obsolete science: a major obstacle to biological evolution and capacity of adaptation

Some 10 years after the first complete sequencing of the human genome, fascinating information was released on the molecule of life. One thing was to know the structure, and quite another to

know how it works. The challenge is not trivial for the understanding of the variability of function. The number of base pairs in the DNA chain is one million in bacteria, 3.2 billions in the human genome, up to 150 billions in the plant with the largest genome. In all cases, only a small percentage of the DNA is made up of genes with the information needed to synthesize proteins, the remaining part, once being considered as "junk DNA, is now known to have a relevant role. Indeed, most fragments of 'junk' DNA, whether they transcribe or not, have an essential function, that of activating or deactivating genes, or controlling and deciding where and when to produce proteins. In a very simplified manner, the DNA of a gene is transcribed, copied into another molecule (the RNA), which in turn produces a protein. Genes can therefore be considered 'recipes' for making proteins, which is what gives living organisms their appearance. Moreover, the dogma that one gene equals one protein is no longer valid, and it is now accepted that one gene may make many proteins, depending on the external and internal environment. For instance in humans 23,000 genes are endowed with the information for the synthesis of one million different proteins. Consequently, the basic unit of heredity is not the gene but the transcript, and the gene concept now groups all transcripts (scattered here and there) that have the information for different proteins.

Thus, the biological premise on which IPR rules are based, derives from an obsolete, mechanistic view of life, according to which living systems are considered to result from the addition of independent and stable components thus liable to be optimized through selection. Life is based on the capacity to evolve throughout generations, and to be plastic is to be endowed with the ability to change during life. Thus living systems should be genetically heterogeneous, namely endowed both with high levels of heterozygosis favoring homeostasis of individuals, that is, to change in changing environments, and thus maintain the same structure/functions, and the genetic variation for evolution through positive selection. Moreover, it has recently been shown that the genetic variability that is really relevant for production is based in

the non-coding regulatory part of the genomes, not even mentioned in IPRs.[4] Furthermore the final level and quality of production of single genomes is known to be highly dependent on the natural and social environments controlling the amount and quality of proteins produced according to local epigenetic dynamics. IPRs do not consider the plasticity levels in different environments nor the relevance of cultural traditions that often strongly influence the structure of epigenomes in a heritable way. Apart from the known cases of epigenetic inheritance, this is particularly relevant in vegetatively propagated crops as well as in seed propagated ones. Environment induced differences are the reason for the labeling in Europe of a number of local productions covered by specific environment related labels.

[4] 1)R.J.Taft, J.S.Mattiick,2003: *Increasing biological complezity is positively correlated with the relative genome-wide expansion of non-coding DNA sequences*, Genome Biology, :5 PI. 2)Cavalier-Smith, T., *The evolution of Genome size*, 2002

THE LAW OF THE SEED

The following principles have inspired the drafting of the Law of the Seed:

1. Long term interest of Humanity, including present and future generations, should prevail over short term and private interest.
2. The conservation of natural resources, including agro-biodiversity, should have precedence over any unsustainable use by the present generations.
3. Agro-biodiversity, be it genetic, technological or even deriving from the effects of
agricultural systems, can be considered the fuel of the engine of Sustainable Development and the needed buffer to secure Sustainable Agriculture in an uncertain future, dominated by new phenomena such as globalization and climate change.
4. Maintaining and using diversity is equivalent to keeping options alive for all.
5. No specific agricultural production system should be undemocratically imposed.
6. Diversity of production systems should be able to co-evolve, to ensure respect for the environment and natural resources, respect for cultural and biological diversity, and human values.
7. Innovation in agriculture is a cumulative, collective and continuous process that should be used for the benefit of all.
8. Sharing, and not appropriation, should apply to biodiversity and genetic resources as well as to their associated knowledge.

9. Plants, plant varieties, their parts and components including genes – even if isolated – (as well as essential biological processes for the production of plant varieties) should not be subject to patentability.

Preliminary considerations

Considering that;

- agriculture started about 10,000 years ago and that full dependency on domesticated crops and animals started during the Bronze Age;

Convinced that Crop Genetic Diversity is indispensable to:

- provide resilience to face unpredictable environmental and climatic changes,
- adapt to variation in productions systems,
- meet the needs of the expanding human population,
- improve the quality of food, including nutrition, taste, and appropriateness,
- develop resistance to continuously evolving pests and diseases,
- use in any plant improvement program,
- provide greater production stability,
- improve the living conditions of many farmers, and
- enhance the integrity of agro-ecosystems;

Considering that;

- since the beginnings of agriculture, a considerable amount of biodiversity has built up in crop production; the application of scientific methods to plant breeding, however, led to the substitution of traditional local varieties by widespread

genetically homogeneous varieties, and thus to a dramatic loss of diversity;

- out of more than 7,000 plant species that have been used by humanity for food and agriculture, the number of crops currently under cultivation is very limited and only 12 account for most of the caloric intake of mankind;

Considering that all countries rely on crop genetic diversity from all over the world;

Alarmed by the continuing erosion of genetic resources also within species (e.g. for major crops more than 75 % of farmers' varieties have disappeared in the last century) and the unacceptable figures of hunger in the world (more than 20% of the population);

Noting that hunger is not due to lack of food at the global level but to lack of access to it, we consider that the best way to fight hunger is to produce food at the local level;

Aware of our responsibility to past and future generations to conserve the World's diversity of plant genetic resources for food and agriculture;

Considering that;

- the essential contributions of past, present and future farmers worldwide, particularly those in centres of origin and diversity, to develop, conserve, improve and make available plant genetic resources; and that
- long before Mendel and modern plant breeding, farmers planted, harvested, stored and exchanged seeds, fed themselves and others, and, by doing so, built a large reservoir of knowledge about crops, their characteristics and possible uses, and their interactions with the surrounding environment;

Considering, however, that;

- all this knowledge has often been ignored by modern plant breeding;
- that farmers, while slowly and steadily improving their crops, also maintained, and continue to maintain, a large amount of biodiversity, in the so called "primitive" agricultural systems practiced by poor farmers in remote and/or marginal conditions;
- diversity and heterogeneity serve to buffer the risk of crop failure due to unpredictable environmental variations;
- in the last Century or so, plant breeding has mainly moved from farmers' fields to research stations and from farmers to scientists, and later from publicly to privately funded operations, and in this process many crops have been neglected by science;

Considering that;

- the Green Revolution was based on mechanization and the introduction of uniform cultivars, able to produce high-yields and perform well in many different locations and countries, only in the presence of the artificial modification of the environment through agronomic inputs such as irrigation, fertilizers, pesticides, rather than adapting the varieties to specific environments and sites;
- this strategy caused major problems, related to the impact of the heavy use of chemicals on the environment, neglecting the poorest farmers not able to purchase the needed chemicals for the desired performance of the new varieties, and overlooking agricultural biodiversity;

Considering that;

- "participatory plant breeding" (PPB)[5] in the development

[5] Defined as the process of plant breeding that collectively involves farmers,

of a new variety, helps to maintain biodiversity and promote resilience and food security while allowing for food quality and productivity, and therefore needs to be used, particularly by public institutions;

- participatory programs allow users to decide which type of varieties better suit their needs in terms of management (e.g. organic, conventional), genetic structure (hybrids, open pollinated varieties, pure lines, mixtures) and can therefore be tailored to adapt to participants' priorities;

Considering that new scientific knowledge and better understanding of on DNA/gene expression, including that related to epigenetic phenomena, and on how biological evolution works, should lead to a revision of current seed legislation;

Considering that;

- the actual–legislation on the marketing of seeds, designed and put in place since the 1960s in Europe, and spread throughout the world, mainly due to pressure by commercial interests, supported by some international agreements, is pushing activities of "on farm" conservation of biodiversity and traditional breeding methods into illegality;
- this is mainly due to the fact that heirloom varieties cannot be registered on official catalogues because of not complying with Uniformity and Stability criteria set out by the legislation for obtaining mandatory marketing authorizations;
- this legislation was established without due consideration to sanitary or environmental risks, out of mere interventionism, in order to orient agricultural systems towards industrialisation, through higher yields, mechanisation, standardisation of production, division of work tasks and the replacement

scientists, extension staff, seed producers, consumers, traders, NGOs, etc., in a gender inclusive manner.

of traditional farmers' varieties by uniform varieties, selected with modern agronomical methods;
- the current legislation has not even acknowledged the international treaty on plant genetic resources recognizing the contribution of local communities and indigenous peoples and the rights of farmers for the conservation and enhancement of local varieties;

Considering that;
- gift, exchange, selling and planting of traditional farmers' seeds belonging to the public domain are being increasingly penalized and criminalized;[6]
- this is due to the imposition of rigid legislation on the marketing of seeds;

Alarmed by recent statements of the European Court of Justice as illustrated in the 'Kokopelli' case (C-59/11), leading to the subordination of biodiversity and freedom of commerce to productivity;

Considering that;
- this legislation, initially seeking the attainment of objectives of general interest, is now oriented towards the protection of mere commercial interests of the breeding industry;
- the full convergence of DUS criteria for the granting of marketing authorizations and for the granting of Plant Breeder's Rights has led to the exclusion of varieties belonging to the Public Domain from the market; and that
- seed-savers organisations are thus forced to operate in clandestineness, or merely rely on unofficial tolerance;

[6] Example: Kokopelli case, brought before the French Supreme Court by the prosecuting Republic of France;

- given the negative evolution of agricultural biodiversity worldwide, no legislation should lead to criminalize diverse farming and breeding, nor the marketing of heirloom varieties belonging to the public domain;

Considering that the trends described above need to be urgently reverted, especially as a vast reform of the European legislation on the marketing of seeds and plant reproductive material is ongoing;

Considering the need to clearly state and reaffirm that the placing on the market, gift or exchange of any seed or plant reproductive material bred through any breeding method and belonging to the public domain, should remain free;

While recognizing that in the last two decades the development of International Agreements such as the International Treaty on Plant Genetic Resources, including Farmer's Rights and a Multilateral System for Access and Benefit-Sharing, as well as the Convention on Biological Diversity and its Protocol on Access and Benefit-Sharing (the Nagoya protocol) are important steps forward to achieve a fair and equitable system, we consider that the ultimate and ideal objective should be the recognition of seeds as Commons and its full availability for those that have no intention to appropriate it;

Worried however that agro-biodiversity and other essential Commons for the survival of humankind and agricultural production are being steadily appropriated;

Considering that innovation in agriculture is a cumulative, collective and continuous process;

Considering that;

- Seeds and life forms are not inventions, and thus allowing patent holders to prevent farmers from saving and conserving seeds, makes patents on seeds morally, scientifically and legally inappropriate;

Considering that;

- the TRIPS agreement includes a mandatory review of Article 27.3(b) which deals with patentability or non-patentability of plant and animal inventions, and the protection of plant varieties;
- this mandatory review must be completed to align International Law with the Law of the Seed;

Considering that;

- the seed industry has the possibility to draft patent claims at their discretion and thereby to obtain "tailor made" patents suitable for their commercial purposes;
- these "tailor made" patents allow patent holders to prevent farmers from saving and exchanging seeds;
- such "tailored" patent claims can be used to circumvent, or avoid by mere skilful drafting, the statutory bars set by the legislator in Art. 53 b of European Patent Convention to plant patents and plant breeding processes;

Considering that such skilful drafting of claims can be achieved:

- through appropriate choice of the category of the claims (G 2-12 Tomato II),
- through chemical refining of seed by additives *(T 49/83 – Propagating material/ CIBA-GEIGY),*
- through drafting species or variety non-specific or trans-variety claims (G 1/98 Novartis II),

- through cutting-off critical steps of a process (Wisconsin WARF G2/06),
- through adding redundant, but technical process steps (i.e. genetic engineering steps, transgenic steps) to an otherwise biological process (G1/08 Broccoli / Tomato 1);

Considering that the "whole content approach", recognised by the European Patent Office in the WARF case (G2/06) and by the European Court of Justice in the Brüstle case, when interpreting Directive 98/44/EC and recently emphasised by the EU Parliament Resolution of 10 May 2012 on the patenting of essential biological processes is the appropriate solution to these kinds of skilful drafting of patent claims;

Considering that products derived from conventional breeding and all conventional breeding methods, including SMART breeding (precision breeding) and breeding material used for conventional breeding shall be excluded from patenting, as demanded by said recent EU Parliament Resolution;

Considering that;

- misappropriation of traditional knowledge and genetic resources by biopiracy shall be prevented and sanctioned against; and that furthermore
- digital libraries of traditional knowledge, including communitybiodiversity registers, should be introduced in all countries with considerable biological resources; these libraries should be made compulsory in all countries;
- this initiative should be financed by public, national or international institutions so that this knowledge remains in the public domain;

Considering that patent offices of all countries should be required in a compulsory way to consult said libraries in their patent examination and prosecution work;

Considering that;

- patents on life and misappropriation of traditional knowledge and genetic resources in bad faith or gross negligence should be acknowledged to constitute infringement of Ordre Public under Section 5, Article 27.2 of the TRIPS agreement[7] and Article 53(a) of the European Patent Convention and numerous national Patent Acts;
- a duty of disclosure of the source of biological material and traditional knowledge should be required, as it is the case, for example, in the Swiss 2007/08 Patent Act and as governments are demanding in the review of TRIPS;

Considering however that non-compliance with this duty of disclosure, i.e. concealing the source of the biological material and/or traditional knowledge in bad faith or gross negligence constitutes fraud on the patent authority and therefore the sanctions need to be dissuasive, including revocation of the patent, as provided for example by US Law (37 CFR ch. I § 1.56).

[7] 1 Section 5 of Article 27.2 says: "Members may exclude from patentability inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect ordre public or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment, provided that such exclusion is not made merely because the exploitation is prohibited by their law."

The Law of the Seed

Part 1 – Conservation of agricultural biodiversity

Article 1 - Overall objective of diversity

Legislation shall not run against the overall objective of conservation and enrichment of diversity.

Article 2 - Genetic erosion

The current trend of genetic erosion in plant genetic resources for food and agriculture, either among species, within species or at varietal levels, shall be reverted. Action shall be taken to minimize and, ultimately, eliminate the causes of genetic erosion.

Article 3 - Plant genetic resources as commons

Plant genetic resources for food and agriculture shall be considered as commons.

Article 4 - Surveys and inventories of plant genetic resources for food and agriculture

Surveys and inventories of plant genetic resources for food and agriculture, and the relevant information and traditional knowledge associated to it, shall be carried out.

Article 5 - "Ex situ" conservation of plant genetic resources

Public institutions shall conserve genetic resources for food and agriculture. Due attention shall be given to its adequate documentation, characterization, regeneration and evaluation.

Access to these collections shall be made freely available for all, provided that there is no intention to appropriate them.

Article 6 - On farm conservation of plant genetic resources

On farm conservation means the conservation of plant genetic resources in the field and land of farmers; on farm conservation and use of plant genetic resources for food and agriculture shall be encouraged and supported, through, *inter alia*, publicly funded programmes.

Article 7 - "In situ" conservation

In situ conservation of wild crop relatives and wild plants for food production shall be promoted, including in protected areas, by supporting, *inter alia*, the efforts of indigenous and local communities.

Article 8 - Absence of restrictions for the use and production of plant genetic resources by farmers

Nothing in the present law can be interpreted as meaning the restriction of use and production of plant genetic resources by farmers in their location of origin.

Part 2 – Plant breeding and Seed Production

Article 9 - Farmers as breeders

Farmers, and local and small breeders, especially women, have been plant breeders and seed producers throughout agricultural history;

Farmers have bred for diversity, quality and resilience, as opposed to the paradigm which privileges Distinctiveness, Uniformity, and Stability (DUS);

Article 10 - Technology and Breeding

Scientific plant breeding must lead to the enhancement of bio-

diversity, the enlargement of the genetic base of cultivated crops and the protection of traditional farmers' varieties.

Article 11 - Research programs

Public research programs shall give priority, inter alia, to:

- Understanding farmers' knowledge of breeding;
- Broaden the genetic base of crops and increase the range of genetic diversity available;
- Promote the use of local and locally adapted crops, varieties and underutilized species;
- Strengthen the capacity to develop varieties particularly adapted to concrete social, economic and ecological conditions, including marginal areas;
- Enhance and conserve plant genetic resources 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 to maintain soil fertility and to combat diseases, weeds and pests;
- Gather knowledge and information of underutilised crops and wild relatives of food crops.

Article 12 - Promotion of agro-ecological, participatory and evolutionary plant breeding programs

Public plant breeding programs must respect the environmental and cultural farming context and therefore include, and give priority to, agro-ecological methods, participatory research methods and participatory-evolutionary breeding programs. For this Law of the Seed these terms should be understood as follows:

Agro-ecological methods[8] are the ones that apply the ecological science to the study, design and management of sustainable

[8] This widely acepted definition is based on: "Altieri, M.A., 1995. *Agroecology: The Science of Sustainable Agriculture*, 2nd ed. Westview Press, Boulder, Colorado".

agro-ecosystems; these methods require as few agrochemicals and energy inputs as possible, and instead rely on ecological interactions and synergisms between biological components, to produce the mechanisms that will enable the systems to boost their own soil fertility, productivity and crop protection;

Participatory plant breeding (PPB) refers to a methodology that collectively involves farmers, scientists, extension staff, seed producers, consumers, traders, NGOs, etc., in a gender inclusive manner, for the development of new crop varieties;

Participatory–evolutionary breeding is a methodology where a crop population, coming from a wide range of crosses or from mixtures, is left evolving for an indefinite amount of time in a multitude of individual locations, allowing farmers to continuously extract, evaluate and develop specifically adapted varieties.

Part 3 – Farmers' Rights

Article 13 – Farmers' rights

Farmers' rights to freely breed and produce, save and exchange, share or sell shall be fully recognised in accordance with the freedom of trade and commerce under national and international law, in particular with

- the Protection of Plant Varieties and Farmers' Rights Act 2001 of India[9], and
- article 9 on Farmers' Rights of the International Treaty on Plant Genetic Resources for Food and Agriculture,

and shall be interpreted in this context and shall be fully respected and implemented both at national and international levels. Recognition of the contribution of local communities and indig-

[9] "A farmer shall be deemed to be entitled to save, use, sow, resow, exchange, share or sell his farm produce including seed of a variety protected under this Act in the same manner as he was entitled before the coming into force of this Act".

enous and farmers' rights, referred to in Article 9 of the international treaty, can also be achieved through systems of collective ownership of local varieties implemented by the public at the regional level and/or local level[10].

Article 14 - Right to Exchange

The gift or exchange of seed of any variety, or its placing on the market, shall be governed by the principles of seed sovereignty.[11] Farmers, seed savers and gardeners cannot be prosecuted or criminalized for any activity related to exchange of seeds and plant reproductive material belonging to the public domain.

Article 15 - Absence of administrative burden

For the handling of varieties and plant reproductive material belonging to the public domain, no registration, payment of fees, traceability, certification, or any kind of administrative burden shall be required from private or public operators.

The expression "belonging to the public domain" means not protected by any kind of intellectual property right.

Article 16 - Labelling

Seeds and plant reproductive material belonging to the public domain and placed on the market, may only be subject to labelling rules, set by farmer communities themselves, regarding denomination, simple botanical description, characteristics of germination, and guarantee of sanitary quality, reasonable varietal and specific purities.

[10] See Regional Law of Tuscany, no. 64 of 16th November, 2004 "Protection and valorization of the heritage of local breeds and varieties of agricultural, livestock and forestry interest".

[11] Seed sovereignty in terms of informal exchange means self governance by farming communities. In the case of placing on the market, seed sovereignty implies the recognition in law, the sovereign rights of farmers.

Labels must be clear, true and not confusing.

Informal exchanges shall not be submitted to compliance with any labelling rule.

Article 17 - Packaging

Seeds and plant reproductive material belonging to the public domain shall not be required to comply with any packaging rule other than the one relating to labelling.

Article 18 - Farmers' rights as consumers

Farmers have a right to safe, reliable, affordable, diverse seed and to freely reproduce plant material exchanged with other farmers or small breeders. Monopolies that prevent farmers from having choices violate farmers' rights.[12] All sales of seeds by corporations shall be governed by biosafety regulations.

Part 4 – Intellectual Property Rights

Article 19 - Patents and Conventional breeding

For all plants that are not engineered by *transgenesis* in genetic engineering, breeding processes shall constitute 'essentially

[12] Bowman v/s Monsanto – Monsanto sued Indiana farmer Vernon Bowman in 2007 accusing Bowman of patent infringement for planting and saving seeds that contained Monsanto's genetically altered Roundup Ready Technology even though Bowman bought those seeds as part of a mix of undifferentiated commodity seeds. and OSGATA et all v/s Monsanto - Organic Seed Growers & Trade Association et al. v. Monsanto was filed in federal district court in Manhattan, NY, on March 29, 2011, on behalf of 60 family farmers, seed businesses and agricultural organizations and challenges Monsanto's patents on genetically engineered (GE) seed. This landmark lawsuit also seeks Court protection for family farmers who, through no fault of their own, may have become contaminated by Monsanto's patented GE seed and find themselves accused of patent infringement. (www.osgata.org)

biological processes for the production of plants' and as such be excluded from patenting.

Products derived from conventional plant breeding and all conventional plant breeding methods, and breeding material used for conventional plant breeding shall be excluded from patenting.

Article 20 - Whole content approach

In assessing inventions and patent applications for compliance with the exclusion provision of Article 20, the whole content of the specification of the patent application shall be considered, not only the claims.

Technically unavoidable pre-process steps and technically unavoidable post-process steps and/or unavoidable post-process uses of the products are considered to constitute part of the content of the specification, even if they are not explicitly included in the specification and/or the claims of a patent application.

Article 21 - Misappropriation of traditional knowledge and genetic resources through patenting

Misappropriation of traditional knowledge and genetic resources through patenting in bad faith or gross negligence shall constitute infringement of Ordre Public and shall be sanctioned accordingly by dismissal of patent applications and/or by revocation of patents.

Article 22 - Digital libraries of traditional knowledge & biological resources

Digital libraries of traditional knowledge and biological resources shall be promoted and introduced in each country of origin of these knowledge and resources.

These digital libraries shall qualify as public institutions and shall remain in the public domain.

The content of these digital libraries shall be legally binding

for the patent authorities of all countries and shall therefore be consulted as state of the art by these authorities when assessing novelty, inventive step and sufficient disclosure of inventions in their examination and prosecution work.

Article 23 - Opposition to patent applications by authorities of the country of origin

Notwithstanding the rights of any other legal entities, the competent authorities for intellectual property in the countries of origin of traditional knowledge & biological resources shall be entitled to initiate, within or outside the respective countries of origin, appropriate legal procedures in opposition to unlawful patent applications and unlawfully granted patents for such traditional knowledge & biological resources.

Article 24 - Duty of disclosure of the source of biological material

The sources of biological material and traditional knowledge shall be explicitly disclosed in any patent application procedure based on, or making use of, such material.

Concealing or falsifying such source of material in bad faith or gross negligence shall constitute fraud on the patent authority and be sanctioned by dismissal of the patent application and/or revocation of the patent in its entirety.

NOTE TO READERS

The Law of the Seed is put forward as a tool to be used by citizens everywhere and in every context to defend their seed freedom and seed sovereignty as well as to provide a practical guide to all future development of laws and policies on seed.

We hope that it will serve as a catalyst for citizens to spread awareness of the critical state of the seed and of biodiversity and of how science and laws are being manipulated, threatening the seed and food sovereignty of peoples in all parts of the world. We hope that citizens everywhere will use The Law of the Seed as an advocacy tool to push for local, regional and national legislation that favors and respects seed freedom and the law of the seed.

We urge people's representatives and institutions to use The Law of the Seed as an instrument to help shape laws related to the seed, putting the obligation of protecting biodiversity, farmers' rights and overall ecological productivity as the superior objectives, and to strengthen laws governing their patent offices to keep seed in the public domain. The Law of the Seed reminds and urges national governments of their obligation to complete the mandatory review of Article 27.3(b) of the TRIPS Agreement of WTO as well as to commit themselves to their constitutional obligations to protect biodiversity and reverse patents on life and patents on seed.

We hope also that the Law of the Seed will serve to ensure that the integrity and independence of scientific research is defended, and dedicated to the promotion and mainstreaming of biodiversity, farmers' rights and the public good, and to boost research on seed diversity, quality and resilience which address the challenges of the ecological, economic and food security crisis within a world scenario of climate change.

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