You too can be a Seed Saver!
A Guide to Seed Saving

Navdanya

Seed

In traditional Indian agriculture the seed is the source of life. It is both the source of grain, and all future seeds. The seed is a free resource which farmers save and exchange amongst one another. It is inseparable from the community's culture and traditional knowledge. The seed, and the plant it produces are storage containers of community values-the new seeds are worshipped before they are planted and new crops are worshipped before being consumed.

Open Pollinated Seeds

Open pollinated seeds have been developed over many years through nature's evolution process and careful breeding by farmers. The indigenous seeds fulfill the farmers' ecological, nutritional and medicinal needs, while also providing staple food, fodder and fuel for the farming community. Farmers' varieties are bred for quality, taste, nutrition, resilience and diversity. Therefore, in the face of climate change they are able to adapt and produce quality grains for the farmers and their communities.

Farmers' seeds are open-pollinated varieties assessable to everyone, free of charge. These seeds are sometimes called "landraces" or "germplasm," terms which serve to devalue the contributions that the farmer makes towards the evolution of their seeds through selective breeding. They are also derogatorily called "primitive cultivars," in contrast to "elite cultivars", names evolved by scientists. Local farmers' varieties should more accurately be called *kudarti* (natural) or *desi* (local); they should be referred to as *dharti ke bija* (seeds of the earth), or as *paramparik* or *nate* (traditional and timeless). They should be called "open source seeds" or "open source software".

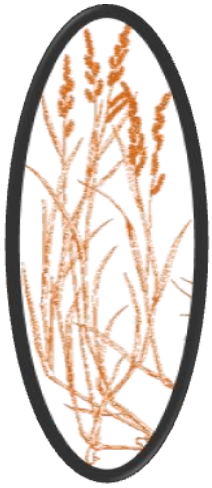
High Yield Variety Seeds (HYV)

The name 'High Yield Variety' implies that the seeds are high yielding in and of themselves. However, the term HYV is misleading, as the notable characteristic of these seeds is that they are highly responsive to chemicals and water, and are in reality "High Response Varieties". Agronomist Francis Chaboussou's empirical evidence clearly demonstrates that pests and disease organisms grow and multiply faster when the plant contains more soluble free nutrients. In other words, the biochemical and physiological state of the plant is strongly affected by the method of cultivation and this controls whether pests can invade; one can therefore avoid pests and diseases by methods of cultivation that limits the accounts of soluble nutrients in the plant (Francis Chaboussou, *Healthy Crops: A New Agricultural Revolution)*

Problems Associated with High Yield Varieties (HYV) Seeds

Intensive use of chemical fertilizers makes HYV seeds highly susceptible to insect pests. The increase in use of chemical pesticides causes illness and death in humans, animals, and other beneficial insects. It also requires large (and steadily increasing) amounts of chemical fertilizers. This intensive use of pesticides and chemical fertilizers eliminates much of the organic matter from the soil, compromising the soil fertility. Pesticide and fertilizer runoff into waterways is also linked to the contamination of water and the harming of aquatic life.

No HYVs have been developed that can withstand flood, drought or salinity, which are the three primary limiting factors of crop production in marginal lands. Moreover, HYV seeds require massive amounts of water, making heavy investments in mechanized, fossil-fuel dependent irrigation systems a necessity . While these seeds can be saved by farmers, they are non-sustainable, because their vulnerability to diseases and pests means they need to be replaced every few years.



Hybrid Seeds

Hybrid seeds are first generation seeds produced through crossbreeding two genetically dissimilar parents. The technique of hybridization can be done by means of controlled hand-pollination, although it also occurs naturally. The offspring of the two parent types produce a new variety with specific characteristics from both parents. New seeds may be bred for traits such as yield, nutrition, or salinity resistance. Hybrid seed cannot be saved because they do not ‘breed true’, the offspring is not identical to the parent. Hybrid seeds have to be bought every year, thus increasing the farmers’ dependence on the seed industry.

Genetic Engineered Seed

A seed that is developed using the technology of genetic engineering is an engineered seed (GM). Genetic engineered seeds are created by introducing one organism to another biologically unrelated organism. Genetically engineered seed uses a gene gun or a plant cancer as a ‘vector’, an antibiotic resistant marker to select successful introduction of the new gene and a viral promoter. Genetically engineered cells are then mass propagated through tissue culture methods to produce thousands of new life forms with new characteristics.

This type of seed is in no way superior to farmers’ varieties. Its yields come from the hybrid seeds into which the GM trait is introduced, not from genetic engineering. It is not true that GMOs increase yield. By their very nature they are monocultures, and are therefore highly vulnerable to diseases and pests. Only two traits have been commercialized on a significant scale- herbicide tolerant crops and Bt toxin crops. The former are supposed to control weeds, the latter to control pests. However, they have created super weeds and super pests as reported in the Navdanya’s study “The GMO Emperor has no Clothes”.

Patents and Genetically Modified Seeds

A patent is a monopoly granted to a person or company that has invented a new product or article, made an improvement on an existing product, or invented a new way of making a product. In the case of patents placed on seeds and plants, this means that the company taking the patent is able to exclude others from making, using, selling, or distributing the patented product. The majority of GM seeds are produced by Multinational Corporations who also make chemicals and thus are patented. A patent prevents the producer from saving and exchanging seeds, therefore undermining the farmers' right on seeds. The producer has to buy fresh seeds for every cultivation season. In effect, the producer loses seed sovereignty and becomes dependent on Multinational Corporations. GM seeds also increase the cost of production, as patented seeds carry a considerable amount in the form of royalty fees which increases their market price.

Terminator Seeds

Terminator seeds are genetically modified to kill their own embryos, making them sterile at harvest. This means that if farmers save the seeds of these plants at harvest for future crops, the next generation of plants will not grow. Farmers would thus need to buy new seeds every year.

After studying these seeds, molecular biologists warned of the possibility of terminator seeds spreading to surrounding food crops or to the natural environment—the gradual spread of sterility in seeding plants would result in a global catastrophe that could eventually wipe out higher life forms, including humans. Since 2001 there has been a de facto worldwide moratorium on the use of terminator technology.

The Green Revolution

Introduction

'Green revolution' is the name given to the science based transformation of Third World agriculture. It was based on the assumption that technology is a superior substitute for nature and natural processes, able to produce limitless growth unconstrained by natures' limit.

Until the 1960s India was successfully and independently developing policies of land reform based on strengthening the ecological base of agriculture and self-reliance. In 1951, a detailed farming strategy was initiated which recognized the need to plan from the bottom which achieved major success—the rate of growth of total crop production was higher during this period than in the years following the introduction of Green Revolution agriculture.

In 1961, the Ford Foundation launched its Agricultural Development Program with the introduction of modern intensive chemical farming. But native varieties of wheat tend to "lodge", or fall over, when subject to intensive fertilizer applications. Therefore the new Green Revolution 'dwarf ' variety developed by American agronomist Norman Borlaug were specifically designed to overcome this problem: shorter and stiffer stemmed, they could absorb chemical fertilizer, to which they were highly receptive, without lodging. The new so-called High Yield Varieties used in Green Revolution agriculture were therefore in reality High Response Varieties, as they required heavy doses of chemical fertilizer and water.

Consequences of the Green Revolution

The first years of the Green Revolution were marked by great enthusiasm as tremendous gains in wheat and rice production were realized. However it soon became clear that HYV crops did not really contribute to high productivity. When there is a shortage of inputs (i.e. lack of irrigation or shortage of chemical fertilizers) due to drought, social unrest, or supply network disruption, "modern [HYV] crops typically show a reduction in yield. The farms' need to increase the land used for mono cropping rice and wheat meant that the production of pulses, vegetables and oils decreased considerably. With the decline in production of pulses, vegetables and coarse grains, Indian nutrition also became deficient. For farmers in poorly-producing regions the failure of their now single crop would mean the loss of the villages' food supply and disastrous financial debt.

In addition to these profound economic and social costs, farmers who adopted Green Revolution agriculture were soon forced to deal with catastrophic ecological consequences due to increased use of pesticides and chemical fertilizers. Moreover, HYV seeds required massive amounts of water and mono cropping caused soil erosion and further reduced the land's water-holding capacity. Heavy investments in mechanized, fossil-fuel dependent irrigation systems were required. Water logging and saline soils occurred in these canal-irrigated tracts, while areas dependent on well irrigation experienced drought and desertification.

Conclusion

"Historically, the Green Revolution represented a choice to breed seed varieties that produce high yields under optimum conditions. It was a choice *not* to start by developing seeds better able to withstand drought or pests. It was a choice *not* to concentrate first on improving traditional methods of increasing yields, such as mixed cropping. It was a choice *not* to develop that, that was productive, labor intensive, and independent of foreign input supply. It was a choice not to concentrate on reinforcing the balanced traditional diets of grains and legumes" (Lappe & Collins, *Violence of the Green Revolution).*

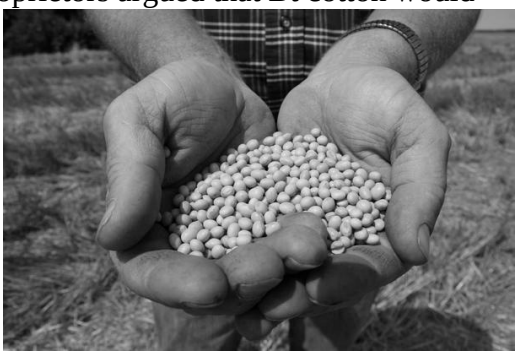
Pesticides and the Pesticide Treadmill

The Green Revolution drastically changed the agricultural landscape of India. It replaced the mixed and rotation crops of millets, pulses, oilseeds and more with monocultures of High Yielding Variety wheat and rice. As mentioned earlier, HYV seeds are more susceptible to insect pests when compared to desi varieties. The large scale of chemical pesticides, along with chemical fertilizers and large amounts of water, spelled devastation for local ecosystems – the soil and water, as well as many beneficial insects, birds, and mammals were damaged and destroyed.

According to the ICAR sources, only one percent of applied pesticides actually reaches the target pests, the rest goes to non target sectors. It has also been estimated that despite heavy pesticide use, pests are now causing damage to some 35% of the crops as against the pre-pesticide era of 5-10% damage.

This is largely due to the change in the insects' ecology (change in insect lifestyle and the way they interact with plants, other organism etc).Within a few years of introduction of HYV seeds, the farmers noted that pests that were obscure or relatively harmless prior to the introduction now thrived. Moreover, many of these pests gradually became resistant to most of the pesticides, leading to increased dependence on pesticides.

The genetically modified crops with inherent pest resistance, like Bt cotton, were introduced as a solution to this situation. However, the story was more or less similar with the GM crops. For instance, consider the case of Bt cotton which is resistant to bollworms, the major pest causing significant damage to cotton plantations in India. The proprietors argued that Bt cotton would significantly reduce the pesticide application.
However, within a few years of introduction of the Bt cotton, sucking pests- which were not a major threat before- had emerged as a prominent pest species. A recent study in Maharashtra found that 45% of sprays were for sucking pest (vs 24% for bollworms) and in Gujrat 76% were for sucking pests (vs only 7% for bollworms).



The above experiments clearly indicate that methods such as genetic modification and HYVs are not long term solutions for pest control. Instead, they create a pesticide treadmill, in which farmers cannot escape the use of pesticides, inflicting serious harm on the entire ecosystem.

Seed Sovereignty

Seed sovereignty is the right to own, sow, breed, save and exchange seeds. This makes seed the common property of the community. Farmers in India have been following this tradition for thousands of years. Sadly, the arrival of commercial seed industries have changed the entire

picture. These Multinational Corporation have successfully taken away the ownership of the seed from the hands of the farmer in the form of Intellectual Property Rights (IPR).

Today, the basic premise of the Intellectual Property Rights regime is to safeguard what it considers industrial property. The IPR regime has become a means of protectionism for MNCs. It flourishes in and for the paradigm of the market economies. It seeks to provide for the protection of ideas and/or information that has apparent commercial value. The rights jurisprudence in the context of intellectual property is in favor of the 'inventor' or 'creator'. But more often than not it is the investor rather than the inventor who is rewarded.

One of the common ways of implementing IPRs is through patents. As mentioned earlier, a patent is a monopoly granted to a person or company that has invented a new product or article, has made an improvement on an existing product, or has invented a new way of making a product.

The Criteria for a Patent is:

- Novelty
- Inventiveness (non-obviousness)
- Utility
- Reproducibility

In the case of patents placed on seeds and plants, this means that the company taking the patent is able to exclude others from making, using, selling, or distributing the patented product. Patents prevent the free exchange of seeds and make it a private commodity.

Beginning in 1990, with meetings regarding plant genetic resources, discussions regarding intellectual property rights within this context were brought to trade negotiations where they had ever been seen before.

Why Patents and Intellectual Property Rights?

The need to provide for Intellectual Property Rights protection is also felt for attracting foreign enterprise. In the absence of intellectual property protection, it becomes more difficult to acquire technology. Companies selling newer technologies are reluctant to market their products for fear of having them unfairly copied.

Therefore it is a misnomer that it encourages invention. A patent does not protect each and every inventor who conceives an invention, it is the first to apply for a patent, rather than the first to invent it, that the law protects. More often than not is not the scientist who is getting rewarded, but the capital that has gone into it.

"In the rush to turn life forms into global commodities, there is no regard for the community-held knowledge, the religious rights or the human rights of indigenous people."

The introduction of the Trade Related Intellectual Property Rights Agreement (TRIPs) of WTO has accelerated the spread of patented genetically engineered seed.

Article 27.3(b) of the TRIPs treaty in GATT states:

Parties may exclude from patentability plants and animals other than micro-organisms, and essentially biological 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. This provision shall be reviewed four years after the entry into force of the Agreement establishing the WTO (World Trading Organization).

A representative of Monsanto, a leading GM seed corporation, later said, "In drafting these agreements we were the patient, diagnostician and physician all in one."

The extension of patents to living organisms, as is granted by several developed countries ignores:

- The value of nature's work in evolution and adaptation
- The contribution of farmers, especially women to selecting, breeding, evolving, saving, sharing a rich biodiversity of crops

The International Union for the Protection of New Varieties of Plants and Indian Laws

What is Sui Generis?

Sui Generis implies that it is up to the individual countries to design their own system of protection for plant varieties in their country, keeping in view their specific socio-economic conditions.

The developing world is being forced to adopt the UPOV model, rather than the sui generis option. The UPOV system does not serve either biodiversity or the farmers of the developing world. It seeks to grant monopoly rights over the results of plant breeding.

The UPOV does not provide for the protection of plant varieties, instead it is designed to protect the rights that it confers on plant-breeders and their market shares. Under the UPOV 1991 Act, a much higher level of protection is provided to breeders.

The law on plant variety protection is pro-UPOV. Thus it does not provide for the protection of farmers' rights.

It must be noted that India is not a party to UPOV. But Asian countries, such as India are under enormous pressure to complete the legislative processes and make laws in favor of corporate breeders such as the Protection of Plant Varieties and Farmers' Rights Act, 2000. This act aims to provide for the establishment of an effective system for the protection of plant varieties, the rights of farmers and plant breeders and to encourage the development of new varieties of plants. But in reality, the Act protects the plant breeders and biotech industries above the

farmer.

A matter of particular concern is the extension of the patent debate to life itself. This debate surfaces as "products of nature" versus "products of the mind". Living organisms and life forms that are self-creating cannot be redefined as machines and artifacts that have been "invented" and allowed to be patented by their "inventor''.

What is Biopiracy?

Biopiracy is the appropriation of indigenous knowledge of the use of biological resources through patents. Such appropriation is most visibly evidenced when scientists and large corporations use the indigenous knowledge of farmers, local health practitioners and traditional communities. The innovations of the pharmaceutical and agricultural researchers are not 'new' as to qualify as an invention, they are based on centuries of knowledge of the traditional societies.

Ironically, the current IPR regimes only recognize and provide protection to industrial innovators, not to the ecological or indigenous. Although it is the latter that are more vulnerable and require real protection through the law. Today neither the national nor the international law adequately provide for the protection of indigenous knowledge systems.

Biopiracy can be prevented by

- formal recognition of the rights of the people and the contribution of farmers to the breeding of biodiversity
- providing for the realization of those rights as community rights

Navdanya's Efforts to Protect Seed Sovereignty

The Battle for Basmati

On July 8th 1994 RiceTec, a Texas-based corporation filed for a patent with 20 broad claims designed to create a complete rice monopoly patent which included planting, harvesting collecting and even cooking of Basmati rice. On September 2nd 1997, the US Patent and Trademark Office (USPTO) granted RiceTec the patent. The introduction of this patent (No. 5663484) basically denies the prior breeding by farmers and thereby denies the role of farmers as breeders. On April 27th, 2000 due to mass protests and a case filed by the Research Foundation for Science, Technology and Ecology before the Supreme Court of India, the government of India filed a petition in the USPTO to re-examine the patent granted to RiceTec. On April 28th 2001 all claims came to be reconsidered. RiceTec has been forced to give up its far reaching and false claims to having invented a very broad range of Basmati rice.

Keeping Neem Native
The Azadirachta Indica, commonly known as the Neem Tree is indigenous to India and has been used for its beneficial properties for over 2000 thousand years. The method to produce the extracted Neem oil is a standard method which has been state of the art for many decades. Thus when the United States Department of Agriculture filed a patent (No. 436257 B1) with the European Patent Office (EPO) in 1990, opposition immediately began, led by Dr. Vandana Shiva, Ms. Magda Alvoet of the European Green Party, and the International Federation of Organic Agriculture Movements. After the help of thousands of participants in a signature campaign and relentless efforts, a hearing was held on May 10th, 2000 at which the EPO revoked the patent.

Winning Wheat Back
The next major victory against biopiracy for Navdanya came in 2004 when the European Patent Office in Munich revoked Monsanto's patent on the Indian wheat variety, Nap Hal. Monsanto, the biggest seed corporation was assigned the patent (No. EP 0445929 B1) on wheat on May 21st, 2003 by the EPO under the simple title, "plants". On January 27th, 2004 The Research Foundation for Science, Technology and Ecology along with Greenpeace and Bharat Krishak Samaha filed a petition at the EPO challenging the patent rights given to Monsanto, leading to the patent being revoked.

Justice for Atta
Atta, a staple food and ingredient within India, is currently under threat from the corporation ConAgra who filed a "novel" patent claiming the rights to an atta processing method, and was granted the patent on August 8th, 2000. The method that ConAgra is claiming to be novel has been used throughout South Asia by thousands of atta chakkis, and so cannot justly be claimed as a novel patent.

Who are the Seed Savers?

In order to resist the imposition of unjust patent laws on the global seed supply, and to protect India's hard working farmers who grow and feed us with their seed, seeds must be saved. Who can save seeds? Anyone, anywhere can save seeds and contribute to the Seed Freedom campaign. Seed saving is not just the job of farmers, but people everywhere who are concerned about the future of our seed and food sovereignty. Whether you have a garden or simply a balcony or window sill you can begin planting your own open-pollinated, organic seed and begin saving. By saving seeds, you are taking a stand against corporations taking over the seed supply, and defending the rights and freedoms of farmers everywhere who have for generations worked to develop the varieties we now know and love.

You can be a Seed Keeper. Make your Garden of Hope a Seed Sanctuary. Plant and save seeds of freedom. Please find below a Growing Calendar to help you begin planting and saving seed. Choose your favorite variety, plant the open-pollinated organic seed, and start saving!

To further your seed education, here are additional resources from Navdanya:

Books

1. *Violence of the Green Revolution*
2. *The Plunder of Nature and Knowledge: Biopiracy*
3. *Monocultures of the Mind*
4. *Biopiracy of Climate Resilient Crops: Gene Giants Steal Farmers' Innovation*
5. *Corporate Hijack of Biodiversity*
6. *Trainer's Manual for Sustainable Agriculture and Biodiversity Conservation of Traditional Knowledge*
7. *Neem: Fight Against Biopiracy and Rejuvenation of Traditional Knowledge*
8. *No Patents on Seeds: A Handbook for Activists*
9. *The GMO Emperor has no Clothes*
10. *The Seed and Spinning Wheel*
11. *Health per Acre: Organic Solutions to Hunger and Malnutrition*
12. *Manifesto on the future of seeds*

Videos

1. *Seed Wars*
2. *Seeds of Freedom*
3. *Seeds and Seed Multinational*
4. *Cotton from my Shroud*

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