

## Registration of Plant Genetic resources and their procedures, Farmers Rights- An overview

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### ABSTRACT

*Germplasm registration is useful to search the new genes for incorporation in existing cultivars to ensure food and nutritional security. At the beginning of the 2000s, the Indian seed sector has been exposed to intellectual property rights (IPRs). Prior to the IPR period, public sector technologies and variants were generally in the public domain and could be accessed by anyone. The PPVFR authority was subsequently constituted in New Delhi in 2005 and has been in operation since 2006 and provides for the protection of the intellectual property rights of plant breeders and farmers involved in the development of plant varieties. In response to this development, the Indian Council of Agricultural Research (ICAR), the nation's top body for agricultural research and education, established rules for the creation, commercialization, and transfer of agricultural technologies' intellectual property in order to improve the working environment for greater innovation in the public sector. The Indian Council of Agricultural Research (ICAR) evaluate, identifies and recommend for release of crop varieties. TRIPS Agreement says "predominantly for the supply of the domestic market", in which the product is under compulsory licensing. Germplasm conservation is to preserve the genetic diversity of selected plants or genetic stock for its utilization at any time Reve in the future. Farmer's varieties and registration is where a variety is registered and farmers obtain the exclusive right to produce and market it. This right recognizes the role of farmers as plant breeders and innovators Plant enetic Resources for Food and Agriculture (PGRFA) form the basis for the genetic improvement of crop species in the development of new varieties.*

**Keywords-** PPV&FRA, germplasm registration, PGFRA, Farmers Rights, PGR

### 1. Introduction

At the beginning of the 2000s, the Indian seed sector has been exposed to intellectual property rights (IPRs). Before the IPR period, public sector technologies and variants were generally in the public domain and could be accessed by anyone. Public sector breeders freely traded germplasm and other planting materials, and private businesses proliferated and sold public-bred varieties without having to pay any royalties to the parent institute. India passed the Protection of Plant Varieties and Farmers Rights Act (PPVFRA) in 2001 following the World Trade Organization's (WTO) by Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement. The PPVFR authority was subsequently constituted in New Delhi in 2005 and has been in operation since 2006. In response to this development, the Indian Council of Agricultural Research (ICAR), the nation's top body for agricultural research and

education, established rules for the creation, commercialization, and transfer of agricultural technologies' intellectual property to improve the working environment for greater innovation in the public sector(2). IPRs and their effects on the seed industry are the subject of various conflicting opinions. IPR advocates contend that doing so would encourage investment in technological advancement, particularly private research and development (R&D), which would in turn help the seed sector expand and give farmers more seed options (3–10).

### 2. Plant Germplasm Registration

#### Need for registration

The need for recognition to the developers of new improved varieties is being served by the Central Sub-Committees on Crop

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Standards, Notification and Release of Varieties of Agricultural Crops (CVRC) as part of the Indian National Agricultural Research System (NARS). Further, the enactment of Protection of Plant Varieties and Farmers' Rights Act (PPV&FRA) 2001 provides for protection of the intellectual property rights of plant breeders and farmers involved in development of plant varieties.

The Indian Council of Agricultural Research (ICAR) operates the mechanism for evaluation, identification and recommendation for release of crop varieties. The Ministry of Agriculture under the Seed Act, 1966, Section 5 provides procedure for notification of released varieties through CVRC and ensures production and sale of seeds meeting the Minimum Seed Certification Standards.

### Application for Registration

#### 1. An application shall be made by

- Breeder of the variety
- The successor of the breeder of the variety
- The assignee of the breeder of the variety

2. Every applicant should submit a single and distinct denomination to a variety with respect to which he/she is seeking registration under this Act in accordance with the regulation

3. If the denomination satisfies the requirements the authority shall make regulations.

4. If not, the applicant is asked to submit another denomination.

5. A denomination assigned to a variety shall not be registered as a trade mark under Trade and Merchandise Act, 1958.

- ✓ The application should contain complete passport data of the parent lines of the variety along with an affidavit sworn by the applicant that the variety does not contain any gene or terminator technology.
- ✓ Seeds must be given along with the application to test the quality attributes as specified in the application and the parental material conform to the standards as specified by regulations.
- ✓ Fees shall be deposited to conduct tests. If the registry is satisfied, he will accept. If not, he may ask the applicant to change or reject the application. If it is accepted, photographs or drawings, particulars of seed will be advertised in the prescribed manner calling objections from the persons
- ✓ Objections if any have to be submitted within three months from the date of advertisement of registration of the application.

### Nodal agency

The Nodal agency for germplasm registration is NBPGR, New Delhi. The addressing of the application should be to the Director, NBPGR, along with seed sample.

Fees for Registration of varieties Fee (rs/.)

1. Cereals/grain legumes	20000
2. Commercial crops	35000
3. Spices & medicinal plants	20000
4. Plantation crops	35000
5. Flower and lawn	15000

6. Fruit trees/ vines	20000
7. Vegetables	20000
8. Forest trees	20000

### Eligibility Criteria

Germplasm or genetic stock of Agricultural, Horticultural and other economic crops including agro forestry, spices, medicinal, aromatic and ornamental plants which satisfy the DUS characters i.e Distinctiveness, Uniformity, Stability and novelty. Extant variety can be registered even if it does not satisfy the criteria of novelty.

#### Validity of the Registration

For trees and vines the validity period is 18 years and for other plant species it is 15 years. After the registration the registered germplasm would be National Sovereign property.

#### Revocation

Set of conditions in which the protection granted to the rights holder is revoked, if

- Incorrect information furnished by the holder
- The registered person or holder is not eligible
- Sufficient information and documents have not been submitted by the rights holder
- The rights holder has not submitted an alternative denomination in case of non availability of the already produced denomination
- If seeds and propagation material are not provided by the holder to the person to whom a compulsory license is issued
- Penalties for violation
- Penalties range from Rs.50000 to one million as well as imprisonment ranging from 3 months to 2 years.

### Re-registration

Registration is cancelled by the PGRC in case of false claims. An appeal for counter claim can be made within a period of 3 months of publication of the brief notes in the Indian Journal of Plant Genetic Resources.

### Compulsory License

After the expiry of 3 years from the issue of the certificate of registration of a variety any person interested can make an application to the Authority, stating the reasonable requirements of the public for seeds and propagating materials of the variety which has not been satisfied or not available to the public at a reasonable rate. Therefore to undertake the production, distribution and sales of the seeds or the propagating material it is requested for the grant of a compulsory license.

#### Benefits of germplasm registration

- It serves as a recognized tool for registration of PGRFA at national level.
- Identifying and developing potentially valuable germplasm
- Provides access to the developed germplasm for utilization in crop improvement programs. A total of 1313 germplasm belonging to 209 crop species have been registered.

### 3. (i). Knowing the chain of events that led to the PPVFRA Act

The history of the protection of PPVFR bill's development is extremely unique, and as a result, there has been a great deal of controversy around it. The bill has successfully achieved its

goals of involving a wide range of stakeholders in the process of its development over the course of its lengthy history. Its goal is to operationalize farmers' rights that are relevant to a variety of stakeholders, including the public sector, farmers, business and intergovernmental organizations. Regarding their rights, the farmers stood out.

When FAO suggested creating a Commission after realizing the significance of materializing farmer rights, the dispute between developed and developing nations became more heated. The organization noticed that despite the widespread use of resources by multinational corporations, there was still underutilization of resources as a result of their anti-common approach. In response to this particular observation, SAI was founded in 1985 as the foreign subsidiaries began to establish themselves strongly in India. The framework of legislation pertaining to the protection of plant varieties saw a significant advancement as a result of this meeting.

Many NGOs and farming groups criticized the first draft of the law for adopting the UPOV Model since it paid no attention to the recognition of farmer's rights. In 1996, a second draft was created, which received criticism for not including ownership rights for farmers. The third draft, which was released in 1997, was criticized once more for its component of a nebulous benefit-sharing system. The final draught was presented in 2001, and it equalized farmer rights with breeder rights, which was once again contentious because arguments were made to consider agriculture as a unique subject and grant it some intellectual property relaxations.

Such an argument was primarily based on the idea that farmers' and breeders' methods of operation are significantly unlike. In contrast to traditional farming practices, which are carried out by the entire community of farmers in agricultural fields in open, using their calculations, breeders typically operate in multinational scientific labs in closed spaces and their results are primarily individualistic, R&D in nature. Because the two have different outcomes, objectives, and ambitions, they shouldn't be compared side by side.

#### **ii. The development of India's plant variety protection laws:**

Prior to the creation of the PPVFR Act, plant varieties were not covered under India's IPR system. The demand for plant breeder's rights has increased ever since seed businesses entered the seed industry in 1988 thanks to the National Seed Policy. In order to comply with Article 27 in Part II of the TRIPS agreement, India, a founding member of the WTO, has to pass a law for the preservation of plant types.

A number of groups, including the Farmers' Forum, Non-Governmental Organizations (NGO), and, to some extent, the governmental sector, fiercely opposed the plant breeder rights bill. This opposition was primarily based on the possibility that private companies could dominate the seed industry. For instance, they could take original resources or parental lines from farms and/or public institutions, develop a variety or hybrid, and then claim ownership without compensating plant genetic material suppliers or rescuers in any way. Policymakers effectively addressed the inequities and created the PPVFR Act in 2001 after taking into account all these issues. This law promotes the creation of new plant varieties with significant economic value and safeguards the rights of both farmers and plant breeders.

Breeders', researchers, and farmers' rights are the three types of rights that are protected under the Act.

- ✓ Plant breeders are given exclusive rights to manufacture, sell, market, distribute, import, and export their registered varieties through the breeder's right, which is a proprietary ownership right granted to plant breeders.
- ✓ The Act's protections for researchers' rights include exemptions for using registered varieties as sources for new kinds and for conducting experiments. To repeatedly use a registered variety as a parental line for commercial production, however, breeder approval is required.
- ✓ The Farmer's Rights Act defines a farmer as a "breeder" who has created a new variety in the same way that a breeder of a variety would; as a "conservator" who has preserved the genetic resources of land races and wild relatives of economic plants, which have been used as donors of genes in varieties registered under this Act; and as a "user" who is allowed to save, use, sow, re-sow, exchange, share, or sell his farm products
- ✓ A variety can be registered under one of four categories under the Indian sui-generis system of plant variety protection: new variety, essentially derived varieties, extant variety, and farmers' variety (1). In contrast, member nations of the International Union for the Protection of New Varieties of Plants (UPOV) do not provide protection for varieties under the last two categories (22).

#### **iii. PVP and the pool of genetic resources: Global Agreements**

The paradigm of liberalized trade and financial flows saw a rise in the agricultural sector in emerging countries, as well as agricultural R&D, corporate mergers, and the formation of agrochemical and biotech firms. (2) This specific element exemplifies how intensely processes of commercialization and commodification in general operate. The gathering of multinational seed, agrochemical, and biotech corporations calls for an all-inclusive zone of IPR protection for plant species under the auspices of the WTO. (3) As soon as multinational firms had a foothold in the agricultural industry, they sought to establish a minimal level of IPR protection to reduce the risk and uncertainty related to R&D. (4)

It is significant to note that the WTO member countries have a duty to the PVP under Article 27.3(b) of the TRIPs Agreement. (5) Article specifically stipulates that the Members shall ensure that plant variety protection is provided, whether through the use of patents, any efficient sui generis approach, or any mixture of both methods. It is crucial to notice that the term "effective sui generis system" is somewhat ambiguous because there is no explanation of what this specific system entails.

Significantly, this specific ambiguity grants the nations a great deal of freedom to create a system that is consistent with their "sui generis" nature. In theory, it is assumed that the use of UPOV and PBRs results in the creation of an effective Sui generis system. (6) It is crucial to remember that the UPOV model of PBRs has a significant impact on the protection of plant types and the listed farmers' rights. (7) The UPOV system is extremely important since it offers an alternative to patent protection. The fact that the patent protects ideas and often has the requirements of non-obviousness, uniqueness, and industrial use cannot be disputed.

The issue with plant breeders' rights is that they only apply to specific plant kinds, and it is essentially necessary for the variety to be new, distinct, uniform, and stable. An argument that Particularly supporting this claim is that the PVP is required to promote investment and innovation, regardless of whether it takes the form of Plant Breeders rights or patents. Making

ensuring that investors are guaranteed a suitable return on their investments is necessary to promote research and development. This particular investor guarantee is compromised by the fact that plants ability to reproduce themselves makes it impossible to enforce exclusive ownership and control rights over the subject of plant genetic resources.

It is significant to note that in the international discussions on PVP, the IU on PGRs and the CBD frequently provide opposing arguments on ownership and control of PGRs. The FAO-organized meeting from 1983 is the first international agreement used to resolve concerns about access and proprietary rights to PGRs for Food and Agriculture, despite the fact that it is not legally enforceable. But there has been a change in the way people are thinking. At first, it was believed that since

the PGRs are a part of humanity's collective heritage, they should be available to everyone. This specific concept serves as the foundation upon which numerous nations and international gene banks successfully gather huge quantities of the relevant plant genetic material without the agreement or payment from the nations through which they received it.

#### **Views of stakeholders on PVP**

Farmers, private seed firms, public research institutions, NGOs seed groups, government organizations, etc. are just a few of the numerous players in the seed sector. Apart from farmers, breeders are the main stakeholders because they are the ones who will most immediately feel the effects of this policy shift.

**Table1. Perception of PPVFRA legislation and impacts on the Indian seed industry**

<b>Particulars</b>	<b>Publicsector</b>	<b>Privatesector</b>
Facilitates accesstogermplasm/propagatingmaterial	-	0
Facilitatesinmarketingofnewtechnology	+	+
PromotesPPPcollaborativeresearchagreements	0	0
Facilitateslicensingagreements	+	+
ProvidesincentivesforR&Dandinnovation	+	+
Facilitatescommercializationofvarieties	+	+
Controlseedprices	0	0
Effectiveprotectionsystem	+	-
Cumbersomeproceduresforobtainingprotection	-	+
Lengthoftestingthevarietyisveryhigh	-	+

*Opinionofthemajorityofrespondents:+indicatespositiveimpact/in Favor,-indicatesnegativeimpact/againstand0indicatesnoimpact.*

#### **PVP registration restrictions**

**Table2. ConstraintsfacedbyprivatesectorinPVPapplication**

<b>Constraints</b>	<b>Garretmeanscore</b>	<b>Rank</b>
Highcostofprotection	84.6	I
Cumbersomeprocedureoffilinganddelayinprocessingapplication	82.7	II
Rapidchangeintechnologylimitsfilingprotection	57.8	III
Inabilitytoenforceprotection	45.9	IV
Valuableinformationaboutthenewvarietymaybeleaked	43.8	V
Competitormaydeveloparoundnewvarietiesorhybrid	37.8	VI
Lackofknowledge	32.5	VII
Maintainingprotectionistooexpensive	27.2	VIII
Hybridsarenaturalpatents,wasteoftimeandmoneyinfilingprotection	24.3	IX

*Sources of information about PPVFRA for farmers*

**Farmers' knowledge of PVP**

Sources of Information	Garrett meanscore	Rank
Electronic media(TV/radio)	72.1	I
Neighbors/fellowfarmers/retailers	53.8	II
KrishiMela/trainings/meetings/campaign	47.3	III
Printmedia(newspaper/bulletin)	27.2	IV
Extensioncontact(stateagriculturedepartment,SAU,KVK)	21.6	V

*Sources of information about PPVFRA for farmers***4. TRIPS AGREEMENT ABOUT:**

TRIPS agreement came into effect on 01.01.1995. TRIPS agreement is a minimum standards agreement that allows members to provide more extensive protection of intellectual property if they so wish

**General provisions:**

As in the main pre-existing intellectual property conventions, the introductory obligation of each Member country is to accord the treatment regarding the protection of intellectual property handed for under the Agreement to the persons of other Members. Composition 1.3 defines who these persons are. These persons are appertained to as "citizens" but include persons, natural or legal, who have a close attachment to other Members without inescapably being citizens. The criteria for determining which persons must therefore profit from the treatment handed for under the Agreement are those laid down for this purpose in the main pre-existing intellectual property conventions of WIPO, applied of course for all WTO Members whether or not they're party to those conventions. These conventions are the Paris Convention, the Berne Convention, the International Convention for the Protection of Players, Directors of Phonograms and Broadcasting Organizations (Rome Convention), and the Treaty on Intellectual Property in Respect of Integrated Circuits( IPIC Treaty). Papers 3, 4, and 5 include the abecedarian rules on the public and most- favored- nation treatment of foreign citizens, which are common to all orders of intellectual property covered by the Agreement.

These scores cover not only the substantial norms of protection but also matters affecting the vacuity, accession, compass, conservation, and enforcement of intellectual property rights as well as those matters affecting the use of intellectual property rights specifically addressed in the Agreement. While the public treatment clause forbids demarcation between a Member's citizens and the citizens of other Members, the most- favored- nation treatment clause forbids demarcation between the citizens of other Members. In respect of the public treatment obligation, the exceptions allowed under the pre-existing intellectual property conventions of WIPO are also allowed under passages. Where these exceptions allow material reciprocity, a consequential exception to MFN treatment is also permitted (e.g. comparison of terms for brand protection above the minimal term needed by the passages Agreement as handed under Composition 7(8) of the Berne Convention as incorporated into the passages Agreement). Certain other limited exceptions to the MFN obligation are also handed for.

The general pretensions of the passages Agreement are contained in the Preamble of the Agreement, which reproduces the introductory Uruguay Round negotiating objects established in the area of passages by the 1986 Punta del Este Declaration and the 1988/89 Mid-Term Review. These objects include the reduction of deformations and impediments to transnational trade, the creation of effective and acceptable protection of intellectual property rights, and icing that measures and procedures to apply intellectual property rights don't themselves come walls to licit trade. These objects should be read in confluence with Composition 7, entitled "objects", according to which the protection and enforcement of intellectual property rights should contribute to the creation of technological invention and the transfer and dispersion of technology, to the collective advantage of directors and druggies of technological knowledge and in a manner conducive to social and profitable weal, and to a balance of rights and scores. Composition 8, entitled " Principles ", recognizes the rights of Members to borrow measures for public health and other public interest reasons and to help the abuse of intellectual property rights, handed that similar measures are harmonious with the vittles' of the passages Agreement.

**Copyright**

During the Uruguay Round accommodations, it was honored that the Berne Convention formerly, for the utmost part, handed acceptable introductory norms of brand protection. Therefore, it was agreed that the point of departure should be the position of protection under the Rearmost Act, the Paris Act of 1971, of that Convention. The point of departure is expressed in Composition 9.1 under which Members are obliged to misbehave with the substantial vittles of the Paris Act of 1971 of the Berne Convention, i.e. papers 1 through 21 of the Berne Convention (1971) and the excursus thereto. still, Members don't have rights or scores under the passages Agreement in respect of the rights conferred under Composition 6bis of that Convention, i.e. the moral rights(the right to claim authorship and to expostulate to any depreciatory action in relation to a work, which would be prejudicial to the author's honor or character), or of the rights deduced therefrom. The vittles of the Berne Convention appertained to deal with questions similar to subject- matter to be defended, minimum term of protection, and rights to be conferred and admissible limitations to those rights. The excursus allows developing countries, under certain conditions, to make some limitations to the right of restatement and the right of reduplication. In addition to taking compliance with the introductory norms of the Berne Convention, the passages Agreement clarifies and adds certain specific points.

Composition 9.2 confirms that brand protection shall extend to expressions and not to ideas, procedures, and styles of operation or fine generalities as similar. Composition 10.1 provides that computer programs, whether in source or object law, shall be defended as erudite workshop under the Berne Convention (1971). This provision confirms that computer programs must be defended under brand and that those vittles' of the Berne Convention that apply to erudite workshop shall be applied also to them. It confirms further, that the form in which a program is, whether in source or object law, doesn't affect the protection. The obligation to cover computer programs as erudite workshop manseng. That only those limitations that are applicable to erudite workshop may be applied to computer programs. It also confirms that the general term of protection of 50 times applies to computer programs. Possible shorter terms applicable to photographic workshop and workshop of applied art may not be applied. Composition 10.2 clarifies that databases and other compendiums of data or other material shall be defended as similar under brand indeed where the databases include data that as similar aren't defended under brand. Databases are eligible for brand protection handed that they by reason of the selection or arrangement of their contents constitute intellectual creations. The provision also confirms that databases have to be defended anyhow of which form they're in, whether machine readable or another form. Likewise, the provision clarifies that similar protection shall not extend to the data or material itself and that it shall be without prejudice to any brand breathing in the data or material itself. Composition 11 provides that authors shall have in respect of at least computer programs and, in certain circumstances, of cinematographic workshop the right to authorize or to enjoin the marketable reimbursement to the public of originals or clones of their brand works. With respect to the cinematographic workshop, the exclusive reimbursement right is subject to the so called impairment test a Member is Plagiarized Unique Total Words: 857 Total Characters: 5492 Plagiarized Sentences: 3.74 Unique Sentences: 30.26 (89%) 11% 89% Page 1 of 2 excepted from the obligation unless similar reimbursement has led to wide copying of similar workshop which is materially injuring the exclusive right of reduplication conferred in that Member on authors and their successors in title. In respect of computer programs, the obligation doesn't apply to settlements where the program itself isn't the essential object of the reimbursement. According to the general rule contained in Composition 7(1) of the Berne Convention as incorporated into the passages Agreement, the term of protection shall be the life of the author and 50 times after his death. Paragraphs 2 through 4 of that Composition specifically allow shorter terms in certain cases. These vittles are supplemented by Composition 12 of the passages Agreement, which provides that whenever the term of protection of a work, other than a photographic work or a work of applied art, is calculated on a base other than the life of a natural person, similar term shall be no lower than 50 times from the end of the timetable time of authorized publication, or, failing similar authorized publication within 50 times from the timber of the work, 50 times from the end of the timetable time of making. Composition 13 requires Members to confine limitations or exceptions to exclusive rights to certain special cases which don't discord with a normal exploitation of the work and don't unreasonably prejudice the licit interests of the right holder. This is a vertical provision that applies to all limitations and exceptions permitted under the vittles of the

Berne Convention and the excursus thereto as incorporated into the passages Agreement. The operation of these limitations is permitted also under the passages Agreement, but the provision makes it clear that they must be applied in a manner that doesn't prejudice the licit interests of the right holder.

### **Related rights**

The vittles on the protection of players, directors of phonograms and broadcasting associations are included in Composition 14. According to Composition 14.1, players shall have the possibility of precluding the unauthorized obsession of their performance on a phonogram (e.g. the recording of a live musical performance). The obsession right covers only audial, not audiovisual prepossessions. Players must also be in position to help the reduplication of similar prepossessions. They shall also have the possibility of precluding unauthorized broadcasting by wireless means and the communication to the public of their live performance. In agreement with Composition 14.2, Members have to grant directors of phonograms an exclusive reduplication right. In addition to this, they've to grant, in agreement with Composition 14.4, an exclusive reimbursement right at least to directors of phonograms. The vittles on rental rights apply also to any other right holders in phonograms as determined in public law. This right has the same compass as the rental right in respect of computer programs. Thus it isn't subject to the impairment test as in respect of the cinematographic workshop. still, it's limited by a so called grand begetting clause, according to which a Member, which on 15 April 1994, i.e. the date of the hand of the Marrakesh Agreement, had in force a system of indifferent remuneration of right holders in respect of the reimbursement of phonograms, may maintain similar system handed that the marketable reimbursement of phonograms isn't giving rise to the material impairment of the exclusive rights of reduplication of right holders. Broadcasting associations shall have, in agreement with Composition 14.3, the right to enjoin the unauthorized obsession, the reduplication of prepossessions, and the rebroadcasting by wireless means of broadcasts, as well as the communication to the public of their TV broadcasts. still, it isn't necessary to grant similar rights to broadcasting associations, if possessors of brand in the subject- matter of broadcasts are handed with the possibility of precluding these acts, subject to the vittles of the Berne Convention. The term of protection is at least 50 times for players and directors of phonograms, and 20 times for broadcasting associations (Composition 14.5). Composition 14.6 provides that any Member may, in relation to the protection of players, directors of phonograms and broadcasting associations, give for conditions, limitations, exceptions and reservations to the extent permitted by the Rome Convention.

### **Patent**

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#### **Protection of undisclosed information:**

The TRIPS Agreement requires Member countries to make patents available for any inventions, whether products or processes, in all fields of technology without demarcation, subject to the normal tests of novelty, inventiveness and artificial connection. It's also needed that patents be available and patent rights pleasurable without demarcation as to the place of invention and whether products are imported or locally produced. There are three admissible exceptions to the introductory rule on patentability. One is for inventions contrary to order public or morality; this explicitly includes inventions dangerous to mortal, beast or factory life or health or seriously prejudicial to the terrain. The use of this exception is subject to the condition that the marketable exploitation of the invention must also be averted and this forestallment must be necessary for the protection of order public or morality (Composition 27.2). The alternate exception is that Members may count from patentability individual, remedial and surgical styles for the treatment of humans or creatures (Article 27.3 (a)). The third is that Members may count shops and creatures other than micro-organisms and basically natural processes for the product of shops or creatures other tannin-biological and microbiological processes. still, any country banning factory kinds from patent protection must give an effective sui generis system of protection. Also, the whole provision is subject to review four times after entry into force of the Agreement (Article 27.3 (b)). The exclusive rights that must be conferred by a product patent are the bones of making, using, offering for trade, selling, and importing for these purposes. Process patent protection must give rights not only over use of the process but also over products attained directly by the process. Patent

possessors shall also have the right to assign, or transfer by race, the patent and to conclude licensing contracts (Composition 28). Members may give limited exceptions to the exclusive rights conferred by a patent, handed that similar exceptions don't unreasonably conflict with a normal exploitation of the patent and don't unreasonably prejudice the licit interests of the patent proprietor, taking account of the licit interests of third parties (Article 30). The term of protection available shall not end before the expiration of a period of 20 times counted from the form date (Composition 33). Members shall bear that an aspirant for a patent shall expose the invention in a manner sufficiently clear and complete for the invention to be carried out by a person professed in the art and may bear the aspirant to indicate the stylish mode for carrying out the invention known to the innovator at the form date or, where precedence is claimed, at the precedence date of the operation (Composition 29.1). still, the judicial authorities shall have the authority to order the defendant to prove that the process to Plagiarized Unique Total Words: 672 Total Characters: 4401 Plagiarized Sentences: 4.76 Unique Sentences: 23.24 (83%) 17% 83% Page 1 of 2 gain an identical product is different from the patented process, where certain conditions indicating a liability that the defended process was used are met( Composition 34), If the subject-matter of a patent is a process for carrying a product. mandatory licensing and government use without the authorization of the right holder are allowed but are made subject to conditions aimed at guarding the licit interests of the right holder. The conditions are substantially contained in Composition 31. These include the obligation, as a general rule, to grant similar licenses only if an unprofitable attempt has been made to acquire a voluntary license on reasonable terms and conditions within a reasonable period of time; the demand to pay acceptable remuneration in the circumstances of each case, taking into account the profitable value of the license; and a demand that opinions be subject to judicial or another independent review by a distinct advanced authority. Certain of these conditions are relaxed where mandatory licenses are employed to remedy practices that have been established as anticompetitive by a legal process. These conditions should be read together with the affiliated vittles of Composition 27.1, which bear that patent rights shall be pleasurable without demarcation as to the field of technology, and whether products are imported or locally produced

## **5. GERMLASM CONSERVATION**

Germplasm conservation is the most profitable method to conserve the genetic traits of endangered and commercially valuable species. Germplasm is a stay information source for all the genes present in the respective plant, which can be conserved for long durations and regenerated whenever it is required in the future. Germplasm in a vast way can be defined as the hereditary material i.e. total content of genes that is inherited via the offsprings of germ cells.(5)

### **1. Importance of Germplasm conservation**

- Germplasm serves as the raw material for the breeder to produce various crops. Therefore, conservation of germplasm has importance in all breeding programs.
- The main objective of germplasm conservation is to preserve the genetic diversity of selected plants or genetic stock for its utilization at any time in future.
- International Board of Plant Genetic Resources (IBPGR), a global body has been established for germplasm conservation. (8)

**ii. Types of germplasm conservation:**

There are mainly two types of germplasm conservation which are

- In-situ conservation
- Ex-situ conservation

**In-situ conservation**

The conservation of germplasm in their natural habitat by constructing national parks/gene sanctuaries is termed as in situ conservation. This approach is particularly useful for preservation of land plants in a near natural habitat along with several wild relatives with genetic diversity.

Limitations of In-situ conservation

- The risk of losing germplasm due to environmental hazards
- ii. The cost of maintenance of a large number of genotypes is very high.

**Ex-situ conservation**

Off-site conservation is called as ex-situ conservation, which deals with conservation of an endangered species outside its natural habitat. Genetic resources either in form of seeds or plant cells, tissues or organs can be preserved as gene banks for long term storage under favorable conditions. Ex-situ conservation cannot allow the plants to continue its evolutionary process but it ensures the availability of stored genetic materials in need and their safety.(4)

**iii. Ways of conserving Germplasm**

Seed gene bank

Conservation of germplasm is in the form of seed. The majority of plants are propagated

Through seeds. Seeds occupy less storage area and transportation is easy. But the viability of seeds Gets reduced at certain time period and is prone to pest infestation.

There are two type of seed based on Their storage

- Orthodox seeds
- Recalcitrant seeds.

**Orthodox seeds:**

These seeds can be dried to moisture content of 5 per cent or lower without losing their viability. These seeds can be stored for longer periods.

**Recalcitrant seeds:**

The viability of these seeds gets reduced if the moisture content is reduced below 12 to 30 percent. These type of germplasm need to be conserved by special Approaches.

Seed gene banks are meant for orthodox seeds which can be dried to very low moisture content. In case of recalcitrant seeds where long term storage is not achieved by seed gene bank hence other Methods such as field gene bank, pollen bank and in vitro germplasm storage might be adopted.(7) (10)

**Field Gene bank**

The conservation of perennial crops, tree species, recalcitrant species and vegetatively Propagated species is done in field gene bank. It involves the collection of plant species and Planting in various locations. The major limitations are it needs greater space, difficult in Maintenance, susceptible to the spread of pest and diseases and also prone to natural disaster. Even Though

drawbacks are present; it is the only available option for conservation of recalcitrant seeds, Clonal materials and perennial tree species. (2)

**Shoot tip bank**

Germplasm is conserved as slow growth cultures of shoot tips and node segments.

**Advantages**

Each genotype can be conserved indefinitely free from viruses or other pathogens.

- It is advantageous for vegetatively propagated crops like potato, sweet potato, cassava etc because seed production in these crops is poor
- Vegetatively propagated material can be saved from natural disasters or pathogen attack tages(6)

**DNA Bank**

DNA segments from the genomes of germplasm accessions are maintained and conserved.

**Cell and organ bank**

Germplasm collection based on cryopreserved (at - 1960C in liquid nitrogen) embryogenic cell cultures, somatic/ zygotic embryos be called cell and organ bank. (9)

**IV. Seed storage****1. Base collection/Principal collection**

These collections are used only when the germplasm of other sources is not available for use in crop improvements

It stored Temperature—18-20°C Moisture-15%

Time period-upto100 years (long term storage)

**2. Active collection**

This category of sample is actively utilized in breeding programs

It stored Temperature-0°C Moisture-8%

Time period-8-10 years (Medium Term storage)

**3. Working collection**

These collections of frequently utilized by breeding in crop improvements program

Temperature 5-10°C Moisture 8-1%

Time period 3-5 years (Short term storage) (1), (3)

**V. Table : Gene Banks for various crops in India**

Crop species	Location of gene bank centre
Wheat	DWR, Karnal (Haryana)
Rice	CRRI, Cuttack (Orissa)
Potato	CPRI, Shimla (Himachal Pradesh)
Cotton	CICR, Nagpur (Maharashtra)
Sugarcane	SBI, Coimbatore (Tamil Nadu)
Tobacco	CTRI, Rajahmundry (Andhra Pradesh)
Pulses	IIPR, Kanpur, (Uttar Pradesh)
Forage crops	IGFRI, Jhansi
Plantation crops	CPCRI, Kasargod, (Kerala)
Tuber crops(except potato)	CTCRI, Trivandrum (Kerala)
Oilseed crops	DOR, Hyderabad (Andhra Pradesh)
Horticultural crops	IIHR, Bangalore (Karnataka)
Sorghum	NRC Sorghum, Hyderabad (Andhra Pradesh)
Groundnut	NRC Groundnut, Junagadh (Gujarat)
Soybean	NRC Soybean, Indore (Madhya Pradesh)
Maize	IARI, New Delhi



*List of important international institutions for germplasm conservation*

<b>Institute/Gene bank</b>	<b>Country</b>	<b>No. Of accession</b>
Australian tropical crops and Forage Genetic Resources centre (AusPGRIS)	Australia	361
Plant genetic resources centre, BARI	Bangladesh	>515
Institute of crop Germplasm Resources, Chinese Academy of Agricultural Sciences	China	26233
Biologic Vegetable Applique, Institute Louis Pasteur	France	850
Laboratoire De ressources Genetiques et Ameli-oration des plantes Tropicales, ORSTOM	France	3500
AICRP on small millets	India	2512
International crop Research Institute For Semi-Arid Tropics (ICRISAT)	India	1542
Ramaiha Genebank, Plant Genetic Resources, Tamil Nadu Agricultural University, Coimbatore	India	4392
National Bureau of Plant Genetic Resources	India	774
Regional station, Akola, NBPGR	India	349

*Conservation status of major crops*

<b>Crop Group</b>	<b>Species</b>	<b>Accession</b>
Cereals	90	156526
Millets & Forages	178	56472
Pseudo Cereals	30	6825
Grain legumes	69	58160
Oilseeds	58	57479
Fibre crops	51	11943
Vegetables	151	25084
Fruits	35	530
Medicinal & aromatic and narcotics plants	661	6771
Spices & condiments	17	3721
Agroforestry species	244	2443
Duplicate safety samples		10235
Total	1584	396189

*Estimation of germplasm holding in 5 largest national plant germplasm system*

<b>Country/IARC</b>	<b>Crop categories</b>	<b>Total</b>
U. S. A	All crops	557000
China	All crops Rice (National Rice Research Institute) Wheat (National Gene Bank)	400000
U. S. S. R	All crops	325000
IRRI	Rice	86000
ICRISAT	Sorghum, millet, chickpea, peanut, pigeon pea	86000
ICARDA	Cereals, legumes, forages	77000

India	All crops	76800
CIMMYT	Wheat, maize	75000
CIAT	Common bean, cassava, forages	66000
IITA	Cowpea, rice, root crops	40000
CIP	Potato, sweet potato	12000

## 6. Farmer's Varieties and Registration

The PPVandFR Act of 2001 was enacted to grant intellectual property rights to plant breeders, scientists and farmers who developed new or existing plant varieties. Farmers are entitled to save, use, sow, re-sow, exchange or sell their farm produce including seed of a registered variety in an unbranded manner. Farmers' varieties are eligible for registration and farmers are totally exempted from payment of any fee in any proceedings under this Act.

The protection period for crops is 15 years and for trees and vines 18 years and for notified varieties 15 years from the date of notification under section 5 of the Seeds Act 1966. An annual fee is payable to maintain your registration and a renewal fee is payable for an extended registration period. (8) (10)

### Farmer's varieties

Farmers' varieties, traditional varieties or landraces, have been selected and developed by farmers through years of cultivation and seed saving for the next season. Farmers hand them down through generations. (5)

Farmers' rights take the form of nine specific rights under Sections 39 to 46 of the Protection of Plant Varieties and Farmers' Rights Act, 2001. (2)

- Rights on seeds.
- Rights to register.
- Rights to reward and recognition.
- Right to benefit-sharing.
- Right to compensation for losses.
- Right against undisclosed use of traditional varieties
- Right to access to seed.
- Right to free services.
- Right to protection against accusations of infringement.

### Rights on seeds

The right to save seeds and use them for sowing, exchanging, sharing, and selling to other farmers.

### Right to register

Once a variety is registered, farmers obtain the exclusive right to produce and market it.

### Right to reward and recognition

This right recognizes the role of farmers in preserving and developing agro-diversity

### Right to benefit-sharing

Farming or tribal communities that contributed to the development of a new crop variety are entitled to an equitable sharing of the benefits earned from it.

### Right to compensation for losses

This right guarantees compensation to farmers who are victims of exaggerated claims regarding the performance of newly registered varieties.

### Right against undisclosed use of traditional varieties

This provision protects farmers when a commercial breeder makes undisclosed use of a traditional variety.

### Right to access seed

If farmers are to benefit from scientific crop improvement, it is self-evident that they need access to seeds

### Right to free services

The Act exempts farmers from paying any fees at any stage of the registration of a variety.

### Right to protection against accusations of infringement

This provision protects people of low legal literacy from harassment, particularly by seed companies. (4) (6) (7)

### Registration procedures

An application goes through two stages prior to registration. First, all applications received by the Authority are compiled and published on its website. In the second stage, only those varieties whose applications have been granted certification for "DUS" (distinctiveness, uniformity, stability) testing are subsequently published in the Plant Variety Journal of India, the journal published by the Authority. Every application requires a processing time, which may range from 8 to 20 months. Once a variety is registered, it is again advertised in the Plant Variety Journal of India as a registered variety the breeder then has the exclusive right to market and produce the crop for a period of 15 years in the case of annual crop varieties, and for 18 years in the case of trees and vines. (5) (1)

### Fees for registration

Types of variety	Fees for registration
Extant Variety notified under section 5 of the Seeds Act, 1966	Rs 2000/-
New Variety/Essentially Derived Variety (EDV)/ Extant Variety about which there is common knowledge (VCK)	Individual Rs. 7000/- Educational Rs.10000/- Commercial Rs.50000/-
Farmers Varieties	No fees

### Certificate of registration

Applications that have fulfilled all requirements and have been finally accepted by the Registrar for registration were issued Certificates of Registration. 747 Certificates have been issued, out of which 91 have been issued for new varieties, 633 for extant varieties notified under the Seeds Act, 1966, 22 for farmers' varieties and 1 for Essentially Derived Variety (EDV). The certificate of registration issued will be valid for nine years in the case of trees and vines and six years in case of other crops(3) (9)

## 7. PGRFA contribution to food security:

Food security and affiliated issues were put forcefully on the global docket in the Rome Declaration on World Food Security in 1996, which called for “ the right of everyone to have access to safe and nutritional food, harmonious with the right to accept food and the abecedarian right of everyone to be free from hunger. ” latterly, in 2002, the ' World Food Summit five times latterly ' led to the development of voluntary guidelines to support the progressive consummation of the right to accept food in the environment of public food security.<sup>6</sup> These guidelines were espoused by the 127th Session of the FAO Council in 2004. Food security exists when all people, at all times, have physical and profitable access to sufficient, safe and nutritional food to meet their salutary requirements and food preferences for an active and healthy life. The four pillars of food security are vacuity, stability of force, access and application.<sup>7</sup> .The PGRFA sector has multiple places to play in helping ensure food security for illustration producing further and better food for pastoral and civic consumers furnishing healthy and further nutritional food and enhancing income generation and pastoral development. There is still a need for a lesser recognition of the multiple places and benefactions that PGRFA can play and for a strengthening of the liaison among all applicable institutions dealing with food security at the global, indigenous, public and original situation

## 8. Conclusion:

Germplasm registration is useful to search the new genes for incorporation in existing cultivars to ensure food and nutritional security (PPV&FRA) 2001 provides for protection of the intellectual property rights of plant breeders and farmers involved in development of plant varieties. The Indian Council of Agricultural Research (ICAR) evaluate identify and recommend for release of crop varieties. TRIPS Agreement says "predominantly for the supply of the domestic market", in which the product is under compulsory licensing. Germplasm conservation is to preserve the genetic diversity of selected plants or genetic stock for its utilization at any time in future. Farmer's varieties and registration is where a variety is registered and farmers obtain the exclusive right to produce and market it. This right recognizes the role of farmers as plant breeders and innovators Plant Genetic Resources for Food and Agriculture (PGRFA) form the basis for genetic improvement of crop species in development of new varieties.

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