



CONTEMPORARY TRENDS IN IPR AND AGRICULTURE - A STUDY OF IPR PROTECTION OF PLANTS IN THE U.S. REGIME

R. GOMATHI¹, DR.PUJARI RAVISEKHARA RAJU²

Assistant Professor, School of Law, SASTRA Deemed to be University, Thanjavur, Tamil Nadu, India,¹

Dean, School of Law, SASTRA Deemed to be University, Thanjavur, Tamil Nadu, India,²

gomathi.ad10@gmail.com ¹

deanlaw@sastra.edu²

Abstract- Agriculture contributes immensely to the GDP of a nation. The introduction of innovative breeding practices in agriculture paved the way for the creation of new varieties of plants. The first part of the article will discuss about the evolution of Intellectual Property Rights (IPR) in the global scenario and the emerging trends in IPR domain in agriculture. The authors had indicated the data pertaining to plant variety protection (PVP) and the plant patents granted in U.S. for the years 2021 to 2023 and 2015 to 2022 respectively. The second part of the article describes about the nature of IPR protection in agriculture in the U.S., legislations involved in PVP, judicial decisions of the U.S. courts, the infringement remedies available in this respect. Finally, the authors conclude by discussing the impact of the IP protection and the current responses to the protection conferred in the U.S. perspective.

Keywords: Agriculture; Intellectual Property Rights; Plant variety protection; Plant patents; Infringement remedies.

INTRODUCTION

Intellectual property rights (IPR) refer to the bundle of rights for protection against usage without consent of the holder on the intangible assets of the holder. Whereas intangible assets denote the incorporeal, non-physical element of property which includes right in intellectual property. Intellectual property (IP) protection can be given in the form of Patents, trademarks, copyrights, industrial designs, trade secrets and geographical designs. Definition of IP according to World Intellectual Property Organisation (WIPO) is that IP refers to creations of mind such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce”¹. The holder of the IP rights gain financial benefits and recognition through his invention. IP system strives to achieve a balance between the interests of the inventors and the general public interest by creating and encouraging research climate in the scientific field. Whereas the term agriculture refers to the practice of cultivating crops, livestock catering to the needs of human beings. Agricultural products include majorly the food grains, fibers and raw materials needed for related activities. Food grains comprise of grains, cereals used for human consumption. Fiber crops on the other hand are purely commercial in nature that are not fit for human consumption but are reared for money. Agriculture also produces raw materials needed for industrial usage. Activity of agriculture involves different kinds of farming techniques and due to increase in technological advancements in the field of plant breeding, the agriculture has become mechanised which warrants an intellectual property protection. Livelihood of the rural population of any country depends mainly on agriculture and its allied activities. The fundamental principle behind granting IP protection to plant varieties is the element of human creativity towards development of a new variety of plant through selection satisfying the element of novelty and distinctness from already existing varieties. The developments in crop varieties do not get classified under the head ‘inventions’, but it is remodified from already existing life forms and propagation takes place by

¹ <https://www.wipo.int/about-ip/en/>, last visited 30, April, 2023, 05.10 pm.



natural process.² The scope of agriculture in a developing country as opposed to an industrial economy is completely in the domain of public sector. Even the research activities are carried on by the government institutions and their universities, funded by the government. Agricultural research activities include research in genetic resources, food systems, fiber crops, forestry, fisheries, soil management, pest control, harvest systems and issues relating to preservation and conservation of natural resources. It can be undoubtedly said that agricultural research paves a way for uninterrupted agricultural progress and economic growth especially for a developing nation. Varied intellectual property technologies involving plant breeding processes for hybrid yields and production of new crops, introduction of genetically modified plant species and effective insecticides for good quality crops necessitates the need of robust IPR regime in developing countries³. These practices will in turn encourage innovative agriculture in any nation. Intellectual property rights are conferred either for industrial property through the grant of patents, trademarks, geographical indications and industrial designs or for literary, artistic, dramatic and other related works through copyright protection. Other IP rights not fitting in the above category falls under the *sui generis* division which means ‘of its own kind’. *Sui generis* rights comprise of the plant breeder’s rights, lay-out designs, and the protection given in respect of semiconductor chips. Apart from a *sui generis* protection, patent rights could also be granted for inventions in plants. International conventions like Agreement on Trade Related Aspects of Intellectual Property Rights also mandates its signatories to provide protection for plant varieties “either by patents or by an effective *sui generis* system or by any combination thereof”⁴. Thus, the evolving intellectual property right of plant varieties in the international perspective with special importance to the position of developing countries are discussed as below.

OBJECTIVES OF THE STUDY

The study aims to analyse the different forms of agriculture that are prevalent by tracing the ancient forms and the contemporary trends in IPR in agriculture. Further the study examines the effectiveness of the plant variety protection rights and the patent granted to the breeders and farmers in the U.S. by virtue of the legislation passed in the state.

LIMITATION OF THE STUDY

The study provides the details of U.S. plant variety protection from the year 2021 to 2023 and plant patents issued from 2015 to 2022.

1. Agriculture In Olden Days

Agriculture and human civilisation are closely connected. Primitive agricultural experience involved hunting and storing food items by men. Crops like rice, pulses and other traditional variety of crops were grown by farmers during the earlier period. Agriculture had been practiced by the world for around 13,000 years and widely in vogue for 7,000 years⁵. Sheep, cattle and other animals were domesticated by farmers of Mesopotamia and Turkey. Pigs were reared by European and Asian farmers. 17th century saw the development in agriculture by adopting irrigation facilities, crop cultivation and usage of fertilisers. The growth of agriculture and trade relating to it made humans migrate from their locality to cities. Studies reveal that plant cultivation began independently across few regions of the world. Later on, men, cultivated and proceeded with mechanisation of agriculture. Agriculture with industrial backing had dominated the yield and profits resultantly in

² https://www.bioversityinternational.org/fileadmin/user_upload/online_library/publications/pdfs/Community_biodiversity_management/6.3.farmers_rights_protection_india.pdf, last visited 30, April, 2023, 08.00 pm,

³ <https://fsii.in/ipr-innovation-agriculture/>, last visited 27, April, 2023, 07.30 pm,

⁴ Art.27(3)(b) of TRIPS

⁵ Montgomery D. *Dirt: The Erosion of Civilizations*. Berkeley and Los Angeles, California: University of California Press; 2008.



the 20th century.⁶ Ancient men had his own modus operandi in agriculture and preserving seeds for agriculture. He solely relied on nature and considered it as his ultimate source for agriculture. He had led the life close to nature and involved in the activity of agriculture. Indian farmers of ancient days preserved the seeds in some parts of the temple and immersed in cow dungs so that the seeds can be used for the cultivation in the successive seasons. Researches in crop improvement had led to the phenomenal achievement of Green Revolution in the crops during the period 1960 to 1980. Consequently, there has been increase in food production at economical price. Research activity in agriculture had paved the way for overall growth of developed and developing nations too. Different types of farming were practiced even during ancient days.

2. Contemporary Trends In Ipr In Agriculture

Biotechnology and its applications have a remarkable impact in the field of agriculture in the contemporary period. Techniques adopted in the field of biotechnology had increased the agricultural yield. Scientific advances to agriculture had eventually resulted in “Green Revolution” that devised new measures catering to the needs of growing human population. A concerted effort towards the end of 20th century aimed in targeting high yields for crops like wheat, rice and maize⁷. Further statistics reveal that there could be a sharp decline in the per capita area supporting food production from 0.44 ha in the year 1961 to around 0.15 by 2050⁸. Bio technology and agriculture have now become inseparable as the former had complemented and supplemented classical breeding techniques of agriculture. Biotechnology offers several procedures like ‘in - vitro’ technologies, other genetic markers, thereby achieving higher intensity of selection. ‘Genetically engineered’ plants, also referred to as transgenic or Genetically Modified plants provides for novel methods inserting variety of genes to breeding pool. This ultimately results in improvising the quality of an existing variety. Various applications for crop and livestock like “Plant rearing and cell and tissue culture” are being carried out using the techniques of biotechnology.

3. Conundrums In Employing Agricultural Biotechnology

Intellectual property rights are said to have a substantial impact on investment in biotechnology areas of the industrial world. Biotechnology is considered as a unique feature of intellectual property in promoting research and development. Crop innovation passes through five stages which are discovery, proof of conception, initial stage of development, final stage for developments and pre-launch. The average time span for producing commercially viable seeds takes around 10 to 15 years. Patent protection makes the inventors invest for long duration towards their innovation. Consequently, intellectual property rights have been receiving wide spread attention for enhancement of science and technology. IP rights have received increasing attention for supporting agricultural development, foreign direct investment (FDI), technology transfer, trade, access to genetic resources and protection of traditional knowledge⁹.

Questions pertaining to access to technology and product pricing, exclusive licensing matters, costs involved in access to materials are being raised. Several countries are still in infancy regarding this emerging proprietary science as it gives raise to both opportunities and problems. Nonetheless, several opportunities are derived from these which includes the below mentioned.

- a. Exposure to new technology.
- b. Growth of Commercial transactions among the stake holders.
- c. Emergence of new partnerships.

⁶ <https://www.vedantu.com/geography/introduction-to-agriculture>, last visited 29, April, 2023, 06.15 pm,

⁷ https://www.wipo.int/ip-development/es/agenda/docs/ipr_in_agriculture.doc, last visited 02, May, 2023, 07.00 pm,

⁸ *ibid*

⁹ <https://fsii.in/ipr-innovation-agriculture/>, last visited 02, May, 2023, 10.00 pm.



d. New delivery mechanism for novel products.

Several nations due to lack of resources, awareness and infrastructural disabilities struggle to implement biotechnological advancements in its agriculture.

4. Role Of Ipr In Research And Development In Agriculture

It is widely understood that the frame work of intellectual property protection has fostered the research and development process in any field. Biotechnology is considered as an apt example of the unique feature of intellectual property in promoting research and development. Globalisation had moved the world towards creation of a knowledge-based economy, whereas intellectual property rights protection have always played the role of a motivator. Agricultural business was generally not linked with intellectual property for the very reason that it depends on sharing of knowledge. However, the introduction of new technology in agriculture and advancements made through development of genetically modified (GM crops) warrants the need of robust IPR regime across the globe. The underlying idea is to encourage innovative agricultural practices of farmers¹⁰. Patent rights are granted for protecting technological innovation and this encourages the inventors to invent more and contribute to the public interest. The actual scope of intellectual property rights in agriculture lies in protecting agricultural goods and services by providing patent, trade mark protection, “plant breeder’s rights”, geographical indications and trade secrets. Agricultural production could be increased due to the IPR protection conferred on its holders. Innovations in agriculture includes in its ambit, developing healthy, safe and nutritious foods for human and animal consumption. Creation of genetically modified seeds and new plant varieties through novel breeding techniques qualify for agricultural innovation. Agriculture had benefitted out of transfer of beneficial traits into crops so that extinction of crops as a result of exposure to pests, droughts and diseases do not happen. Introduction of resistant seed varieties of plants can lead to greater yields of plants at the lowest requirement of chemical manures and fertilisers. Thus, agricultural innovation contributes significantly to reduce poverty, food crisis and prevents malnutrition in developing nations especially. Sensitisation and awareness programs for the farming communities by the researchers, government organisations, non-governmental organisations and other private players are guiding and creating awareness among the farmers about the innovations available in this regard. Several nations are still constrained in funding innovative research projects in agriculture. Intellectual property rights through patent protection had facilitated the growth of research in plant genomics. Researchers employ advanced genomics for understanding the genetic expression of crops and their relationship with ‘agriculturally significant traits’. Intellectual property rights act as a catalyst for investments in research and development and enables the companies to attract investors in the field. Thus, there need to be a striking balance between the protection of the intellectual property rights of farmers and the usage of technology for the welfare of entire ecosystem. Strong implementing mechanisms need to be adopted for regulating the illegal activities that hampers growth of technology and puts the farmers in an unfavourable position. In a landmark case¹¹, The Supreme court of United States held that, utility patents could be allowed on a living organism and had even allowed biotechnological investment for recuperating future investments. Thus, it is evident from studies that the investments into biotechnological areas had continued to boom ever since 1990s. There is evidence for spurt in patents being granted before the US Patents & Trademark Office, from 1996 to 2015, of which the considerable 16,6,629 belongs to biotechnological areas classified as utility patents¹².

¹⁰ *ibid*

¹¹ *Diamond v. Chakrabarty*, 447 U.S. 303 (1980)

¹² <https://www.uspto.gov/web/offices/ac/ido/oeip/taf/data/biotech.htm>, last visited 04, May, 2023, 04.15 pm



5. International Conventions And Ip Rights In Agriculture

Intellectual property rights in agriculture have grown to a considerable extent in the contemporary period. World Intellectual Property Organisation (WIPO) constituted the provisions for the interplay of international law on IPR. First international instrument granting IP protection to agriculture is the “Paris Convention on the Protection of Industrial Property, 1883”, which got revised in the year 1967. Several other treaties relating to patents, trademarks, competition laws etc. One of the significant international instruments on protection of new varieties of plants and plant breeders’ rights is the UPOV, which is the acronym for “The Union Internationale pour la Protections des Obtentions Vegetables” or “International Union for the Protection of New Varieties of plants” signed in the year 1961 and revised until 1991. “The International Undertaking on Plant Genetic Resources (IUPGR)” implemented in the year 1983, enables the free exchange of plant genetic resources as they constitute the heritage of human race. This undertaking aims in ensuring plant genetic resources are available for economic and social welfare especially for agricultural activities and that it will be explored and utilised to make it available for plant breeding and other technological purposes¹³. The undertaking provides for equity for the farming communities to receive their due share of benefits from “plant genetic resources” that were provided by them to the world¹⁴. Next in line is The Agreement on Trade Related Aspects on Intellectual property Rights (TRIPS), which is World Trade Organisation’s (WTO) agreement. **It was negotiated during the year Uruguay round held between 1986- 1994.** It introduced the rules of intellectual property into international trade and commerce.¹⁵ Other international instruments are Convention on Biological Diversity (CBD) and “The International Treaty on Plant Genetic Resources For Food and Agriculture, 2001, (ITPGRFA). Of these international instruments, very significant ones are the TRIPS and UPOV which provides for the fundamental provisions and enables the member states to provide intellectual property protection in the field of agriculture.

5.1 UPOV and Plant Variety Protection

“The Union Internationale pour la Protections des Obtentions Vegetables” or “International Union for the Protection of New Varieties of plants” is a multilateral treaty for plant variety protection. The treaty is administered in cooperation with the WIPO. UPOV Convention enables a uniform standard for the scope and extent of rights of plant breeders. The convention was signed in the year 1961 and the final version was given shape in the year 1991. At present there are 78 members to the UPOV¹⁶. The mission statement of the UPOV is as follows, “To provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society”¹⁷. The current provisions widen the scope and ambit of breeder’s rights but restricts farmer’s and researcher’s exemptions providing for longer term of protection for species or genera of plants. The status of membership to UPOV reveals that the participation of world nations especially with regard to developing nations to UPOV is inadequate¹⁸.

5.2 TRIPS as a tool for IPR implementation across the globe

The Agreement on Trade Related Aspects on Intellectual property Rights (TRIPS), is a milestone in promoting trade and commerce in the domain of intellectual creativity and

¹³ Michael Blakeney, “Protection of Plant Varieties and Farmers’ Rights”, 24(1) European Intellectual Property Review, 2002, pp.9-19, at 9.

¹⁴ Patricia Lucia Cantuaria Marin, *Providing Protection for Plant Genetic Resources Patents Sui generis System and Bio-partnerships* (New York: Kluwer Law International 2002) at 49.

¹⁵ Jayashree Watal, “Intellectual Property Rights in Indian Agriculture Indian Council for Research on International Economic Relations”, July, 1998,

¹⁶ <https://www.upov.int/export/sites/upov/members/en/pdf/status.pdf>, status as on 18th September, 2022. last visited 01, May, 2023, 08.15 pm,

¹⁷ <https://www.upov.int/about/en/mission.html>, last visited 01, April, 2023, 09.00 pm,

¹⁸ Diversity Vol. 13, No. 2 and 3, 1997, p.3



knowledge-based activities, thereby resolving disputes relating to intellectual property and allied matters. This also ensures the members of World Trade Organisation (WTO) to pursue their goals towards economic development¹⁹. The concept of trade was given a wider scope beyond transporting and shipping goods across the frontier after the emergence of TRIPS in the global arena. Innovation and creativity add value to the international trade in the contemporary trend. The major concern lies in enhancing the value and provide for the flow and exchange of knowledge across the borders. The TRIPS in this regard play a vital role in facilitating the above-mentioned tasks. It further resolves trade disputes relating to intellectual property and assures WTO members towards achievement of their domestic objectives. Hence it is an effective legal instrument providing a link between intellectual property and trade and commerce related activities. As rightly defined by the TRIPS “Intellectual property refers to creations of the mind”²⁰. The creations mentioned may be in the form of artistic expression, marks, names, symbols etc, used in trade and inventions. The state can confer the right on the inventor or the author of the particular item to commercially exploit the product to the exclusion of others giving the author a complete monopoly to use them. Intellectual property rights can be granted by way of copyrights, patents, trademarks, geographical indications, and industrial designs. TRIPS agreement attempts to bring the entire intellectual property rights protection under a single umbrella of international rules. It further establishes certain “minimum standards of protection” and enforcement measures for each member nations that need to be observed towards fellow World Trade Organisation (WTO) members. TRIPS provide a proper platform and the base for the member nations to suitably amend and implement their needs towards achievement of public goals. It provides abundant scope for members to strike balance between the long - term benefits and short-term costs towards intellectual property. Member nations can cut their short-term costs by following the mechanisms allowed under TRIPS. World Trade Organisation’s dispute settlement system also exists for trade disputes.

5.2.1. Scope and ambit of TRIPS

TRIPS agreement provides for the following areas relating to intellectual property protection.

- a. Defining the scope of provisions related to multilateral trading system to international intellectual property and their interface.
- b. Indicating the minimum standards of protection to be provided by the member nations.
- c. Clarifying the procedures that members are obliged to provide for enforcement of rights in their nation.
- d. Ways to settle disputes relating to intellectual property among the members of WTO.
- e. Implementing TRIPS provisions by laying down special transitional arrangements.

TRIPS agreement requires the members to provide for protection of plant varieties through patents or through a “sui generis” system for plant variety²¹. It had not specifically mentioned about adherence of member nations to UPOV convention. The extent of intellectual property protection under TRIPS is very clear allowing patent protection for microorganisms, non-biological and microbiological processes involving production of plants and animals and excluding patent protection for plants and animals produced through biological process²².

6. U.S. And The Ipr Of Plants

United States Congress had passed the “U.S. Plant Variety Protection Act, 1970” to primarily encourage the growth and development of new varieties of crops and to put it into the use of general public. The Act also provides for the payment of royalties to the farmers which in turn

¹⁹ https://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm7_e.htm, last visited 02, May, 2023, 04.15 pm,

²⁰ *ibid*

²¹ Art. 27(3)(b) of TRIPS.

²² <https://icrier.org/pdf/jayashreew.pdf>, last visited 02, May, 2023, 04.15 pm,.



offers funds for the research activities that lead to developing new varieties. The protection enables the collection of royalties that, in turn, provide funding for development of other new varieties. The Act benefits the consumers at large and promotes agricultural developments in all segments. The position in U.S. prior to 1970 was majorly through the public finance institutions. New varieties resulted in increased crop yield and enabled farmers to harvest crops without the threat of pest attacks and losses that occur incidentally²³. The major issue was the funding for variety and research involved in it. Not much activity was carried out in developing new varieties hence, it necessitated the enactment of “The Plant Variety Protection Act, 1970”. The Act enabled the owner of the variety to collect royalties so that constant funding for plant variety development could flow. Both public and private institutions are developing thousands of varieties of plants. However, pitfalls in implementation of the Act had been experienced and the Act was amended in the year 1994 followed by the decision of U.S. Supreme court in the year 1995 which had brought remarkable positive effects in implementing the Act²⁴. In addition to this, plant patents are being granted through Patents Act, on July 19, 1952²⁵. Chapter 15 of the Act through sections 161 to 164 provides for patents for plants²⁶, description and claims relating to it, the grant of patents and provisions for assistance of department of Agriculture.

6.1. Subject Matter of Plant Variety Protection in the U.S.

U.S. confers three types of intellectual property protection for breeders to obtain their plant variety protection. U.S. had become a party to UPOV convention on 22nd February, 1999²⁷. The three categories of plant variety protection are ‘plant patents’, ‘utility patents’ and ‘plant variety protection’²⁸. Information which is considered as a valuable information of Plant breeders are also protected through trade secrets. The “United States Patent and Trademark Office (USPTO)” is the appropriate office to grant plant patents for plants that qualify the novel, distinct criteria for asexually reproduced ones. Inventions related to genes, traits, method of application and plant parts are subject matter of patent grant. A term of 20 years from the date of filing is being granted for the protection of plant patents. The Plant Variety Protection Office (PVPO) under the U.S. Department of Agriculture offers certificates of plant variety protection to the breeders who had bred new variety of seeds, tubers and plants that are propagated asexually. The protection conferred on the varieties is for the period of 20 years and 25-year protection is given for vines and trees. The chain of protection and intellectual policy development is well coordinated among the government agencies, the USPTO and PVPO. The owner conferred with plant variety rights enjoy an exclusive legal right to market, sell and manage the use of their varieties in relation to other breeders.

²³ <https://datcp.wi.gov/Documents/BrownBagSeed.pdf>, last visited 03, May, 2023, 06.00 pm

²⁴ *ibid*

²⁵ <https://www.govinfo.gov/content/pkg/USCODE-2011-title35/html/USCODE-2011-title35.htm>, last visited 05, May, 2023, 04.15 pm

²⁶ §161. Patents for plants

Whoever invents or discovers and asexually reproduces any distinct and new variety of plant, including cultivated sports, mutants, hybrids, and newly found seedlings, other than a tuber propagated plant or a plant found in an uncultivated state, may obtain a patent therefor, subject to the conditions and requirements of this title. The provisions of this title relating to patents for inventions shall apply to patents for plants, except as otherwise provided.

²⁷ <https://www.bakermckenzie.com/en/insight/publications/guides/-/media/files/insight/publications/2020/05/baker-mckenzie-plant-variety-rights-summary.pdf>, last visited 03, May, 2023, 07.15 pm

²⁸ <https://www.uspto.gov/ip-policy/patent-policy/international-convention-protection-new-varieties-plants-upov>, last visited 04, May, 2023, 08.15 pm



6.2 Differences between plant patents and plant variety protection

Both the Plant Patents Act and The Plant Variety Protection Act are entirely different in its ambit and applicability. The requirements for a Plant Patent are not as stringent as the utility patent²⁹. The description requirement for a plant patent is not strictly followed as required for a utility patent. The Plant Variety Protection Act mandates for a description of a variety which is distinct, uniform and stable. It also requires a description of genealogy and breeding procedure, when known³⁰. The Act also requires the seeds to be deposited in public depository³¹. Whereas the utility patent holders receive considerable rights of exclusion than the plant variety protection certificate holders. Under a utility patent, there are no such seed saving or exemptions for research³². The Plant variety certificate is not that much broader as the utility patent with regards to the scope for protection of the rights of holders. A breeder can make use of a plant that is protected by the plant variety to develop new inbred line, whereas this could not be done for a plant patented under Section 101³³. Hence it could be said that patents provide much effective protection as they do not provide for researcher's exemptions and farmer's privilege. In *Pioneer Hi-Bred International Vs. Holden Foundation Seeds Inc*³⁴, it was held that the district court was right in inferring trade secret misappropriation of a genetic make-up of seed corn, based on finding that seed sold by the defendant was derived from plaintiff's parent seed. The court of law finally held that the Plant Variety Protection Act does not pre-empt trade secret claims and had affirmed a \$46 million damages to the plaintiff.

Another landmark judgement of *Monsanto Co. Vs. Mc Farling I*³⁵ the U.S. Federal Circuit made a clear distinction between "farmer's rights" prevalent in the Plant Variety Protection Act and the Patent Act by stating that "The right to save seed of plants registered under the Plant Variety Protection Act does not impart the right to save seed of plants patented under the Patent Act".

In spite of the difficulties that are faced for obtaining patents, there is a sharp increase in applications for utility patents, due to the strong protection accorded for the patent holders³⁶.

6.3 Legislative back up for IPR in agriculture in the U.S.

The Plant Variety Protection Act, 1970 provides for establishing an office called as the "Plant Variety Protection Office" in the Department of Agriculture³⁷. Another provision vide Section 7 provides for the constitution of "Plant Variety Protection Board". Board consists of experts as members in areas pertaining to development of varieties mentioned in this chapter. Membership includes farmer representation that are numbered equally from private seed sector industry and from public sector organisation. The Secretary will preside over the meetings. The functions of board shall include advising the secretary regarding the adoption of rules and regulations for facilitation of proper administration of the provisions of the Act, hearing all advisory decisions through appeals from examiners. The Act also defines core terms like 'asexually reproduced', 'basic seed', 'breeder', 'essentially derived variety', 'seed', 'variety', 'distinctness', 'publicly known varieties' and other terms through Section 41. Protectability of plant varieties as laid down in section 42 says that the variety must be new, distinct, uniform and stable in order to qualify for

²⁹ 35 U.S.C. 162 DESCRIPTION, CLAIM. "No plant patent shall be declared invalid for noncompliance with [section 112](#) if the description is as complete as is reasonably possible. The claim in the specification shall be in formal terms to the plant shown and described."

³⁰ 7 USC S. 2422(2)

³¹ 7 USC S.2422(4)

³² Elizabeth Verkey, "*Law of Plant Varieties Protection*", Eastern Book Company, 2007.

³³ 7 USC S. 2541 (a)(4)

³⁴ 35 F.3d 1226

³⁵ 302 F.3d 1299 (Fed. Cir.2002).

³⁶ Elizabeth Verkey, "*Law of Plant Varieties Protection*", Eastern Book Company, 2007.

³⁷ <https://uscode.house.gov/view.xhtml?path=/prelim@title7/chapter57&edition=prelim>, last visited 05, May, 2023, 11.15 pm.



a protection. Chapter 5 of the Act through sections 51 to 57 provides for the details of application for parties or breeders and the effect of death or incapacity of breeders. Other provisions discuss about the examination of applications, provisions relating to appeals and certificates issued for the plant variety protection.³⁸ In addition to it Plant Patents Act, grants plant patents to the inventor or discoverer of ‘asexually reproduced’ plant variety which is distinct and new other than tuber propagated ones in an uncultivated form.³⁹

6.4. Infringement and remedies under the Act

Section 111 of the Act provides for infringement of plant variety protection. It explains that the unauthorised usage involving sale, marketing the protected variety, and any other associated acts, prior to expiration of plant variety protection right, importing or exporting the protected variety into or from U.S., sexually multiplying, propagation by tuber as a step involved in marketing. Other acts are using the variety for a hybrid or unique variety out of it, using seeds with the label “unauthorized propagation prohibited” or “unauthorized seed multiplication prohibited”, dispensing the said variety to another form that can propagate, conditioning the variety for propagation excepting conditioning permitted under Section.113, stocking the variety for purposes mentioned under this Act, performing any of the above mentioned acts without obtaining a plant patent where the variety is multiplied other than by sexual means and lastly instigating or inducing performance of the foregoing acts. Section 114 of the Act also protects the user from infringement action the usage and reproduction of a protected variety intended for plant breeding or ‘bonafide’ research purposes.

The Act also lays down remedies for infringement of plant variety vide Section 121. The owner is given a remedy for infringement of the protection under Section 111 by way of a civil action, an injunction as in Section 123. This relief is granted keeping in mind the principles of equity preventing further damage to the parties on terms as the court deems just and reasonable. Consequently, the court also awards damages on finding that infringement had taken place but the damages shall not be less than the reasonable royalty together with interests and costs may be awarded by the courts of law. The Act also raises a prima facie presumption that the variety if sold in the name of the variety in the certificate that is protected, as the same variety would amount to infringement. However, the Act provides for defences for the act of infringement. They are non-infringement, invalidity of protection of variety as a result of suit established on the grounds mentioned in Section 52, infringement being done under a certificate adverse to the asserted one and acts done prior to the notice of infringement and any other acts allowed under this Act. The courts allow experts testimony also for the determination of royalty and damages for the infringement. With respect to the act of infringement prior to issuance of certificate, the court shall award damages as per its discretion protecting innocent intentions of the party. In *Armstrong Nurseries, Inc. Vs. Smith*⁴⁰, the defendant in this case was held to have induced infringement by providing the direct infringer with budwood from patented roses.

7. Plant Variety Protection Certificates Granted In The U.S.

S.No.	YEAR	PLANT VARIETY CERTIFICATES (SEMI REGULAR BASIS)
1.	2021	475
2.	2022	435
3.	2023 (As on 28.04.2023)	150

³⁸ <https://www.upov.int/export/sites/upov/members/en/npvlaws/usa/uspvpa.pdf>, last visited 04, May, 2023, 09.15 pm

³⁹ <https://www.uspto.gov/patents/basics/apply/plant-patent>, last visited 08 May, 2023 , 11.16 a.m.

⁴⁰ 170 F. Supp. 519 (E.D. Tex. 1958).



The above table shows the plant variety protection certificates granted from the year 2021 to 2023⁴¹.

8. Plant Patents Granted In The U.S.

S.No.	YEAR	PLANT PATENTS APPLICATION	PLANT PATENTS GRANTED
1.	2015	1,140	1,074
2.	2016	1,177	1,235
3.	2017	1,059	1,311
4.	2018	1,079	1,208
5.	2019	1,134	1,279
6.	2020	1,171	1,398
7.	2021	--	1,256 ⁴²
8.	2022	918	1138 ⁴³

The above table indicates the plant patents granted from the year 2015 to 2022.⁴⁴

9. Findings Of The Study

Thus, from the above study, the authors find that the U.S. had witnessed phenomenal growth in the field of agriculture and the allied activities. Transition that took place from the traditional mode of agricultural practices to the modern techniques had indeed proved beneficial for the stake holders and the entire world population. The author further infers from the above-mentioned data in the table that there is a slight decrease in the plant variety protection granted to the farmers and the breeders in the year 2022 where it came down to 435, while it was it was 475 in the preceding year, 2021. As far as plant patents are concerned, there is a steady increase from the year 2015 to 2017. There was a sudden decrease in the grant for the year 2018 and a sharp increase till 2020. However, there was a decline in the grant for the year 2021 and 2022. However, considering the overall scenario the author finds that the awareness among the breeders and the inventors to seek intellectual property protection in the U.S. either through plant variety protection or plant patents had increased multi fold which had in turn facilitated them to innovate new ideas for enhancing agricultural operations.

CONCLUSION

Agriculture of the contemporary times pose several challenges due to the decreased availability of total cultivable lands, usage of fertilisers and pesticides for farming⁴⁵. The major drawback in carrying out research in agricultural sector is the non-availability of sponsor for funding them. The U.S. government had enacted a legislation "Bayh - Dole Act, 1980" and got implemented in the year 1981. The main aim of the Act is to allow public research organisations to invent by using Federal research dollars to hold the title of their inventions. The primary constraint is the existence of possibility of a backlash with respect to intellectual property protection for living organism and food production. Even if this is granted, this could be driven by public perceptions in a negative sense. Time is ripe to provide opportunities for smaller entities by

⁴¹ <https://www.ams.usda.gov/services/plant-variety-protection/issued-certificates>, last visited 13.05.2023, at 02.47 p.m.

⁴² <https://www.statista.com/statistics/256586/number-of-plant-patent-grants-in-the-us/>, last visited 12, May, 2023, 05.11 pm

⁴³ <https://www.lexology.com/library/detail.aspx?g=1170d66d-63b8-4901-b819-e88c67916a2f>, last visited 13, May, 2023, 11.10 am

⁴⁴ https://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.htm, last visited, last visited 13, May, 2023, 11.01 am

⁴⁵ <https://www.ecofarmingdaily.com/build-soil/farming-improve-soil-health/> last visited 03, May, 2023, 10.15 pm



harmonising the current intellectual property systems. Private investment is driven for the reason that there is a guaranty in protection, especially in cases of pulses⁴⁶. This scenario will witness an increase in research and development activity. Public sector undertakes the basic research whereas private organisations carry on with applied aspects. U.S. provides for a robust legislation for plant variety protection and in addition to it, patent protection for the inventions related to plants called as “utility patents” is also provided. However, the technical difficulties in accessing and applying for the patents due to the multiplicity of the process exists which could be made simple for free flow of technology. Thus, it could be rightly said that U.S. being the member of UPOV, had effectively implemented the plant variety protection and the grant of patents, thereby promoting the field of research and enhancing the quality of agriculture. Amidst the widespread agitation, which happened in other parts of the world for granting patents to the plants, U.S. had successfully implemented and granted the patent protection for plants. After nearly eight decades, the US economy with respect to agricultural sector had grown 24 times, resulting in the farm sector getting consolidated, down to 2.1 million farms for 446 acres in size⁴⁷. Broader market changes had paved the way for emergence of intellectual property generally and intellectual property pertaining to plant varieties in particular. Thus, benchmarking these intellectual property rights forms a basis of dealing with the legal, scientific and market forces in the U.S. This could also have an impact on the international trade and treaties entered into by the nation. U.S. in the near future will make necessary amendments to simplify the process and procedures for obtaining the patents for plants.

ACKNOWLEDGEMENT

We would extend our sincere gratitude to the SASTRA Deemed to be University, Thanjavur, for providing us with valuable resources which helped us complete the article. I am grateful to my Research supervisor, Dr.Pujari Ravisekhara Raju, The Dean, School of Law, SASTRA Deemed to be University, Thanjavur for his encouragement and support towards this work. I would also extend my heartfelt thanks to my family, colleagues and friends without whose inspiration and care, this work would not have been possible.

REFERENCES

- [1] UPOV Convention, The Union Internationale pour la Protections des Obtentions Vegetables” or “International Union for the Protection of New Varieties of plants
- [2] Carlos Correa, “*Trade Related Aspects of Intellectual Property Rights: A Commentary on the TRIPS Agreement*”, 2007.
- [3] The International Undertaking on Plant Genetic Resources (IUPGR)
- [4] The U.S. Plant Variety Protection Act, 1970
- [5] The U.S. Patents Act, 1970
- [6] Elizabeth Verkey, *Law of Plant varieties Protection*, Eastern Book Company, 2007.
- [7] S.Thippeswamy, “Plant Variety Protection: A Historical Perspective”, *International Journal of Development Research* pp. 16839-16840, 2017
- [8] Convention on Biological Diversity Act, 2002.
- [9] “The International Treaty on Plant Genetic Resources For Food and Agriculture, 2001, (ITPGRFA).
- [10] Marrakesh Agreement for World Trade Organisation, (Annexure 1C).
- [11] Bayh - Dole Act, 1980

⁴⁶ <https://krishi.icar.gov.in/jspui/bitstream/123456789/703/1/pb10.pdf>, last visited 05, May, 2023, 09.15 pm

⁴⁷ “*The evolving landscape of plant varietal rights in the United States, 1930–2008*”, Philip G Pardey, [Bonwoo Koo](#), [Jennifer Drew](#), [Jeff Horwich](#), and [Carol Nottenburg](#), , *Nat Biotechnol.* 2013 Jan; 31(1): 25–29. doi: [10.1038/nbt.2467](https://doi.org/10.1038/nbt.2467),



- [12] World Intellectual Property Organisation, “The Economics of Intellectual Property” (WIPO, 2009).
- [13] Law Relating to Intellectual Property Rights, V.K.Ahuja,
- [14] Edition: 3rd Edition, 2017.
- [15] “The International Undertaking on Plant Genetic Resources (IUPGR)”, 1983
- [16] Antony Taubman, Hannu Wager, and Jayashree Watal, “A Handbook on the WTO TRIPS Agreement.