

## Patent Trends in ICAR institutes - A Review

Archna Suman† and Divya Pandey

Institute Technology Management Unit, Indian Agricultural Research Institute, Pusa Road, New Delhi, India

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There is growing awareness amongst research institutes, though comparatively feeble and less competitive than the fierce corporate world, in filing and protecting their intellectual property rights. The article highlights statistics that will help identify and address patent protection matters and related issues. The current study provides a glimpse into the status of patent grants in the Indian Council of Agriculture Research (ICAR) institutes addressing all forms of plant and animal research and presents an overview. Areas of agro machinery, agrochemicals, food and dairy technology have the maximum number of innovations patented in the last decade with IARI being the top applicant and grantee.

**Keywords:** Intellectual property rights, agriculture, patent, patent portfolio, ICAR institutions, Indian Patents Act

India's patent regime has once again come into focus following the proposed US Chamber of Commerce's Global Intellectual Property Centre (GIPC) index.<sup>1</sup> Although the raging debates have more to do with the pharmaceutical sector with focus on the recent issuance of a compulsory licence; concerns have been raised about India's overall commitment to promoting innovation and continuing on its path towards creating a knowledge-based economy. This article attempts to illustratively examine the patent trends in Indian Council of Agriculture Research (ICAR) institutes with a view to identify the technology trend dominating the agricultural sector in India and further help assess the value of research and its protection. The patents granted to ICAR institutes for various innovations are spread all across the country and date back to 1957. Of several patent applications filed, about nineteen patents were granted to the various research institutions of ICAR in the 50 year period from the year 1950 to 2000 (ref. 2). The numbers have significantly improved over the years owing to the rising awareness amongst researchers and other professionals and the research trends.

Effective implementation of intellectual property rights (IPRs) related legislation in place have and continue to have a significant impact on the course of agricultural R&D in the country. The modifications in legal provisions and national policies over the years have resulted in increased public-private partnership

in agricultural R&D and far more public private relationships have been formed. The general trend observed is that both competition and cooperation in the areas of relevance are increasing in these segments.

Technology based businesses like agribusiness use intellectual property as an essential legal instrument to charge a stream of innovative products from research and development. Production, protection, commercialization and incorporation of intellectual property (IP) in improvement of national developmental strategies has been crucial in defining the role of India in the world market on one hand and overcoming deprivation and hunger within the country on the other. Although, India is no more a food deficient country, climate change continues to pose a major challenge to agriculture and hence the country needs a climate resilient development strategy. Areas seeking technology innovation and upgradation are mechanization of small farms to mitigate labour shortage and develop energy efficient farm equipments with use of renewable energy models like solar power. At the same time, it is equally important to focus on developing suitable post harvest technologies to reduce farm wastage and contribute in the development of agro-processing.

Intellectual property management in agriculture requires broad portfolio management that includes the fundamental need to link IPR protection with licensing, technology transfer, up-scaling and commercialization. Patents, plant variety protection, copyright, trademarks, designs, trade secrets and

†Corresponding author: Email: archsuman@yahoo.com

geographical indications are all significant IP rights in the agricultural sector. Although patents are the most common form of IPR in the manufacturing sector, most countries like India do not allow 'plant patents' which is understandable as in this case temporary market power may disrupt food supplies, food prices or national food security. In general, patents in agriculture are for processes related to agrochemicals, growth promoters and regulators, vaccines, drugs, hides and wool, dairy technology, food technology, fuel and biogas production, bioreactors, standardization of various laboratory protocols, environment management, etc. However, there are certain restrictions under Section [3(h), 3(i) & 3(j)] of the Patents Act, 1970 related to grant of agricultural inventions.<sup>3</sup> Amongst the Indian scientific research and development organizations CSIR, DRDO and ICAR form the three of the top Indian patent applicants according to the recent annual report of the Indian patent Office.<sup>2</sup> The Indian Council of Agricultural Research has accomplished effective acceleration in the growth of commercializable R&D by increasing the number of patents filed from 35 in 2008-09 to 51 in 2010-11. About 94 patents were filed in the year 2011-12 that is about twice the number of applications filed than its previous year, although in the following year the count dropped down to 68 showing a deceleration.<sup>2</sup>

### Methodology of the Study

The present study seeks to compile and examine all the patents granted to the various ICAR institutes, from its first grant in 1957, with a view to identify IPR awareness trends as well as the different technologies that have been focused on and considered worthy of protection.

The patent applications filed between 1957-2000, 2000-2005, 2005-2010 and 2010 onwards and eventually granted were studied as regards to percentage of grant, technology area, status, etc.

The patent portfolio of ICAR's various institutes was assessed by identifying the technologies that have been protected by patents. The Indian Patent Office database was used to obtain details of the patents applied for, those granted, their status, etc. This was expected to reveal the breakthroughs, the direction in which technology was headed and future requirements. The status of the number of applications filed could not be appropriately deduced from the database alone because it only displays the

published applications whereas there may be others that are not yet published. All the granted patents were studied for their content and categorized in what was the most easily perceived mode. This helped identify the course and various fields of research. The patents were also classified on the basis of their inventor institutes that helped recognize the major contributors to the ICAR patent portfolio. The number of patents expiring in the near future has also been discussed establishing the fleeting nature of patents.

### ICAR's Patent Portfolio

The patent applications that survived the test of novelty, applicability and industrial use went on to be granted patents, many of which have completed their 20 year term and entered public domain. Inventions that find use in the leather industry, fibre and rubber industry, paint and wood technology like the preparation of fat liquors from non-edible oils, production of enhanced and durable fibres, production of durable, antibacterial fabrics, emulsion paints, particle boards etc., were protected in the early decades by ICAR. For instance, one invention describes the preparation of fat liquors from indigenous non edible oil like sardine fish oil by sulphating the oil under suitable conditions. This obtained product is used for the treatment of leather goods known as fat liquoring, making them abrasion free. Another invention discusses a chemical finishing process where peroxide binding is imparted to cotton fabrics in presence of zinc acetate analyst. The fabric after impregnation, drying and curing exhibits excellent bacteriostatic activity durable to launderings. One portable instrument for measuring the fineness of jute fibres without using electricity and a seed cum fertilizer drill intended to be used with conventional animal drawn country wooden plough were inventions in the category of agro machinery. Another mechanized arrangement amongst those granted patents was known as a conical process vat to perform heating, cooling, mixing & concentrating unit operations involved in the manufacture of dairy products. In the entire period studied, 19 patents were granted of those applications filed in the first 50 years between 1950 and 2000, while 28 patents were granted of those filed in the five years between 2000 and 2005 and 15 patents of those applications filed between 2005 and 2010. None of the applications filed by ICAR institutes after 2010 have been granted so far.

The number of applications filed up to 2000 and hence the number of patents granted among those is small because of lack of IPR awareness as compared to now and limitations in the patent regime almost about until the year 2000 regarding the selectivity of patentable inventions.

However, things were set to change after the implementation of the amended Patent Act in compliance with the TRIPS Agreement. The TRIPS Agreement (Article 65) required the incorporation of product patents in the areas of food, chemistry, biotechnology, etc., in India and other developing countries with a view to harmonize patent protection at the global level. A period of about ten years from 1995 to 2005 was provided to implement the transition during which a 'mail box' provision was temporarily established to receive such applications. Thus, the number of applications filed between 2000 and 2005 was large in anticipation of the new law as observed from the number of those applications granted in the following years. The crucial amendment in the Patents Act, 1970 was relating to Section 3(i) which held the process of medicinal, prophylactic, surgical, curative, etc., treatment of plants and animals as non-patentable subject matter. The phrase 'or plants' was omitted by the Patents (Amendment) Act (2002).<sup>4</sup> This allowed agrochemicals, plant growth promoters, disease control techniques and other similar innovations to be accepted as patentable subject matters. The favourable amendments in the patent law along with increased awareness led to renewed interest in agriculture patents.

As far as the patents applied for between 2005 and 2010 is concerned, some of them may still be pending acceptance which is why the number is low. And given the pendency of patent applications at the Indian Patent Office, it is not surprising that none of the patent applications filed after 2010 have reached the point of grant as yet. Many of the ICAR patent applications are still awaiting acceptance at the patent office according to the data available at the Indian Patent Office website.<sup>2</sup> Also the journey from the filing till the grant of a patent is a long process and takes quite many years. Many applications either do not reach the point of being in line for grant based on eligibility grounds or are not supported by the applicants and left midstream. Regardless the validity period of a granted patent starts ticking from the first date it was filed i.e. its priority date for a period of twenty years. Deducing from the data

above, most of the ICAR applications are set to expire between 2020 and 2025, provided they are maintained until then.

#### Technologies under Protection

Broadly the inventions for which patents have been granted fall in the categories of agrochemicals, agro machinery, food/dairy technology, environment management, jute & fibre technology, growth promoters and regulators, pest management, disease control, etc. The categories are based on the International Patent Classification (IPC) by WIPO. These inventions correspond to those filed in or after the year 2000, since these are the active patents, while those filed before them are already in open domain. The change in law and thus the increase in scope of the subject matter that can be patented, to comply with the TRIPS regime, has provided a big impetus to the intellectual property policy of ICAR as can be seen from the wide variety of technologies that is being protected. The percentage wise distribution of patents in various technology areas is depicted in Fig. 1.

An examination of the kind of inventions that have been granted patents and are still active, shows that the food and dairy technology is the major area followed by agrochemicals that include insecticides and post harvesting chemicals for increasing shelf life and the like. Almost equal in number are the inventions related to agromachinery, followed by environment management and so on. Some inventions that ease the burden of agricultural pre and post harvesting practices are Pusa coring device for removing cores of apple and pineapple, a manually

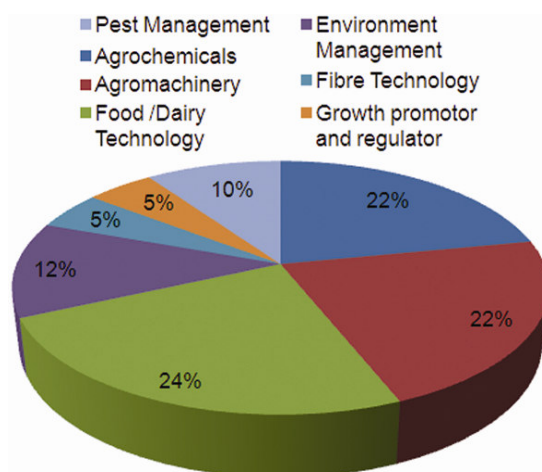


Fig. 1 – Patents granted to ICAR institutes: Major classes of technology

operated tender coconut cutter, a coconut deshelling machine, planting machinery called Pusa seed cum fertilizer disc, mechanical & non-mechanical oil expellers, machine for chopping and crushing water Hyacinth etc.<sup>5-7</sup>

The whey-mango beverage having a longer shelf life, classified as a food technology under this study is an example of a very effective innovation. The whey proteins present in whey are not stabilized which results in denaturation of whey proteins and hence these beverages are nutritionally poor. The sterilization of whey-based beverages was not possible due to destabilization of whey proteins during sterilization. The invention addressed the problem by devising a method to stabilize the whey proteins enabling the production of whey-mango beverage in sterilized condition.<sup>8</sup> The preparation of low cholesterol ghee and the process for preparation of spray dried cheddar cheese flavour are also some of the techniques that resulted from R&D in the food sector.<sup>9,10</sup> Biopesticidal formulations, photostable insecticides like Azadirachtin A, a technique of detection of transgene CryIAC responsible for insect resistance are some of the inventions falling in the domain of insect and pest management.<sup>11-13</sup> Environmental solutions include inventions like the development of product from lignocellulosic agro waste from wheat operation for the effective removal of heavy metals in the environment.<sup>14</sup> A low cost matrix and the process developed for the immobilization of bacterial biomass has an application in the field of bioremediation. Other important inventions that were granted patents are novel superabsorbent cellulosic hydrogels, plant growth regulators for hybrid seed production, a PCR based method for differentiating cow and buffalo milk by detecting segments of mitochondrial genes, a kit for diagnosis of Brucellosis in small ruminants like sheep and goat and many more.<sup>15,16</sup>

#### Limitations due to the Patent Protection Regime

There still remain certain categories of technology in which patents cannot be obtained due to their being non-patentable subject matter as per Indian Patent Act. Of these, many of them are relevant to the agricultural sector, but the following sections are quite significant:

(i) As per Section 3(d) of the Act, “the mere discovery of a new form of a known substance which does not result in the enhancement of the known efficacy of that substance or the mere discovery of

any new property or new use for a known substance or of the mere use of a known process, machine or apparatus unless such known process results in a new product or employs at least one new reactant”<sup>4</sup> is not patentable. This is important to the protection of agrochemicals in general.

(ii) Section 3(h) provides that a method of agriculture or horticulture is not patentable.<sup>4</sup> Some examples of processes the likes of which are not inventions under the Indian Patents Act are, a method of producing a plant, even if it involved a modification of the conditions under which natural phenomena would pursue their inevitable course (for instance a green house); a method of producing improved soil from the soil with nematodes by treating the soil with a preparation containing specified phosphorathioates; a method of producing mushrooms and a method for the cultivation of algae; and so on.<sup>17</sup>

(iii) According to Section 3(j) plants and animals in whole or any part thereof other than microorganisms but including seeds, varieties and species and essentially biological processes for production or propagation of plants and animals are not patentable.<sup>4</sup>

The above areas are those in which patents cannot be obtained in India although they may be areas in which the various ICAR institutes could be working but cannot be assessed on the basis of the patent portfolio.

#### ICAR: Technology Management and R&D

The Council is the apex body for coordinating, guiding and managing research and education in agriculture including horticulture, fisheries and animal sciences in the country. It has more than a hundred ICAR institutes and agricultural universities spread across the country. All of these have assigned their IP rights to the main governing body thereby encompassing the cumulative patent records in ICAR’s patent portfolio. The institutes’ R&D has generated productive methods, technologies and products worth commercializing affecting the nation’s economic development on the whole. National as well as foreign licensing patterns have been established which help return the value of the intellectual derived innovations. Table 1 shows the various institutions of ICAR which have been granted patents giving an idea of the breakthrough attained by each of them reflecting in a

Table 1 — The number of patents granted to the ICAR institutes from 2000 till present

Institute	Granted patents
IARI (Indian Agricultural Research Institute, New Delhi)	13
CIBA (Central Institute of Brakishwater Aquaculture, Chennai)	2
CIFA- Central Inland Fisheries Research Institute, Barrackpore	2
CIPHET (Central Institute on Post Harvest Engineering & Technology, Ludhiana)	6
CPCRI (Central Plantation Crops research Institute. Kasargod)	2
CSWCRTI (Central Soil and Water Conservation Research and Training Institute, Dehradun)	1
CPRI (Central Potato Research Institute, Shimla)	1
CTRI (Central Tobacco Research Institute, Rajahmundry)	1
IVRI (Indian Veterinary Research Institute, Izzatnagar)	4
NBPGR (National Bureau of Plant Genetic Resources, New Delhi)	2
NCIPM (National Centre for Integrated Pest Management, New Delhi)	2
NDRI (National Dairy Research Institute, Karnal)	4
NIRJ&FT (National Institute of Research on Jute & Allied Fibre Technology, Kolkata)	2

way the quantum of efforts made for meaningful and commercially applicable technologies.

### Conclusion

The intellectual property protection world is huge, demanding and constantly changing and in order to keep abreast researchers must be aware of the research strategy adopted to return value for their intellect and time utilized. There can be two strategies: first, to identify the white spaces or the blanks in the technology areas that are yet to be monopolized and second, to identify from the existing research studies, options that are commercially viable and effectively eligible for patent protection. Amongst the various institutes of ICAR, the centrally located IARI has in its bag the maximum number of patents and assumedly the maximum number of applications filed until now. Its history, capability and mandate are perhaps major contributors. Intellectual property rights are not just attained by the grant of the patent alone, subsequent maintenance and prosecution and enforcement of IP rights are equally important. Post filing and post grant efforts when monitored properly help gain deserved and better benefits. This will not only strengthen the patent portfolio of the organization but also help establish a strong patent regime in the country.

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