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Impact of Intellectual Property Rights on the Indian Seed Industry

M.S.Sidhu*

INTRODUCTION

As we all know, man is dependent for most practical purposes upon plants for his food. Plants are directly or indirectly the basis for virtually the whole of the nutrition of animals and men. Plants are also a major source of materials for shelter, clothing, fuel and drugs. The ornamental plants are responsible for beautifying man's environment. Man has long recognised the possibility of selecting amongst plants those which are best suited to his needs and this process has been responsible for the progressive domestication of many species. The systematic selection of plants to meet man's needs increased dramatically during the nineteenth century and in the course of the twentieth century has become, with the growth in the science of genetics, a science in its own right.

The objective of the plant breeder is to select within a species a type which, when grown under identical conditions to those under which a pre-existing type is grown, provides to an enhanced degree a particular desired characteristic whether this be yield, disease resistance, harvest stability, quality or in the case of ornamental plants, some decorative feature. The economic and aesthetic contribution of plant breeding to the well-being of man is for most purposes unchallenged. How this was the emerging activity of plant breeding organised and who was doing it? In earlier times, selection was performed almost unconsciously by the farmers selecting what they considered to be the best types as the seed parents for subsequent sowing. In Europe, in the nineteenth century, such selection was increasingly effected by farmers who took a particular interest in the performance of the crops which they grew and who either derived personal satisfaction and perhaps economic benefit from the resulting improvement or perhaps specialised in the production of superior seed as a feature of their farming business. At a later stage, some seed and nursery business pursued selection as an incidental activity of their business perhaps earning an enhanced profit for a short time by offering improved seed and plant novelties (Greengrass, 1993).

It may be noted that genetic variability provides the raw material for continuous advances in biological productivity. For example, a series of improvements in yield potential was rendered possible in rice through the use of new genetic material (Swaminathan, 1993). With the advent of biotechnology, genetic resources have become immeasurably more important. Some economic surveys have predicted that biotechnology alone would account for up to 50 to 60 per cent of the global economy in the next two or three decades. This has triggered a battle for the political and economic control of the world's most lucrative resources (Sahai, 1993). Keeping in view these implications, this study seeks to examine the impact of Intellectual Property Rights (IPRs) on the Indian seed industry.

* Economist (Marketing), Department of Economics and Sociology, Punjab Agricultural University, Ludhiana-141 004.

Database

The study is based on the Ph.D thesis of the author (Sidhu, 1996). Both primary as well as secondary data have been used. Regarding sources of seed in Punjab, information was collected from randomly selected 199 farmers for wheat, 102 farmers for paddy, 80 farmers for cotton (American), 49 farmers for rapeseed and mustard and 40 farmers in the case of potato.[1] The data were also taken from the Reports of the various Commissions/Committees/Expert Groups constituted by the Government of India from time to time.

RESULTS AND DISCUSSION

Trade Related Intellectual Property Rights (TRIPS) Agreement

The Eighth Round of General Agreement on Tariffs and Trade (GATT) was finally signed on April 15, 1994 by 125 countries including India which became effective from January 1, 1995.[2] The GATT accord on TRIPS gave rise to a whole lot of apprehensions in the country. The patenting of seeds and genes particularly generated a lot of controversy. The farmers were told that they would have to buy their seeds every year from the multinational seed companies like Pioneer, Sandoz, Cargill, etc.; they could not exchange seeds with the fellow farmers and so on. But a careful perusal of the GATT (1994) would reveal that some of these apprehensions may be unfounded.

The TRIPS agreement covered eight types of intellectual property, viz., patent, trademark, copyrights, industrial designs, integrated circuits, geographical indication, protection of undisclosed information and control of anti-competition practices in contractual licenses. Of these eight, it is only in the area of patents that most controversy surrounded in India. It is in this sector (TRIPS) of the GATT that the advanced countries have a distinct advantage and a decisive lead over the developing and the least developed countries and the subject of TRIPS had been brought in the gambit of GATT on the insistence of the industrial world by the U.S.A.

A patent is given for an invention. To qualify for a patent, an invention must satisfy three fundamental criteria, viz., it must be new, involve an inventive step and be useful in industry or agriculture. An invention would be regarded as new only if it is not known or used or made public anywhere in the world before the filing of the patent application. An invention would be regarded as involving an inventive step only if it would not have been obvious to someone with a good knowledge and superiority of the subject-matter.

Anything existing or previously known or used could not be given intellectual property protection. Therefore, neither neem, mango or tulsi, nor any other plant, tree or seed existing now could be patented or their use restricted in any manner by an intellectual property system (Ganesan, 1994 a).

The TRIPS agreement did not require us to patent seeds. However, we would have to establish an effective system for the protection of 'plant varieties', seeds and other form of propagation material called a plant breeders' rights (PBR) system. Under it, a plant variety would qualify for protection only if it fulfils definite criteria, 'novelty', i.e., it must be new, not known or sold or used previously, 'distinctiveness', i.e., it must be clearly distinguishable from any known existing variety, uniformity (i.e., it must breed true to its essential characteristics every generation).

We have to establish a PBR system by the year 2000. All the existing varieties of seeds and all new varieties of seeds that would come into the market till the PBR system is established, as well as all varieties of seeds for which protection is not sought or given under the new PBR system would not be affected. In the PBR system we establish, we are free to provide clearly for what is known as 'farmer's privilege'. This means that a farmer is completely free to use the farm-saved seed of a protected variety for growing subsequent crops either on his own land or on leased-in land or for traditional exchange in the village community. As long as the farmer continues to be a grain producer and does not convert himself into a 'commercial seed seller' of the protected variety, he would be unaffected by the PBR.

'New' varieties for which protection would be sought and given may be few in number. Most of the inter-farmer sales of seeds pertain to the existing non-protected varieties. Further, the question of farm-saved seed is relevant for self-pollinated crops, like wheat, paddy, etc. So far as hybrid seeds are concerned, the farmers even today buy the hybrid seeds from the seed companies because hybrid seeds lose vigour with successive cultivation of such crops (Sidhu, 1996).

Farmers' Sources of Seed

Cereal farms in developing countries often have three major sources of seed: seed purchased from a formal seed industry, seed obtained from other farmers and seed retained from the previous year's grain crop (Tetlay *et al.*, 1991). More than 85 per cent of the seed consumed in India was produced by the farmer himself (Banerjee, 1984). The data given in Table 1 clearly indicates that the farmers of agriculturally most developed states of the country used self-retained seeds to the extent of about 80 per cent, 62 per cent, 55 per cent, 59 per cent and 91 per cent in the case of wheat, paddy, cotton (American), rapeseed and mustard and potato respectively. The next important source was fellow-farmers. The quality of seed[3] obtained in a way was cheap for the farmers because they often resorted to barter system (Sidhu, 1996). Moreover, it involved no transportation cost and the fellow-farmers also did not insist on immediate cash payment. The share of the organised seed sector was meagre on account of high price of certified seeds and non-availability at proper places in time. The farmers also reported that there was insignificant yield differences between certified and self-retained seeds of various crops. Keeping these facts in view, the Indian farmers would continue to use self-retained seeds even in the TRIPS regime because the Indian seed industry is basically cereal-based. In the case of self-pollinated crops like wheat, paddy, etc., there is very slow degeneration in the quality of seed.

TABLE 1. SOURCES OF SEED FOR PRINCIPAL CROPS WITH THE SELECTED FARMERS IN PUNJAB, 1992-93

(*qtls.*)

Sr. No.	Source of seed	Crops				
		Wheat	Paddy	Cotton (American)	Rapeseed and mustard	Potato
	(1)	(2)	(3)	(4)	(5)	(6)
1.	Self-retained seed	663.53 (80.37)	45.43 (62.42)	38.03 (55.20)	1.06 (58.85)	6,859.90 (90.51)
2.	Fellow-farmers					
	(a) Quality seed	70.85 (8.58)	6.36 (8.74)	0.07 (0.10)	0.05 (2.78)	275.50 (3.63)
	(b) General seed	13.30 (1.61)	1.58 (2.16)	1.20 (1.74)	-	48.00 (0.63)
	(c) Sub total (a+b)	84.15 (10.19)	7.94 (10.90)	1.27 (1.84)	0.05 (2.78)	323.50 (4.26)
3.	Relatives					
	(a) Quality seed	4.80 (0.58)	-	-	-	60.00 (0.79)
	(b) General seed	0.50 (0.06)	0.50 (0.69)	-	-	-
	(c) Sub-total (a+b)	5.30 (0.64)	0.50 (0.69)	-	-	60.00 (0.79)
4.	Punjab Agricultural University	12.05 (1.46)	4.53 (6.22)	-	0.08 (4.44)	-
5.	Punjab State Seeds Corporation	14.35 (1.74)	2.17 (2.98)	-	-	-
6.	National Seeds Corporation	-	2.56 (3.52)	-	-	-
7.	State Farms Corporation of India	0.80 (0.10)	-	-	-	-
8.	Department of Agriculture	24.70 (2.99)	5.43 (7.46)	0.59 (0.86)	0.43 (23.93)	-
9.	Department of Horticulture	-	-	-	-	246.00 (3.25)
10.	Commission agents	-	-	9.16 (13.30)	-	-
11.	Central Potato Research Institute	-	-	-	-	18.00 (0.24)
12.	Cold Stores	-	-	-	-	72.00 (0.95)
13.	Seed dealers					
	(a) Authorised	2.40 (0.29)	2.51 (3.45)	0.35 (0.51)	0.10 (5.56)	-
	(b) Unauthorised	18.30 (2.22)	1.72 (2.36)	19.49 (28.29)	0.08 (4.44)	-
	(c) Sub-total (a+b)	20.70 (2.51)	4.23 (5.81)	19.84 (28.80)	0.18 (10.00)	-
	Total	825.58 (100.00)	72.79 (100.00)	68.89 (100.00)	1.80 (100.00)	7,579.40 (100.00)

Source: Sidhu (1996).

Agricultural Research and Development Programmes

At present, there is a well organised government seed research and distribution system, and a new entrant has to offer reasonably priced seeds of proven quality to break into the Indian seed market (Aggarwal, 1994). India has excellent plant breeding capabilities. The Indian Council of Agricultural Research (ICAR) is the apex organisation for sponsoring, co-ordinating and promoting plant breeding research in the country. There are 27 Agricultural Universities with strong base of agricultural research including plant breeding and genetics. Under the ICAR, there are 43 Central Institutes, 4 National Bureaus, 20 National Research Centres and 70 All-India Coordinated Research Projects. It may be mentioned that 2,078 high-yielding varieties (HYVs) of different crops had been released/notified in India by the end of 1993 under Section 5 of the Seeds Act, 1966. The public research institutes/organisations had already played an important role in this regard.

Realising the importance of plant genetic resources in crop improvement and the urgent need for their collection and conservation of the genetic diversity for current use and for posterity, the ICAR established the National Bureau of Plant Genetic Research (NBPGR) in New Delhi in 1976. The real strength of the Bureau emanates from the growing linkages with crop-based institutes, National Research Centres and Agricultural Universities. A national grid comprising base and active collections has been established by developing partnership and co-operative efforts. The NBPGR has 12 regional stations/base centres/research farms providing access to most representative agro-climatic regions of the country for collection, evaluation, conservation and distribution of plant genetic resources.

The Indian National Gene Bank has been established by NBPGR to conserve national heritage of germplasm collection in the form of seeds, vegetative propagules, tissue/cell cultures, embryos and gametes (NBPGR, 1993). The Bureau has a strong programme on in-vitro conservation and cryopreservation of a large number of plant species. The total accession under the long-term storage (-20° C) were about 1.17 lakh and medium-term storage (+4° C) were about 56,000 as on March 31, 1993. The grand total thus worked out to be about 1.73 lakh accessions. These figures reveal that India has a strong foundation for research on plants and genes.

Our crop improvement programmes have been acknowledged not only in India but in many of the developed and developing countries as evidenced by the cultivation of some of India's HYVs and hybrids at the global level. India's short duration and high sucrose varieties of sugarcane are in cultivation in more than 25 countries of the world (Randhawa, 1993). In fact, India has the distinction of developing the first cotton and pearl millet hybrids in the world. Development of regular bearing hybrids in mango, HYVs of coconut, cashewnut, arecanut and grapes are some of the classical examples of research achievements in horticulture and plantation crops.

Global Seed Sales

The global seed trade is highly concentrated in western industrialised countries. The global sales of improved seeds were estimated at US $ 18 billion (excluding socialist countries) during the year 1986-87 (Table 2). A major share of this trade is in the hands of 26 multinational seed companies, of which five each are of the USA and the Netherlands, seven are

of France, two each of Switzerland, Germany and Japan and three are of England. None of these companies belong to the developing countries like India. In the exports from the U.S.A., the most important exported seeds to developing countries are hybrid corn and sorghum, fodder crop seeds, seeds of soybean and vegetables. The seed exports from Europe consist of almost 50 per cent of seed potatoes and 30 per cent of vegetable seeds. The exports of seeds of basic food crops (rice, wheat, pulses) from industrialised countries are still very low, less than 2 per cent of total seed exports to developing countries (Grooseman, 1993). It may be mentioned here that Indian seed industry is cereal-based with a turnover of about Rs. 1,000 crores comprising mainly wheat and paddy seeds.[4] The multinational seed companies have little interest in these crops due to large volume and low value. Therefore, TRIPS regime will have little impact on the Indian seed industry which is cereal-based.

TABLE 2. ESTIMATED SEED SALES OF LEADING PRIVATE SEED COMPANIES, 1986-87

Sr. No.	Seed Company	Country of origin	Seed sales* (US$ million)	Proportion of global sales (percentage)
	(1)	(2)	(3)	(4)
1.	Pioneer Hi-bred	U.S.A.	800	4.4
2.	Sandoz	Switzerland	450	2.5
3.	Shell/Nickerson	U.K./Netherlands	350	1.9
4.	Urmagrain	France	300	1.7
5.	Dekab/Pfizer	U.S.A.	220	1.2
6.	Cargil	U.S.A.	200	1.1
7.	Upjohn/Asgrow	U.S.A.	200	1.1
8.	I.C.I.	U.K.	190	1.0
9.	Takii	Japan	180	1.0
10.	Orsa/Laferge	France	170	0.9
11.	Vander Have/Sukeranie	Netherlands	150	0.8
12.	Ciba Giegy	Switzerland	150	0.8
13.	Sakata	Japan	140	0.8
14.	Maisadour	France	120	0.7
15	Lubrizol/Agrigenetics	U.S.A.	120	0.7
16.	Clause	France	100	0.6
17.	Volvo/Provendor	Sweden	100	0.6
18.	Sanofi/Etf Aquiticine	France	80	0.5
19.	K W S	Germany	70	0.4
20.	Unilever/PBI	U.K.	60	0.3
21.	Hoechst	Germany	60	0.3
22.	Royal Sluis**	Netherlands	60	0.3
23.	Barenbrug ***	Netherlands	60	0.3
24.	Coop.de Paul/CACBA	France	50	0.3
25.	Uncac/Expansem	France	50	0.3
26.	Cebeco	Netherlands	40	0.2

Source: Grooseman (1993).
* Global sales of improved seed estimated at US $ 18 billion (excluding socialist countries).
** Horticultural seed only.
*** Acquired by Unilever in 1988.

Gap between Seed Requirement and Its Supply

The seed requirement and its supply to the Indian farmers for the years 1990-91 to 1992-93 in the case of wheat, paddy, cotton, rapeseed and mustard and potato crops are shown in Table 3. The data clearly show that the gap between the seed requirement and seed actually distributed in India for different crops was more where the Seed Multiplication Ratio (SMR)

TABLE 3. GAP BETWEEN REQUIREMENT AND SUPPLY OF CERTIFIED/QUALITY SEEDS OF SOME CROPS IN INDIA

Year (1)	Cropped area (million ha) (2)	Seed requirement (lakh qtls) (3)	Seed distributed (lakh qtls) (4)	Gap (lakh qtls) (5)
Wheat (seed rate: 100 kg/hectare)				
1990-91	24.17	60.43	14.20	46.23 (76.50)
1991-92	23.26	58.15	14.04	44.11 (75.86)
1992-93	24.43	61.08	15.15	45.93 (75.20)
Paddy (seed rate: 30 kg/hectare)				
1990-91	42.69	32.02	13.66	18.36 (57.34)
1991-92	42.65	31.99	14.47	17.52 (54.77)
1992-93	41.64	31.23	14.28	16.95 (52.27)
Cotton (seed rate: 20 kg/hectare)				
1990-91	7.44	3.72	1.92	1.80 (48.39)
1991-92	7.66	3.83	1.77	2.06 (53.79)
1992-93	7.54	3.77	1.87	1.90 (50.40)
Rapeseed and mustard (seed rate: 5 kg/hectare)				
1990-91	5.78	0.96	0.74	0.22 (22.92)
1991-92	6.55	1.09	0.77	0.32 (29.36)
1992-93	6.30	1.05	0.75	0.30 (28.57)
Potato (seed rate: 3000 kg/hectare)				
1990-91	0.94	70.50	7.97	62.53 (88.70)
1991-92	1.03	77.25	6.90	70.35 (91.07)
1992-93	1.08	81.00	7.10	73.90 (91.23)

Source: Sidhu (1996).
Notes: (i) Figures in parentheses are gaps as per cent of requirement.
(ii) The seed replacement rate (SRR) has been taken as 25 per cent for all the crops except 33.33 per cent in the case of rapeseed and mustard.

was low and vice versa. The SMR is only 1:4 for potato as compared to 1:100 for rapeseed and mustard, 1:80 for paddy, 1:50 for cotton and 1:20 for wheat (Government of India, 1989). The SMR of potato was the lowest and the gap was 88.70, 91.07 and 91.23 per cent during 1990-91, 1991-92 and 1992-93 respectively. Similarly, for wheat crop which has a low SMR, the gap was 76.50, 75.86 and 75.20 per cent during these three years respectively.

On the other hand, the SMR was very high for rapeseed and mustard where the gap was 22.92, 29.36 and 28.57 per cent during 1990-91, 1991-92 and 1992-93 respectively. For paddy, the gap was about 57 per cent in 1990-91, about 55 per cent in 1991-92 and about 52 per cent in 1992-93. Similarly, the gap for cotton was about 48, 54 and 50 per cent during the corresponding three years. The high gap between the requirement of certified/quality seeds and its distribution in the country is a matter that requires serious attention for increased

seed production. The public and private seed agencies did not have adequate facilities/infrastructure in this regard. Therefore, the entry of multinational companies (MNCs) in the Indian seed industry will provide healthy competition and the farmers will get adequate supply of certified seeds to give a boost to the agricultural production in the 21st century.

Impact of TRIPS on Seed Prices

As already discussed, a vast majority of the farmers used self-retained seeds or seeds obtained from the fellow-farmers and relatives for different crops. The prices of these seeds are more or less linked with the grain prices. Whatever seeds that may be released by our research institutes in future, there is no reason why the above-mentioned prevailing prices should go up. Even without TRIPS, the prices of hybrid seeds of different crops are high all over the country because the labour component of cost is very high in the case of hybrid seeds.

It is true that the prices of those seeds which would be developed outside India may be high because the farmers would have to pay a little more by way of royalty. These seeds may be more productive also (Sidhu, 1996). But the Indian farmers would compare the economics of seed purchases. Given this option, the farmers would make the correct decision. If these seeds would not be productive, the farmers simply would not choose them. The TRIPS would provide an opportunity to the Indian farmers to get first rate seed technology.

Impact on Land Ceiling

Another implication of TRIPS/GATT would arise from the land required for seed research by the multinational seed companies (MNSCs). In different states, the existing land ceiling limits vary from 4.05 to 7.28 hectares for irrigated land with two crops. In Punjab and Haryana (the green revolution belt), these limits are 7 hectares and 7.25 hectares respectively. For the irrigated land with one crop, the land ceiling is 10.93 hectares and for dryland 21.85 hectares. These limits also vary from state to state.

Keeping this fact in view, the government would have to bring some structural changes in the existing land ceiling regulation because the limits are too small for MNSCs to carry on seed research as per agro-climatic conditions in India. The MNSCs would not be able to make huge fixed investment on buildings, laboratories, processing units, stores, deep tubewells, etc., on the leased-in land. Moreover, uncertainty always hang on in the case of leased-in land. The land is the backbone of seed research, seed production and seed multiplication. The policy makers would have to examine this aspect thoroughly before coming to some policy decisions. It would have wider implications for Indian agriculture.

Legislative Measures vis-a-vis TRIPS

The Government of India has initiated steps to bring about legislation on the controversial issues of plant variety protection to safeguard the interests of farmers with regard to use and availability of seeds in the wake of TRIPS. The five important features of the proposed legislation are (a) the farmer can choose the best seeds he likes; (b) he can save seed from one crop and use it for replanting in the next crop; (c) he can sell his surplus seed but not as branded seed as it is in the case of protected variety; (d) he can also become wholetime

seed producer and sell protected seed as a commercial enterprise with the consent of the rights holder; and (e) our scientists will be free to use all seed varieties, including protected varieties, for experiment and research for developing new varieties.

Under the proposed legislation, the Government of India will constitute a national authority for plant variety protection and protection of the rights of the breeders, farmers and researchers. The authority will be a purely professional body (Chawla, 1995). Seven ex-officio members of the authority which includes the Chairman, Agriculture Commissioner, Horticulture Commissioner, Director, NBPGR, Director, Botanical Survey of India, etc. will ensure proper maintenance of the national register of plant varieties (NRPV).

The fundamental issue in the entire debate on TRIPS is whether it is in India's interest to establish a system for the protection of plant breeder's rights. The answer clearly is yes.

India has abundant plant breeding skills and coupled with the agro-ecological diversity and the ingenuinty of the farmers, it will be possible to develop a vibrant seed industry that not only meets domestic demand but also makes India a competitive player in the world seed trade. India's agricultural production can increase by 15 to 20 per cent if high quality seeds are more widely available. Besides, India can then capture 25 per cent of the world seed market (Ganesan, 1994 b).

But right now, in the absence of a system for rewarding investment in plant breeding, providing investment in the seed industry is confined to hybrid seeds, HYVs or ornamental and horticultural plants. Without a good and sound PBR system, private investment cannot be attracted to cereal crops. A plant breeder and a farmer are not adversaries and the former cannot succeed without ensuring the latter's success.

Above all, the slowdown in foodgrain production particularly during the 1990s has serious implications for the Indian economy particularly the agricultural sector. In the first seven years of this decade, the annual growth rate in foodgrain production was just 1.7 per cent, lower than the population growth of 1.8 per cent during the same period. A number of measures are required to be taken to impart sustainable growth in Indian agriculture. The supply of high-yielding quality seeds is most crucial in this regard. The TRIPS regime will provide an opportunity to Indian agriculture in general and seed industry in particular.

CONCLUSION

The GATT accord on TRIPS had raised a whole lot of apprehensions in the country. The patenting of seeds and genes particularly generated a lot of controversy. The farmers were told that they would have to buy their seeds every year from the MNSCs; they could not exchange seeds with the fellow-farmers and so on. But a careful perusal of the GATT (1994) would reveal that some of these apprehensions may be unfounded. The TRIPS agreement covered eight types of intellectual property. Of these eight, it is only in the area of patents that most controversy surrounded in India. It is in this section (TRIPS) of GATT that the advanced countries have a distinct advantage and a decisive lead over the developing countries. In India, a majority of the farmers use self-retained seeds for most of the crops. The other important source is fellow-farmers and relatives. Even under the TRIPS regime, the Indian farmers can avail of this facility. In India, there is a well organised government seed research and distribution system, and a new entrant has to offer reasonably priced seeds of proven quality to break into the Indian seed market. India has excellent plant breeding

capabilities. The ICAR is the apex organisation for sponsoring, co-ordinating and promoting plant breeding research in India. India's crop improvement programmes have been acknowledged not only in the country but in many of the developed and developing countries as evidenced by the utilisation of some of our HYVs and hybrids at the global level.

The TRIPS regime will provide an opportunity to the Indian farmers to get first rate seed technology although at a little high price. This will give a boost to agricultural production in the country which has shown slowdown in the recent past.

NOTES

1. The methodology in detail is not given in the text because of space limitation. For details, see Sidhu (1996).

2. The new World Trade Organisation (WTO) which replaced the GATT, has come into effect from January 1, 1995 with the backing of at least 85 founding members, including India.

3.The main features of the term quality seed used were as follows:

(a) The fellow-farmers or relatives procured the seeds initially from the reliable sources like Punjab Agricultural University, other research institutes, public seeds agencies, government departments, authorised seed dealers of public agencies and private seed companies.

(b) The seeds procured were within the recommended renewal periods.

(c) There was no deterioration in the quality of seeds.

(d) The fellow-farmers/relatives obtained normal yield of the crop for which seeds were procured by the selected farmers. In case the seeds taken by the selected farmers from the fellow-farmers/relatives did not fulfill even a single feature out of the listed four, those seeds were not considered as quality seeds in the study.

4. The total certified/quality seed distributed in India during 1995-96 was 69.90 lakh quintals. Out of this, the share of wheat seed was about 32 per cent, paddy seed 22 per cent, other cereals' seed 9 per cent, pulses' seed 5 per cent, seed of oilseeds 18 per cent, cotton seed 4 per cent and potato seed 10 per cent.

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