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Abstract

The seed regime in the state as well as in the country has undergone drastic change. The gradual shift from traditional varieties to HYVs in the initial phase, and from public sector production to private sector characterized the changing seed market. By the beginning of nineties, the private sector controlled lion's share of seed market. The globalisation of nineties saw entry of multinational companies into Indian seed industry with genetically modified varieties of seeds in high value added crops such as cotton and oilseeds. This transformation is actively encouraged by the state seed policy. The introduction of Plant Variety Protection and Farmers Rights legislations has brought the patent regime concerning plant-breeding activity in consonance with international norms and thereby protecting the interests of the MNCs. The private seed markets have posed quite a challenge for the farmers to accustom with a hoard of companies that flooded the markets with aggressive advertising campaigns and other promotional instruments. Though the seed markets provided price competitiveness, 'the quality failures' have featured prominently on the flip side. This has called the role of regulatory regime seriously into question regarding punishing the erring and fraudulent seed companies and giving compensatory justice to the victims. The private participation in seed companies is generally described as a remedy to the 'governmental failure' in public sector production. However market failure is equally potential threat to efficient functioning. The new institutional economics holds that private markets do not function efficiently automatically. The market failure can arise from information asymmetry and bounded rationality. The buyers face risk for lacking the information that the sellers do not disclose. Such opportunistic behaviour of markets can be effectively checked by a proper regulatory regime that imposes greater disclosure norms and standards; and a proper legal regime to address the failure in compliance. The seed market suffers from the 'lemons problem' that cannot be solved through market based instruments alone but should have a vigilant regulation system. The compensatory mechanisms will make the seed companies to maintain standards.

Changing Seed Policy, Law and Regulation : An appraisal of The Emerging Seed Markets in Andhra Pradesh

E Revathi and R V Ramana Murthy

Introduction

Indian seed market is undergoing an important transformation for the past one-decade and more. The increasing private participation in seed production, development of new varieties for value added crops, and introduction of genetically modified varieties has characterized the new seed regime. The new seed policy definitely shaped the growth of private participation joined by the global seed companies. However, breeder activity is still predominantly undertaken by the state through agricultural universities and other research institutes. Even though the reliance on market for the development of seeds and varieties marks new seed regime, we are yet to evolve a fool proof regulatory mechanism that ensures quality and standards in production of seeds and effective laws to deal with failures associated with thereof. This became pretty clear in the recent experiences of agrarian crisis faced by the farmers in Andhra Pradesh and elsewhere. The problems associated with seeds in terms of spurious seeds, failure of yields, and lack of compensation mechanisms seriously exposed the lacunae in the regulatory regime for which the government finally responded with a new draft bill. It is important to understand the process of establishment of market dominated seed regime to appraise its relative merits and limitations. It is an established fact that private seed sector has taken firm roots in production by now. Yet it is important to identify the complementary institutions that support the successful working of market. In this paper, we trace the changing seed policy that enabled the emergence of private seed sector, discuss the problems of seed failures faced by farmers. We finally appraise the scope of regulation and law in mitigating the seed market crisis.

We organise the paper in five sections. First section traces the evolution of seed policy. Second section describes structure and growth of seed industry in the country as well as the state of Andhra Pradesh. Third section places seed failures in the light of agrarian

distress in A.P. Fourth section conceptualises failure of seed market in New Institutional Economics framework, and in final section we examine the regulatory mechanism and legal remedies to market failures in seeds.

I. Evolution of Seed Policy in India

The traditional system of agriculture prevailed till the early 1960's was mostly self-sufficient in terms of inputs, which broadly can be termed as subsistence peasant system. The agriculture system was closely integrated with the inward-looking village economy and was marginally linked with markets outside the village. Seed, traditionally was prepared by the farmers by selecting the best lot from their crops. The seeds were exchanged within the farmer's community, and it was used and reused a number of times. The persistent shortage of food grains in the country and unsustainable foodgrain imports in the form of PL 480 led the State to embark on Green Revolution program in the sixties. The new agricultural strategy entailed introduction of new varieties of seeds in rice and wheat. These new varieties of seeds popularised as high yielding varieties (HYV) are important part of the package along with water and chemical fertilizers. Government policy pushed this package backed by a whole set of intervention mechanisms like procurement, subsidies and support prices besides others.

As a part of the strategy, production and distribution of seed varieties were undertaken by the public sector, with a set of supporting institutions set up for this purpose. The first phase of green revolution technology was confined only to a few crops like rice and wheat. The agencies set up by the state in developing production and distribution of improved crop varieties and hybrids also have effectively pursued the twin goals of efficiency and equity [Pal et al (2002)][1]. The public sector seed industry was the major player undertaking breeding and multiplication and presence of private sector was negligible. Some private participation existed only as complimentary in the low-end activities of seed multiplication. Seed requirement in the HYV technology was not very high as varieties can be reused a few number of times, to which need the public sector catered to quite efficiently. The regulatory framework adopted at the time is simple and adequate to the modest needs of the times.

[1] Regulatory framework in the case of developing countries is mostly introduced by their governments unlike the case of the developed countries. Evolution of regulatory framework in USA shows that private sector successfully resisted attempts by USDA in 1962 to make registration of all new varieties compulsory (Farington J, Witcombe JR 1997).

As the first phase of green revolution is distinctly limited to few food crops and water rich regions, the decade of eighties has witnessed the second phase of green revolution that diversified into non-food crops. The shortage of pulses and oil seeds led to commissioning of special technology missions in crops such as oilseeds, pulses, cotton. etc. The decade also witnessed more dry land agriculture allocated to non-food crops like cotton, groundnut, maize, chili, etc. The supply of varieties and hybrid seed for these crops could not be adequately met by the public seed sector, the gap effectively filled by the private sector. The seed industry witnessed a paradigm shift with the liberalized seed policy of the Government of India in 1988. The New policy on Seed Development 1988 (NPSD henceforth) eased the regulations on imports, exports of seeds and foreign direct investment. The import of seeds of coarse cereals, pulses and oilseeds was allowed for two years by companies having foreign collaboration for the production of seeds with foreign firms, provided the latter agreed to supply the parent line seeds to Indian Companies[2]. Under NPSD, import of seed/ planting material, vegetable, flower, ornamental plants and fruits are kept under open general license (OGL) and hence are free to be imported, in accordance with the provisions of Plants, Fruits and Seed Order 1989. The NPSD strengthened the private seed sector in terms of research and development, which also got boosted by the Intellectual Property Rights (IPR). The 1988 policy is a turning point in the seed policy, which made entry of MNC into the domestic seed industry[3]. As result there is large-scale merger of private seed industry with the Multinational seed companies[4]. The introduction of the Plant Variety Protection (PVP) and the Farmers' Rights Act, that protected the breeders' rights over the varieties led to introduction of number of varieties and hybrids of value added crops by the private industry. However, this shift in the policy did not ensure any transparent mechanism and public testing of these new varieties / hybrids/ transgenic for evaluating their agronomic performance with regard to yield, biotic and non-biotic stresses and other quality parameters, as private plant breeders need not notify their varieties. After developing their varieties they can directly market them.

[2] see Niranjan Rao.C (2004)

[3] Though companies like Cargill entered through joint venture partnership with the Indian seed companies, a few already were affiliated to Indian Companies like the HLL. They have started R&D activities, mainly concentrating on hybrids like corn, cotton, sunflower vegetables and flowers and account a major share of commercial production of seeds in India.

[4] The majority of MN seed companies have their presence in India either as joint venture or with 100 % equity with the main focus on biotechnology.

Section II

Structure and Growth of Seed Industry

The Indian agriculture in India has witnessed a gradual shift towards commercialisation of input markets, where seed as a market input is gaining prominence. The implication of commercialisation is at two levels, first is the price factor and second is the quality aspect. According to the data on cost of cultivation (CACP studies) the seed cost has been going up although as a percentage share of the total cost declined in the past one decade. The Indian seed law allows the sale of truthfully labelled seed which leaves the farmer to find his luck regarding the quality of the seed after he sows.[5]

The seed production in India as stated earlier is undertaken both by public sector as well as private sector. Traditionally, Indian Council for Agricultural Research (ICAR) and the State Agricultural Universities (SAU) developed improved crop varieties and hybrids. The stage of multiplication is also done by public seed agencies like the National Seed Corporation NSC, State Farms Corporation of India SFCI and the 13 State Seed Corporations. The Andhra Pradesh State Seed Development Corporation (APSSDC) took up the production for the state. The NSC established in the year 1963 was given the primary responsibility for production of foundation seed. It is important to underscore the role played by the public sector seed companies that concentrated on low value and high volume seeds, like HYVs in food crops that yield only low profits but helped in achieving food self-sufficiency for the country. Where as the private sector pitched itself on high value and low volume seeds that entail high profit production. It should not be forgotten that much of the growth of the Indian seed industry has resulted more from indigenous research and development efforts by a large allocation of state resources.

The private sector has emerged since eighties and by now it has grown into quite a large and heterogeneous entity. The players in this market include big indigenous companies, multinational companies functioning individually and also in collaboration with Indian companies on the higher end and small farm level operators and unregistered companies in the low end market (Pal et al, 2002). Private companies produce seeds by indenting for breeder seed in advance of a couple of years from public sector breeders or purchase from private sector, then multiply into foundation seed[6] and market it commercially. The later is a horizontal process, which does not require any time. Initially only certified seed pro-

[5] Truthful seed is that sold with a label provided by seed producer that states about a) germination and b) purity.

[6] The foundation seed is further multiplied into seed for cultivation and distributed through the retail system.

duction was given to the private sector, but later even the foundation seed production was also given to this sector. Now after the new seed policy, private plant breeding has accelerated. The private companies using the germ plasm produced by the public sector companies release large numbers of proprietary hybrids.[7] The private sector has a large incentive in the seed sector because of growing seed market where farmers are increasingly preferring their seed for the higher yield factor. The Indian seed industry is worth around Rs.2000 crore annually and estimates show that it may be reaching Rs.6000 crore in the coming 7-8 years time. Interestingly one can observe the diminishing market share of public sector as seed market is growing over period, and the share of multinational companies is rising (Tables 1&2).

As climatic conditions in Andhra Pradesh provide highly congenial for seed production, a lions share of seed production in the country comes from the state. More than one lakh farmers are engaged in seed production of different crops. In all there are 440 (small, medium and large) seed production companies in both the public and the private sectors involved in the production of the certified seed. There are 288 seed processing plants registered with the APSSDC. During the agricultural year 2003-04 the total estimated seed requirement in the state was 53.0 lakh quintals of which only 29 percent was supplied by the public sector and a major part of the seed requirement (nearly 70 percent) is met by the private seed sector. Private seed production is over 90 percent in the crops like cotton, sorghum, maize, pearl millet and sunflower (Tables 4&5). High seed replacement ratios in the state also project a high demand for the seed. At present about 27.0 lakh quintals of seeds of varieties and hybrids of different crops is produced in the state, which is about 25 percent of the seed targeted for distribution in the country. The seed replacement ratio (SRR) is 29 percent, in the case of varieties, which is the highest in the country, increases demand for seeds. Much of seed supplied by the private sector is not certified, the certified seed is meeting only 15 to 20 percent of total seed requirement, rest is simply truthfully labelled[8].

There are two different views as far as the success and desirability of private sector participation in the seed market. One set of views hold that private participation brings price competition and wider outreach in the case of value added crops. However, the quality can be ensured only through a facilitating regulatory framework and farmer awareness. They also argue that private sector still needs a level playing field vis-à-vis a subsidized public

[7] Hybrids not tested and released by the formal variety release system.
[8] Seed industry in AP- A profile, page 18

sector in terms of assured markets and storage facilities (Pray 1990, Jaffee and Srivastava 1994; Pray et al 2001). The second school argues that such strengthening of private sector especially transnational seed companies will be a step towards the monopoly control over the Indian seed sector and its bio-resources (Shiva and Crompton,1998). The prevailing view in the state is that the private sector has led to considerable price competition and price stabilization. However quality of seeds remains a serious problem, as proper regulatory regime is yet to come into place.

Table 1: Share of public and private sector in seed industry in India

(Value in million rupees)

Time period	Public sector % share	Private sector %share			Total value of industry
		MNC	SC#	Total	
1994	30	40	30	70	10,000
1998	NA	NA	NA	NA	12-16,000
2000	NA	NA	NA	NA	20,000
2004	25	NA	NA	75	39,000

SC = small companies, MNC = multinational companies
Source: Agriculture Today

Table 2: Size of private seed sector in India

Sl.No.	No. Of Companies	Size of Company	Sales turnover (in million Rs.)
1.	20	Large	> 200
2.	Small	Medium	200
3.	Large No.	Small/Un-Organised Local players	< 20

Source: Seed industry in AP – A Profile, 2004

Table 3: Production and distribution of seed (certified & labeled) in AP

(In lakh quintals)

Sl. No.	Seed Produced				Seed distributed		
	Year	Public	Private	Total	Public	Private	Total
1.	1997-98	NA	NA	16.88	NA	NA	11.331
2.	1998-99	NA	NA	17-95	NA	NA	12.45
3.	1999-00	NA	NA	19-83	NA	NA	12.61
4.	2000-01	NA	NA	20.51	NA	NA	11.88
5.	2001-02	6.46	13.94	20.41	4.50	8.02	12.52
6.	2002-03	NA	NA	24.97*	NA	NA	15.22
7.	2003-04	15.00	12.00	27.36*	NA	NA	15.48

Source: same as above
* Excluding fodder, jowar and seed

Table 4: Percentage share in distribution of certified and labelled seed by public and private sectors in AP (2001-02)

Crop	Certified seed		Labelled seed		Total	
	Public	Private	Public	Private	Public	Private
Paddy	39.2	60.8	86.9	13.1	41.7	58.3
Jowar	4.0	96.0	6.3	93.7	4.3	95.7
Maize	7.8	92.2	0.0	100.0	2.9	97.1
Red gram	15.6	84.4	1.3	98.7	5.3	94.7
Black gram	19.1	80.9	10.2	89.8	13.8	86.2
Groundnut	9.2	90.8	47.9	52.1	43.5	56.5
Sunflower	3.4	96.6	0.0	100.0	0.9	99.1
Cotton	2.3	98.7	0.0	100.0	1.1	98.9
All crops*	35.1	64.9	38.3	61.7	36.0	64.0

Source: Commissionarate of Agriculture, Andhra Pradesh (2001-02)

Table 5: Relative Shares of Public and Private Sector in Seed Productions in AP (2001-02)

Crop	Public sector	Private sector
Paddy variety	50.15	49.84
Jowar variety	4.96	95.04
Jowar hybrid	15.51	84.49
Maize variety	1.24	98.75
Maize hybrid	5.85	94.15
Redgram variety	27.68	72.32
Blackgram variety	39.71	60.29
Groundnut variety	20.38	79.62
Sunflower variety	0.34	99.66
Sunflower hybrid	-	100.00
Soyabean variety	16.36	83.64
Cotton variety	1.79	98.21
Cotton hybrid	1.26	98.74

Source: same as above

Section III

Agrarian Distress and Seeds in A.P.

The agrarian distress in the state of A.P. in the post nineties is well documented in the literature. The prominent features of this crisis are stagnating yields, falling rates of growth, rising costs of production, growing unviablity of agriculture in general in all agricultural classes and in particular the small and marginal farmers, that reflected in farmers' suicides in the past eight years. The seed failures have also added to the gravity of crisis in several parts of the state that has not received much attention so far.

The State experienced a steep deceleration of agricultural output from 3.4 percent in eighties to 2.3 percent in the nineties. The growth rate of rice output declined from 3.2 to 1.6 percent, that of groundnut declined from 5.2 to 1.9 percent, cotton from 8.1 to 7.4 percent [Subramanyam and Satyasekhar (2002)]. This deceleration in growth rates is said to be entirely due to fall in yields[9]. The interesting aspect of the crisis is that in spite of expansion in the area under the cultivation (at a rate of 0.6 percent per annum nineties) the productivity levels have come down which have adverse consequences for profitability.

The area expansion under cultivation that took place largely in Telangana and Rayalaseema regions is almost singularly under the private bore well irrigation that expanded by 7.6 lakh hectares in nineties, compared to 3.2 lakh hectares in eighties. During the same time, the canal irrigation has declined by –1.48 percent since eighties [Subramanyam and Satyasekhar (2002); p.230]. It is clear from above figures that the public investment in irrigation has declined and private investment accelerated. Added to this, the state experienced severe drought conditions in large number of mandals continuously from 1999 to 2004[10].

The structure of land holdings is an important aspect to understand which section of peasantry that took the brunt of crisis. The disturbing aspect of the structure of holdings is that the number of small and marginal farmers in the state has been rising over period, which now constitute 86 percent of total holding owning 42.68 percent of total area. The proliferation of small and marginal holdings ensued for general reasons such as mutation of

[9] The growth rate of rice yield declined from 3.1 to 1.3 percent; that of cotton declined from 3.4 to 1.4 percent; that of sugarcane declined from 3.2 to 1.0 percent and that of groundnut stagnated [Subramanyam and Satyasekhar (2002)].

[10] For example, 90 percent of total mandals were declared as drought hit in 2002 and 45 percent in 2003.

ownership, land distribution by the state, purchase of land by these sections from large and medium farmers and land ceilings. Despite the paucity of official data, several village level studies have shown that backward castes and dalits constitutes most of the small and marginal holdings that have acquired land in the last decade [Reddy DN (2002)]. The capital endowments of these farmers are said to be insufficient while higher cropping intensity and high irrigation levels characterize the holdings. In the process of diversification towards high value commercial crops, these farmers could not allocate land to food crops as means of insurance in the event of a crisis. Studies have shown that agriculture of small and marginal farmers is economically unviable [AERC (1992, 1997)].

Besides the drought, the unviability of agriculture in the nineties is believed to have stemmed from the fiscal reforms of the government undertaken since the early nineties. The power tariffs in the state, for example, are hiked by 9 percent, irrigation rates raised by 5 times [GOAP White Paper on Fiscal Reforms 2001]. The withdrawal of fertilizer subsidy and hiking of other tariffs have contributed a rise in overall cost of cultivation roughly by 200 percent in 1996-97 compared to 1990-91 [CACP reports]. The rise in cost of production, falling productivity levels characterizes the growing unviability of agriculture in general, while the more vulnerable and resource-poor groups of small and marginal farmers face the acuteness of the crisis in particular. This has been amply manifested in a continuous number of suicides of farmers, particularly in dry areas cultivating commercial crops [Parthasarathy (1996), Sudershan Reddy and Venkateshwar Rao(1998), R.Mohan Rao (2002), Chadrashekhar Rao (2004)].

A major problem arising from the mid nineties is that of crop failures especially in the case of commercial crops like cotton, chilli, maize etc, because of the low quality and spurious nature of the seed (GRS Rao 1998, Chowdary KR etal, 1998, see Table7). The number of complaints registered with the department of agriculture and the number of cases filed in the district courts also manifests this. The report of the Fact Finding Committee[11] suggested that farmers should be compensated for the seed failure, it termed the practices of seed companies as unfair trade practices such as misbranding and non-disclosure of necessary features prohibited under the Competition Act and also recommended that appropriate amendments be made to the 1966 Seed Act. The case of Warangal district shows that

[11] Based on the complaints by the farmers the district collector of Warangal constituted a Fact Finding Committee to look into crop damages due to seed in agricultural year 1998-99. The report highlights the case of misbranding of seed and it established that crop failure is because of the low quality seed.

court cases have been filed continuously beginning with 1997-98, which spans not only to hybrids but also Genetically Modified seeds in the case of cotton. (Table 8) The government of AP entered into an MoU with private seed companies, in the year 2002, in which the terms included compensation for seed failure and liability. The pro-active policy of the state is believed to have reduced the number of complaints regarding poor germination, genetic impurity which has come down drastically (Table 6).

Table 6: Seed failure complaints

Sl.No.	Year	Nature of Complaint	No. Of Complaints	No. Of Sub-Standard Samples
1.	1999-00	——	——	1598
2.	2001-02	Poor Germination Genetic Impurity	2341 312	— —
3.	2002-03	——	——	549
4.	2003-04	Poor Germination Genetic Impurity	1474 24	588 —

Source: Statement of Seed Industry in Andhra Pradesh June 2004

Table 7: Crop failure complaints

Crop	Company	Seed brand	Year	District	Complaint	Loss incurred
Maize	Monsanto	Frontline hybrid DK 973	2003 kharif	Warangal	no yield	-
Cotton	EID Parry Sreeram	Ajit seeds	1999-00	Warangal	-	35,000 (acres)
Chilli	Sarsas agri Karnataka		1999-00	Warangal	no fruits	Rs 1,00,000
Cotton	EID Parry Sreeram	Ajit seeds	1999-00	Guntur	-	75,000 acres
S Flower	AP seeds		1999-00	Guntur	-	250 acres
Maize	AP seeds	Kanchana 517	1999-00	Warangal	-	-
Paddy	AP seeds	Jaldidan-8	2000-01	RangaReddy	-	25 acres
Chilli	Ankur,	Arch-228	2000-01	Kurnool	-	130 acres
Gerkin	VST Natural product ltd		2000-01	Ranga reddy	-	Rs 12,00,000
Maize	Cargil		1999-00	Warangal	-	5000 acres
Cotton	Excel	Excel-35	1999-00	Warangal	-	-

Data source: Compiled from various news papers in various years and dates.

Table 8: Crop failure and losses incurred by farmers in Warangal district

Name of the Farmer	Mandal	Year	Company	Crop/ Seed Variety	Price of Seed (Rs)	Invest-ment (Rs)	Normal Yield (Qtl.Per acre)	Present Yield (Qtl.Per acre)	Average Loss (Rs)
Banothu Pool sing	Sanghem	1998	E.I.D Parry (India) Ltd.	Cotton/ Parry white gold	800	---	12.00	1.00	20,000
Banothu Brahma	Sanghem	1999	E.I.D Parry (India) Ltd.	Cotton/ Parry white gold	800	10,000	12.00	1.00	20,000
Kollipaka Buchaiah	Dugondi	1997	Sarpan Argil	Chilli/ SB106	875	1,10,000	Nil	Nil	Nil
Terala Rama Nnaiah	Sanghem	2002	Mahyco Seed Ltd	Cotton/ MECH 162BT. HYV	1600	---	15.00	Nil	25,000
Nallateegala Yadagiri	Sanghem	2002	Mahyco Seed Ltd	Cotton/ MECH 162BT. HYV	1600	---	10-15.00	Nil	25,000
Nalla Yadagiri	Devaru uppula	2002	Mahyco Seed Ltd	Cotton/ MECH 162BT. HYV	1600	---	10-15.00	Nil	25,000
B.Venkat-eswarlu	Devar uppula	2002	Mahyco Seed Ltd	Cotton/ MECH 162BT. HYV	1600	---	10-15.00	Nil	25,000
Nalla Satyana-rayana	Devar uppula	2002	Mahyco Seed Ltd	Cotton/ MECH 162BT. HYV	1600	---	10-15.00	Nil	25,000

Data source: Complaint petitions filed in the district forum, Warangal, under Consumer Protection Act, 1986

Failure of seeds as a major problem has come up during the mid nineties, in the post Paris Convention. The unregulated informal market has provided a haven for fly-by-night operators selling spurious seed. Spurious seed problem is found in both the hybrid technology as well as in the GE (BT) technology, mostly in the case of illegal BT hybrids.

There are at least three sets of studies that argue the reason in explaining the agrarian crisis that largely center on the failure of government policy. The major differences among them are that one set of studies blame the globalisation of input and output markets [Shiva and Jaffri (1997); Assadi (1998)]. The other group of studies focuses on the failure of domestic policy of the state in terms of failing institutional support to agriculture [Vasavi (2001), Deshpande (2002)]. The third group blame internal as well as external reforms as the basis for the crisis among other factors [CP Chandrasekhar et al (2002) and Reddy D N (2003)].

While there can be little disagreement on much of the above arguments on the policy failures, a much more important aspect that largely eluded the literature is the question of market failure that generate supply-side inefficiencies, may it be public sector, or domestic private sector or multinational that frustrate the farmers in terms of yield failures, crop failures, spurious seeds, spurious pesticides etc. All said and done, the Indian farmers live in the times of commercialisation, deal with markets national or global, what are the institutional mechanisms that are complimentary to the market structure is an important question that has not been addressed so far in the literature.

Section IV

Seeds Market Failure – A Law and Economic Analysis

The theory of market failure in economic theory is a well recognised area in welfare economics. Markets can usher mutually advantageous transactions only when there are no externalities, public goods, monopolies and perfect information is available to all transacting parties. Development economists favoured a state provision as a solution to market failures that result from public goods and externalities. However, the experiences of state failures world over in efficient provision of goods and services have made policy makers and academia to rethink on alternatives. The New Institutional Economics (NIE) [See Furubotn and Richer (2000) explains the co-ordination failure between transactors because of lack of information that results in opportunistic behaviour and transaction costs, par excellence. The lack of information to buyers, particularly in case of specialized goods, according to NIE literature, leads to adverse selection problem. Further, presence of spurious and inferior quality goods available at lesser or same price can lure the buyers towards poor quality goods and destroying market for good quality goods, which is called 'lemons problem' [Akerlof(1970)]. The seed market in the state typically suffers from the lemons problem where farmers fail to distinguish between spurious

seeds and quality ones. There are two solutions to such problem one devised by market, namely through unique inimitable packing, high advertisement, warranties and guarantees which poor quality producers cannot afford to offer. The second solution is a regulatory one, namely by stipulating standards, imposition of fines for failure to maintain standards, and compensation for product failures [Cooter and Ulen (2004)]. These are also measures normally welcomed by the industry since that restores the confidence on the market for the buyers. Thus new institutional economics exemplifies the symbiotic relation between law, regulation and markets.

Section V

Regulatory Framework

The object of the basic regulatory framework (1966 seed act) is to regulate the quality of seeds (food crops, cotton seeds) in the interest of increased agriculture production. It delegates authority to committees, for specific regulation so that these regulations can be flexibly modified. The power to notify kinds or varieties of seed rests with the central government. State seed certification agency is formulated to carry out the functions of the certification agency at the state level. Once a variety is released its seed multiplication is subjected to rigorous seed certification standards, which involves complex field inspection and laboratory testing before certified seed can be made available to the farmer. The marketing of seed, dissemination to farmer also is controlled by legislation and government policies. The regulatory framework aimed to keep a major proportion of seed production in the hands of public sector, while it was thought market forces to be inefficient.

In India the basic Seed Act 1966 provides a general policy and institutional framework. The process of release of new varieties is monitored by the Central Variety Release Committee (CVRC), which from time to time releases list of cultivars. These new varieties of agricultural crops have to possess value for cultivation and use (VCU) as well as distinctness, uniformity and stability (DUS). Besides the above two criteria determination of the area of adaptation, the recommendation domain of a new cultivars, production of data, based on which recommendation for extension are formulated also are important aims of regulatory framework.

The GOI declared seeds as an essential commodity under the Essential Commodities Act, 1955. The penalty provision under the Essential Commodities Act is more strin-

gent with regard to quality parameter, under clause 13 C of seed control order 1983[12], as the penalties under Seed Act 1966 are nominal.

Table 9: Institutions involved in the seed industry

Organization	Activity
ICAR, SAU,	Plant breeding
From 82-83 farms of NSC, SFCI	
SAUs, ICAR	Identification for release
Central seed sub-committee and state seed Sub-committees	Release of new varieties
Central seed sub-committee	Notification of new variety
State depts. of agriculture, SAUs, NGOs, private companies	Popularisation
NSC, State seed corporations, SAUs, SFCI, Private companies, farmers' organizations, NGOs	Seed production
State Seed Certification Agency	Seed Certification
NSC, SFCI, SSCs, SAUs, cooperatives, private Companies, seed traders, farmers' associations	Distribution

The Central seed sub-committee[13], releases varieties of regional or national importance and the state seed sub-committees release varieties beneficial for individual state. Before a variety can be released by the central sub-committee, identification and testing of the new variety for its value for cultivation and use (VCU) is done by the All India Coordinated Crop Implement Project (AICCIP). The AICCIP is a national body functioning under ICAR, which is created for all major crops or groups of crops. A minimum of three years of multilocational trials is made for value for cultivation and use and the variety should be suited to specified agro-climatic and soil conditions. After testing of variety and its recommendation by the AICCIP, release and notification is done by central sub-committee. Though state committees on seeds also can release they do not have the power to notify the varieties. The state departments of agriculture take up popularisation of the varieties. The seed certificate rules are uniformly applicable to the public and private sector. Seeds not

[12] **Seed Control order 1983**: This is issued under the provisions of Essential Commodities Act 1955. Under this order the government declared seeds for sowing and planting of food crops, fruits, cattle fodder and jute to be essential commodities. After being challenged in courts by various seed dealers associations, the Supreme Court upheld the validity of the order which came into effect from 1994, July 1.

[13] A Central seed committee looks in to the aspects of fixation of minimum standards for germination, purity and other quality factors.

certified or sold as " Truthfully labelled" are not assured for genetic purity but the seed standards are not lower than the certified class of seed. Unreleased varieties belonging to both private sector and public sector do not come under the purview of seeds act for the purpose of certification.

The Government of India brought out Seed Act in 2000[14], the provisions of which were reiterated in the National Seed Policy in 2002 and also in the Revised Seed Act in 2004. This Seed Act was formulated in consonance with the GOI stand regarding the Trade Related Intellectual Property Rights (TRIPS) in the original GATT round in 1994. This Act shall not restrict the farmer to save, use, exchange share or sell his farm seeds except that they should not be sold under commercial brand name. For the first time this act has made registration compulsory. Registration of kinds/ varieties and hybrids of seeds with the National Seed Board set up for the purpose of this Act, registration of seed processing units and companies with the state governments was made compulsory. The registration of the seed producers and dealers at the district level allows the state government to gain control over them. Penalty in case of contravention of any provision of this Act, no compliance of genetic purity standards, or sale of misbranded seed, sale of unregistered seed is punishable[15].

[14] i) 'any kind or variety will be sold in the country only if the said variety has been registered by the board for the purpose of this act on fulfillment of criteria as prescribed'. ii) All varieties that are registered will be entered into the National Seed Register maintained by the board.
iii) Registration will be granted for new varieties on the basis of multi-location trials to determine Value for Cultivation and Usage (VCU) over a period of three seasons
iv) a kind or variety containing harmful or potentially harmful technology such as terminator technology (GURT) shall not be registered
v) no registration of kind or variety is made if it is found that commercial exploitation is to be stopped
vi) the national seed board will specify the minimum standards of germination, physical purity, and seed health with respect to any seed of a registered kind or variety.
vii) Mark or labelling to be made in order to specify the standards of germination, seed health, physical purity etc and declaration of its transgenic nature
viii) The state government shall maintain a list of the seed dealers and seed producers in each district
ix) Every dealer shall display stock list or prices or rates of different seeds
x) This act shall not restrict the farmer to save, use, exchange, share or sell his farm seeds and planting material, except that he shall not sell it under a brand name.
xi) All seed processing units shall be registered with the state govt. and shall be required to meet the specifications in terms of infrastructure, equipment and qualified manpower.
xii) Regarding import of seed and plant material PFS order 1989 stands valid
xiii) Seed or planting material containing any harmful technology such as terminator technology (GURT)
xiv) In case of offence committed by companies is liable for punishment as above.

[15] i) For first offence Rs 5000 to maximum 25,000, for major offence imprisonment for a term of six months, or with fine of fifty thousand rupees.

India has gone for a law to grant plant breeders right on new varieties of seeds for the first time by opting the *sui generis*[16] system under the PVP and FR Act passed in 2001[17] ,where farmers rights are also provided for simultaneously. The Act necessitates a greater transparency in the operations of the private companies and effective control of unauthorized activities. On public demand and interest of the people, the private companies are required to comply with information on parent material and seed certification. It is expected that the Act provide incentives for faster growth in number of varieties where the farmers can frequently replace some of the older varieties with relatively newer and more productive ones. (Suresh Pal and Robert Tripps 2001)

What is interesting in this PVP &FR Act is that the farmer in principle is protected against the supply of spurious or bad quality seed. The Act states that if the seed supplied does not perform as has been proclaimed by the breeder/company, the farmers shall have the right to claim compensations. However, so far the PVP Authority as per the Act, is yet to come into existence to deal with regulation and disputes. It is said that even the clause in the Act is weekly framed, leaving much more to the discretion of the authority (Suman Sahai, 2001). The PVP Act has more than adequately protected the Breeders Rights over the varieties they have developed. On registration, the breeder has complete right and full control over production and commercialisation. Any infringement of breeders' right will invite stringent punishment in the form of substantial fines and incarceration. Other levels of violation of breeders right like that of similarity in packaging (Passing off) are also actionable under the Act.

In accordance with the policy shift in the Seed regime the Government of AP came to an agreement in 2002 (called the Memorandum of Understanding, MoU) with the seed producers which is more of "enabling friendly regulation and not ones that stifle initiative, and performance and encourage corruption in the era of liberalisation"[18]. This MoU is

[16] The Protection of new Plant Varieties viz. The patent option was not undertaken due to the popular opposition from farmers unions.

[17] The main provisions of the Act are:

i) protection of plant varieties for 15 years confirming the conditions of novelty, DUS

ii) protection of farmers rights and privileges to save, exchange and sale unbranded seed of protected varieties

iii) sharing of benefits in case the variety contains genetic resources owned by farmers, community or the nation

iv) compulsory licensing of the protected variety in the public interest after three years

[18] .A state level National Committee under the chairmanship of Commissioner and Director of Agriculture will assess the seed requirement and advise the agriculture universities to produce the required quantities of breeder seed of notified varieties, the district level committees will be suggested regarding the estimations of crop loss.

aimed to protect the interest of farmers, provide a mechanism of compensation, whenever a farmer suffers because of substandard quality of seeds. As certification is not compulsory and it is allowed that seed producers can certify their own seed conforming to the standards prescribed under various provisions of laws, the producer be made responsible and accountable for all their actions, and shall stand guarantee for the standards of germination, and genetic purity.

New Seed Bill and Prospects for Quality:

In place of the MoU executed by the earlier Telugu Desam government, the present Congress government proposed the Andhra Pradesh Seeds Regulation Bill 2004. This bill is on similar lines of the National Seeds Act 2000. This has come up as a response to the problem of 'spurious seed', which became a major problem from the mid nineties. The legislation is meant "to provide for regulating the quality of seeds for sale, import and export and to facilitate production and supply of quality seed to the farmers". The proposed Act deals the issue at three levels: i) penalty, ii) registration and iii) compensation to the farmers.

The definition of the term 'misbranding' has been as 'a substitute for, or resembles in a manner likely to deceive, another variety of seed under the name of which it is sold, and is not plainly or conspicuously labelled so as to indicate its true nature' (Proposed Seed Bill 2004). The misleading nature of marketing tactics of private sellers lay beyond that of labels on the package, but through advertisements, road shows, advertisement documentaries, price rebate and so on. Therefore the definition should also include such claims. The punishment under the proposed act now covers fines, incarceration and compensation. The extent of success of this act in bringing the deterrents against fraudulent seed business depends on three things. First, if fines are less than the profits, it may continue to be ineffective. The proposed act increases the fine for first offence to not less than Rs 1000 extending to Rs 25,000 and for the second offence Rs 50,000 along with six-month jail term. Second, criminal liability in terms of incarceration increases the burden of proof, thereby making conviction rare and difficult. And third, if compensation is not adequate the victim may not receive the intended justice. The economic theory of crimes suggests that it is perfectly rational to commit a crime as long as the actual benefits of a crime exceed the expected costs of punishment. Civil liabilities in our country are fixed at such absurdly low levels that it hardly imposes a price on the offender.

The compulsory registration of the agencies involved in production and distribution, with the Board set up for the purpose (GOI, Seed Act 2000) in the proposed seed bill 2004 for the state of Andhra Pradesh, where, it was optional in the earlier acts, ensures information control over them. However 'agronomic performance' is not defined in the act which may be all encompassing but still not specific and which may be elusive. Agronomic performance has many parameters like the yield, growth, pest, disease and drought resistance, quality etc. Besides multi location trials have to be conducted at least for three seasons (the period not mentioned in the act) in all the agro ecological zones including irrigated and un-irrigated conditions since seeds are marketed not specific in a single zone. Despite the delay involved in obtaining registration, it is worth having to avoid informal nature of the sector that is not amenable for regulation.

The third issue is compensation to the farmer from the seed manufacturer. The new bill provides for compensation.[19] The provision of compensation itself is an incentive for the victim to go for a legal battle. However there are still a number of facilitating mechanisms that have to come into place for finding successful legal solution are missing. The compensation is to be sought under the Consumer Protection Act 1986. This can efficiently be done if the parameters of performance are well defined and clear rules exist for the technical authority to ascertain the damage. If the government comes out with a notification on the extent of compensation payable with proper estimation of the cost of production of different crops, it can avoid the delays in the delivery. The civil liability will then make the companies to be careful in preparing seeds ar d also drive away the bogus seed companies. In case the civil liability proves too costly for the seed companies, they can go for insurance solution and the insurer in turn would oversee the precautions taken by seed firms. The threat of bankruptcy would discipline the seed companies in the long run, achieved through the litigation process.

There are, however, certain problems in the implementation of the bill. For instance, the inquiry into the complaints received is done by state level and district level committees, consisting of secretaries, agricultural scientists, seed company representatives and farmers' representatives. An effective coordination mechanism among such broad spectrum of members appears to be doubtful, except during some crisis or sensitive cases. Without a

[19] MOU states a time frame of 15 days to investigate by the district level committee and submit its report. The compensation is to be paid within 30 days to the farmer by the seed seller, which appears too ambitious as also proved in number of instances [MoU 2002 and proposed seed bill 2004]. Now time frame has to come under the Consumer Protection Act 1986.

dedicated committee appointed on regular basis at the district level, it is difficult to believe such speedy compensation would happen.

The other problem is, by making compensation heavy; the new law might make the small entrepreneurs close down for the fear of bankruptcy. This may leave the market completely for the big players, presumably MNCs to operate ultimately. This may lead to rise in the seed prices in the long run as the monopoly rents and insurance premiums would be passed into the price by the firms, which may be detrimental to the interests of small farmers.

The field level experiences of farmers, show a number of cases filed for the compensation have been filed in Consumer courts while the judgments remain pending in consumer courts for long time.[20] A second problem is that in the event of award of compensation by the 'district level monitoring committee[21]', the company may not comply with the decision of the committee. Several licenses were cancelled by the Department of Agriculture, though that did not deter the detractors in conducting their business on other names. It is observed that it is not just small brands whose seeds failed, but even those of top MNCs like the Parry Monsanto and Mahyco Monsanto, and big domestic companies like the Ankur seed, AP seeds and VST seed, have also supplied seed of low quality, adequately documented by the district monitoring committees.

In spite of all these problems, the expectations of seeking justice by farmers still lie only with the Seeds Act, since it is even more difficult to expect the same from the other civil laws, like the Consumer Protection Act 1986. Under the Consumer Protection Act the victim is entitled only to extent of the cost of the product purchased, but not the collateral damage. For compensation of the crop loss, one has to file under the tort law or contract law under Sale of Goods Act. But the delay and high court fees would deter an ordinary farmer who already is insolvent by the damage done by the spurious seeds. Therefore, despite the remedies available under the civil procedure, the procedural impediments are hindrances to justice for the victims, and consumer protection laws are too inadequate to compensate the loss.

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[20] though cases were filed in the consumer court in the year 2003-04 they are pending judgment

[21] in Prakasam district the district level committee awarded compensation to the extent of Rs 44,00,000 to farmers cultivating maize against the seed company 'Parry Monsanto' which was also upheld by the state level committee

Conclusion

The new seed regime marks a new phase of commercialisation of Indian agriculture. The gradual shift from traditional varieties in seeds to high yielding varieties in wheat and rice marked the 'green revolution' from mid-sixties onwards. The production and distribution of high yielding seed varieties was carried essentially through public sector institutions. The second phase of green revolution witnessed a policy effort to increase the production of various other food and non-food crops such as oilseeds, pulses, cotton, chillies, vegetables, etc. The failure to expand public sector to meet the growing demand for seeds of high-value and low-volume commercial crops created incentives for private sector to supply seeds. The structure of the private market was characterised by medium scale companies to small scale companies. The Seeds Act 1966 and the Seed Rules gave the regulatory framework that has by and large played limited role in terms of actual regulation. The limited role for regulation perhaps can be understood by the fact that these companies only were involving in multiplication of seeds from the breeder seed developed by the agricultural universities and other related research laboratories. The notable point is that participation of private companies has facilitated an adequate supply of new varieties and high yielding seeds to meet the growing demand. By the beginning of nineties, the private sector controlled lion's share of seed market, leaving rice and wheat. The globalisation of nineties saw entry of multinational companies into Indian seed industry with genetically modified varieties of seeds in high value added crops such as cotton and oilseeds. The introduction of Plant Variety Protection and Farmers Rights legislations has brought the patent regime concerning plant-breeding activity in consonance with international norms and thereby protecting the interests of the MNCs.

The new structure of seed market has evolved with multinationals and Indian subsidiaries at the top and medium and smaller companies in the middle and the bottom. The private seed markets have posed quite a challenge for the farmers to accustom with a hoard of companies that flooded the markets with aggressive advertising campaigns and other promotional instruments. Though the seed markets provided price competitiveness, 'the quality failures' have featured prominently on the flip side. The spuriousness and inferior quality in seeds hit the farmers, incidentally in the difficult times of larger agrarian crisis that is characterised by rising costs of production, declining yields and irrigation sources and falling terms of trade. The marginalisation of agriculture in terms of holdings has brought extremely vulnerable groups of farmers into agriculture that was undertaking investments with high risks. The quality failures in seeds in several instances have added to

looming crisis in agriculture, particularly in the state, that precipitated it further. In some of the cases, it even became the cause for the suicides that took place continuously in the state since mid-nineties. This has called the role of regulatory regime seriously into question regarding punishing the erring and fraudulent seed companies and giving compensatory justice to the victims.

The private participation in seed companies is generally described as a remedy to the 'governmental failure' in public sector production in terms of inability to supply in volume as well as in quality for the crops of the current demand. The lack of accountability in the public sector is largely held as critical factor in the public sector failure. The new institutional economics looks at the question of the market failures differently. It holds that private markets do not function efficiently automatically. The market failure can arise from information asymmetry and bounded rationality. The sellers can always fool the buyers for having the real information that the latter lack, explained in terms of principal-agent relationship in the literature. However, such opportunistic behaviour of markets is argued to be amenable for effective check by a proper regulatory regime that imposes greater disclosure norms and standards; and a proper legal regime to address the failure in compliance. The seed market suffers from the 'lemons problem' that cannot be solved through market based instruments alone such as labelling, advertisement, warranties, etc., but should have a vigilant regulation system with penalties, punishments and compensations. The compensatory mechanisms will make the seed companies to maintain standards. However, compensation packages should be clearly developed so as avoid further litigation.

Such regulation is required to restore the markets which otherwise would 'race to bottom' by destroying the confidence of the buyers. The Memorandum of Understanding reached between the seed growers of state of Andhra Pradesh and the State Government typically represents this philosophy where seed growers came forward for a MoU that compensates the victims and penalises the erring seed companies. This finally took a shape of a Bill, by the new government in power that is awaiting the central government's concurrence. This bill surely represents an improvement over the existing Seeds Act 1966. However, the proposed mechanism still requires reassessment. Particularly when it is going to face a huge task of monitoring the advancing technological options along with fraudulent practices, there is a need for a competent and dedicated agency to regulate, which is still missing. The offences that large corporations can commit require a very competent centralised regulatory agency to monitor with stringent disclosure norms. And for checking small

time offenders, like those supplying spurious seeds, a vigilant decentralised regulatory system is what it required. This responsibility should be judicially distributed among central, state and district levels. The fines and de-licensing are still weak instruments since they cannot stop the business that could be carried through other sources. Even the imprisonment clause in the punishment makes the conviction difficult by raising the burden of proof. Therefore, it is only the compensation clause is the singularly most important provision that addresses the punishment to the injurer as well as justice to the victim. Having said so much of the efficacy of law, what is equally important is the level of awareness on the part of the farmers. Here the state, the farmer's organisations, and the NGOs have substantial role to play in the long run.

Appendix Table 1:

Compensation Framework as in MOU 2002

Sl. No.	Complaint	Time period	Disposal time	Compensation to be awarded	Period of payment of compensation
1.	Poor germination	10 days after sowing	2 weeks from the time complaint received	Paddy 150 % of cost of seed OR replacing equal quantity of quality seed free of cost plus 50% cost of seed. For dry crops replacement of seed free of cost or cash payment equal to the cost of the seed plus cash payment @ Rs. 250 per acre In case of cotton cultivation charges of Rs. 350/- per acre plus replacement of seed free of cost or cash payment equal to cost of the Seed	Within 7 days from date of decision Within 30 days from the date of award. In case of delayed payment 24% interest shall be levied
2.	Genetic Impurity	15 days from the date of 50% flowering or at appropriate stage depending on the crop	30 days from receipt of complaint	Cost of difference in yield of the crop in questions and that of normal yield of that particular crop or variety.	
3.	Crop failure of newly developed research variety			Same as above	

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