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Farmers' perceptions towards risk, sources and its mitigating strategies in Haryana *vis-a-vis* Tamil Nadu for *Bt* cotton

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ABSTRACT: The study is based on primary data obtained from 60 farmers from each state of Haryana and Tamil Nadu, respectively. The data were collected from the sample farmers by survey method. The data were analysed using tabular analysis descriptive statistics like averages, percentages, and C.V. The results of the study indicated that majority of the farmers in both the states were risk neutral. The major risks experienced by farmers during the production of *Bt* cotton were pest and disease incidence in case of Haryana and lodging and rainfall at harvesting stage in case of Tamil Nadu. The major risk mitigation strategies adopted by farmers in *Bt* cotton cultivation were planting resistance varieties, availing credit and investing on other crops, complementing farm income with off farm income and keeping one season fallow. Majority of the farmers of both the states Haryana and Tamil Nadu were not enrolled in any formal risk mitigating measures such as crop and weather based insurance schemes.

Key words : *Bt* cotton, farmers' perceptions, mitigating strategies, risk sources, tabular analysis

The agricultural sector is exposed to a variety of risks, which occur with high frequency. These include climate and weather risks, natural catastrophes, pest and diseases, which cause highly variable production outcomes. Production risks are exacerbated by price risks, credit risks, technological risks and institutional risks. The factors affecting agriculture mostly are natural and the local weather aberrations like frost, abrupt rise in temperature, heavy rainfall, hailstorm etc. Different farm practices, size of the operated area, importance given by farmers to particular crop in a particular area on give rise to variation in input use, their costs, productivity and production. The risk is much more than normally presumed.

Risk management in agriculture ranges from informal mechanisms like (avoidance of highly risky crops, diversification across crops and across income sources) to formal mechanisms like agriculture insurance, minimum support price system and future markets. While studying the crop insurance in the country, Ramaswami observed that to protect farmers against production risks the crop insurance scheme based on the area approach has some concerns. This is due to the fact that premiums are not in line with actuarial cost. Such subsidization makes it expensive to expand the crop insurance programme. Best insurance to the farmers and enhanced earning capacity is possible only by adopting steps like: multi-cropping, scientific farming with regulated drip irrigation, creation of reliable agro and food processing infrastructure, increased availability of ground water and 24x7 power availability. The coordinated mission mode operation has to be

initiated by government in partnership with the agricultural universities and its scientists.

Since cotton crop is a climate change complaint crop adapted under different environments with low, high rainfall, needs relatively more investment in terms of fertilizer application, irrigation and insect pest management. Farmers adopt new technologies as the rate of returns to such investments are relatively high for increasing their incomes but the risk of crop failure are also high due to unforeseen vagaries of nature. Thus, measuring the degree of risk aversion, risk bearing abilities of farmers and factors that impede adoption of technologies in cotton is crucial for promoting improved technologies in order to enhance productivity and profitability of this crop. Henceforth, risk is present in all management decisions of cotton production, marketing and processing results into price, yield and resource uncertainty. Understanding this link between production and marketing risk exposure and assessing risk, its sources and mitigating strategies are also vital to scale up existing successful farm technologies across poor cotton growers in both the states. Present studies are an attempt to examine respondents attitude towards risk, risk sources and mitigating strategies for *Bt* cotton crop in Haryana and Tamil Nadu to reduce variability in yield and income.

MATERIALS AND METHODS

The present study was carried out in both the states of Haryana and Tamil Nadu. A multistage random sampling technique was adopted for selection of districts, blocks, villages and sample farmers. Sirsa and Hisar district of Haryana and Salem and Dharmapuri district of Tamil Nadu were randomly selected to represent a case study. Then, one block was randomly selected from each selected districts of Haryana and Tamil Nadu for the present study *i.e.* Uklana block from Hisar district, Mandi Dabwali block from Sirsa district, Dharmapuri block from Dharmapuri district and Aattur block from Salem district. From each selected blocks, two villages were also randomly selected. Thus in total following eight villages were selected for present study. These villages were Mugalpur and Sahu from Uklana block in Hisar district and Kharian and Risalia Khera from Mandi Dabwali block from Sirsa district in Haryana. Similarly in Tamil Nadu, Onniyampatti and Andipatti from Dharmapuri block in Dharmapuri district and Thalavalpatti and Puthiragoundampalayam from Aattur block in Salem district were selected. From the selected villages, a random sample of 15 respondents from each village were selected. In all, a sample of 120 farmers were selected, 60 from each states by using multistage random sampling technique. From these selected farmers, the primary data regarding various farmers' perceptions towards risk, sources and risk mitigating strategies adopted by them were collected by conducting the personal interview with the selected respondents on pre tested schedule.

Farmers differ in the degree to which they accept risk. Some farmers are willing to accept more risk than others. Attitudes to risk are often related to the financial ability of the farmer to accept a small gain or loss. Farmers' attitudes may be classified as: risk-averter those who try to avoid the impact of risks by adopting some risk management strategies; risk bearers

those who are open to more risky business options; and risk neutral farmers who lie between the risk averse and risk taking position. To determine the farmers' perceptions towards risk, 120 farmers were consulted in both the states of Haryana and Tamil Nadu using an interview schedule. Based on the information given by the farmers, the farmers were then classified as risk averter, risk bearer and risk neutral.

Information regarding the major risks experienced by farmers and the various mitigating strategies adopted by them to overcome those risks during *Bt* cotton cultivation were collected from the respondents by survey method through personal interview with the help of pre tested schedule designed for the study. That information given by sampled farmers of both the states of Haryana and Tamil Nadu was presented in a tabular form.

RESULTS AND DISCUSSIONS

Farmers' perceptions towards risk : Farmers may be divided into three types: risk neutral; risk takers and risk-averse. The risk averse farmers try to avoid taking risks. They tend to be more cautious individuals with preferences for less risky sources of income. In general, they will sacrifice some amount of income to reduce the chance of low income and losses. A risk averter does not refuse to accept any risk at all. However, the risk averter would seek to be compensated for the risk taken by receiving a higher return than would normally be obtained if there were no risk. Risk takers are people who are open to more risky business options. Unlike the risk averse, risk takers choose the alternative that gives some chance of a higher outcome, even though they may have to accept a lower outcome.

When faced with the choice, risk taking farmers tend to prefer to take the chance to make gains rather than protecting themselves from potential losses. Even so, risk taking farmers are still influenced by the return they could receive. Risk neutral lies between the risk-averse and risk-taking positions. It is useful for the farmers and those who provide support services to know their attitudes towards risk. In this way, they are more conscious of the motivation behind the risk management decisions made. While most farmers tend to be risk averse, attitude concerning risk is not fixed. Many factors influence it. Thus in one situation a farmer may be risk averse, and in another situation the same farmer may be a risk-taker.

The sampled farmers of both the states of Haryana and Tamil Nadu were classified into risk bearers, risk neutral and risk averters as indicated in Table 1 based on their individual perceptions towards risk. In Haryana, 25 per cent of the small farmers, 41.18 per cent of the medium farmers and 33.33 per cent of the large farmers were risk bearers but in Tamil Nadu it was 11.54, 21.74 and 18.18 per cent, respectively. About 68.75 per cent of small farmers, 47.06 per cent of medium farmers and 37.04 per cent of large farmers were risk neutral in Haryana where as in case of Tamil Nadu it was 65.38, 52.17 and 45.45 per cent, respectively. The percentage of risk averters in Haryana were 6.25 (small farmers), 11.76 (medium farmers) and 29.63 (large farmers) similarly in Tamil Nadu it was 23.08, 26.09 and 36.36 per cent, respectively.

Table 1. Farmers perceptions toward risk

Particulars	Risk bearers	Risk neutral	Risk averters	**Total**
Haryana				
Small (N=16)	4 (25)	11 (68.75)	1 (6.25)	**16 (100)**
Medium (N=17)	7 (41.18)	8 (47.06)	2 (11.76)	**17 (100)**
Large (N=27)	9 (33.33)	10 (37.04)	8 (29.63)	**27 (100)**
Overall (N=60)	**20 (33.33)**	**29 (48.33)**	**11 (18.33)**	**60 (100)**
Tamil Nadu				
Small (N=26)	3 (11.54)	17 (65.38)	6 (23.08)	**26 (100)**
Medium (N=23)	5 (21.74)	12 (52.17)	6 (26.09)	**23 (100)**
Large (N=11)	2 (18.18)	5 (45.45)	4 (36.36)	**11 (100)**
Overall (N=60)	**10 (16.67)**	**34 (56.67)**	**16 (26.67)**	**60 (100)**

Figures in the parentheses indicate the percentage to the total number

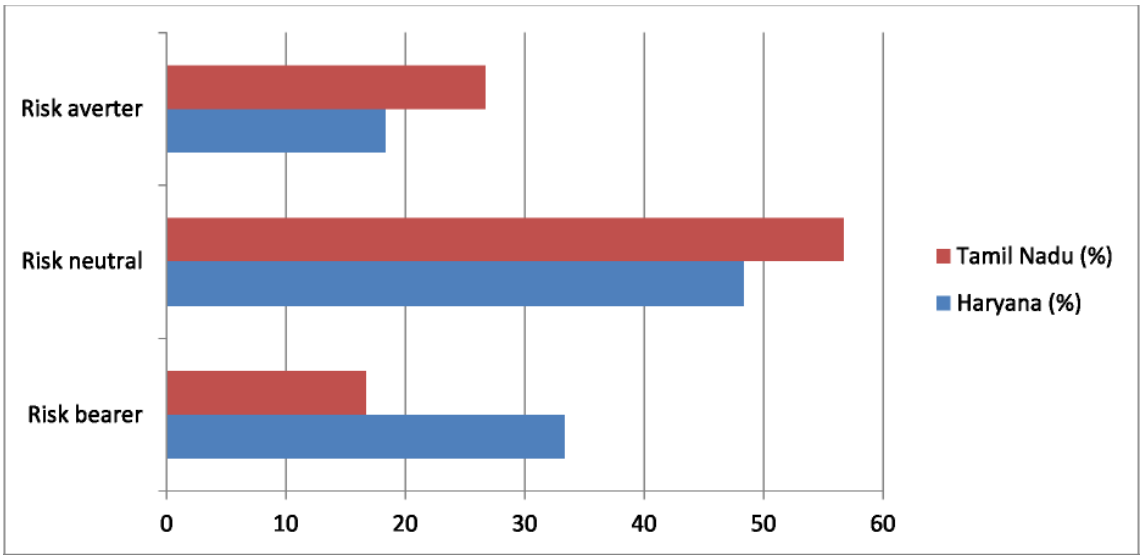

Fig. 1. Farmer's perceptions towards risk

vely. Totally, 33.33 per cent of risk bear bearers, 48.33 per cent of risk neutral and 18.33 per cent of the risk avers were in Haryana and in Tamil Nadu, the overall percentage of risk bearers, risk neutral and risk averter were 16.67, 56.67 and 26.67, respectively.

Major risks experienced by farmers in *Bt* cotton cultivation : The data in Table 2 depicts the information regarding the sources of major risks experienced by cotton growers in cultivation of *Bt* cotton during past three years in both the states of Haryana and Tamil Nadu. As per the information given by *Bt* cotton growers in both Haryana and Tamil Nadu, the major risks were drought/moisture stress, pest and disease

incidence including sucking pests and boll worms, high price of inputs, lodging and rainfall at harvesting stage, low price of output and non-availability of inputs like seed, fertilizers and insecticides. In Haryana, major yield loss occurred due to pest and disease incidence (80 per cent of total yield loss) followed by low price of output (45% of the total yield loss) and drought/ moisture stress (40% of the total yield loss). Where as in case of Tamil Nadu, major risk factors responsible for yield loss were lodging and rainfall at harvesting stage (70% of the total yield loss) followed by low price of output (60% of the total yield loss) and drought/moisture stress (40% of the total yield loss). Non-availability of inputs (seeds, fertilizers and insecticides) and high price of inputs were the minor factors responsible for the yield loss in *Bt* cotton cultivation.

Estimates of area, yield and price variability : The area coverage and yield of agricultural commodities varied widely due to fluctuations in climatic events and changes in management practices. Yield variability has an effect on the goal of meeting rising aggregate demand and on price and market stability. It leads to unstable farmer income, unstable household food production, variable supplies and prices to consumers.

Considering the area, yield and price under *Bt* cotton for improved cultivars during 2011-2012 to 2015-2016, the farmers from selected areas were experienced higher degree of variability as presented in Table 3. Stabilizing this high degree of variability through different formal and informal risk mitigating measures is the main concern, as it influences their

Table 2. Major risks experienced by farmers in *Bt* cotton cultivation during past three years

S. No	Particulars	Haryana		Tamil Nadu	
		Rank* (Based on severity)	Per cent yield loss occurred	Rank* (Based on severity)	Per cent yield loss occurred
1	Drought/moisture stress	2	40	2	40
2	Pest and disease incidence				
	i) Sucking pests (particularly whitefly)				
	ii) Bollworms	1	80	2	35
3	High price of inputs	3	20	3	10
4	Low price of output	2	45	1	60
5	Major risk factors at harvesting stage (lodging, rainfall)	3	20	1	70
6	Non availability of inputs (seed, fertilizers and insecticides)	3	10	3	15

*1-High, 2-Medium, 3-Low

Table 3. Variation of area, yield and price during 2011-2012 to 2015-2016

Particulars		2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Haryana	Area (ac)	6.1	5.3	5.2	5.8	5.1
	CV (%)	30.83	35.01	40.28	25.42	33.90
	Yield(gtls/ac)	8.0	8.2	6.7	7.4	6.1
	CV (%)	21.97	20.47	31.63	24.92	25.55
	Price (Rs./q)	3983	4331	4913	4405	4300
	CV (%)	8.53	9.53	10.54	14.43	15.94
Tamil Nadu	Area (ac)	1.5	1.8	1.9	2.1	2.5
	CV (%)	33.33	42.06	35.57	35.10	26.83
	Yield(gtls/ac)	8.2	8.5	8.0	7.9	7.8
	CV (%)	19.81	21.75	20.48	23.92	24.00
	Price (Rs./q)	3585	4161	5197	4417	4100
	CV (%)	29.90	12.09	11.62	15.07	9.67

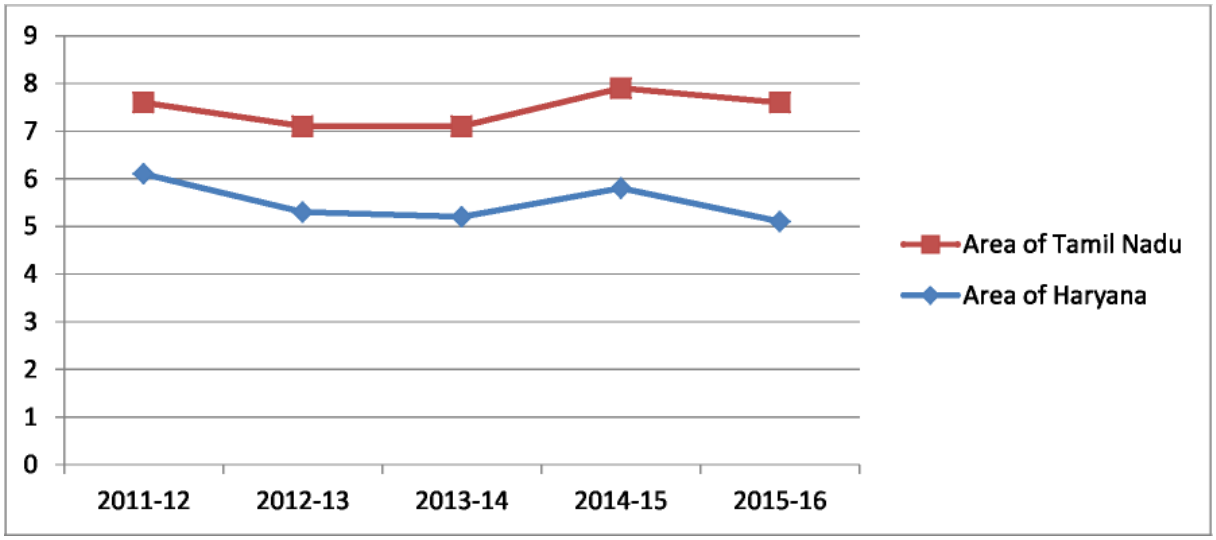

Fig. 2. Variation of area and during 2011-12 to 2015-16 in Haryana Tanu1 Nadu

decision to allocate resources in the cultivation of *Bt* cotton. The table indicated that from year 2011-2012 to 2015-2016 variability in area, yield and price in Haryana were ranges from around 25 per cent to 40 per cent (C.V. 25.42 to 42.28), about 20 to 32 per cent (C.V. 20.47 to 31.63) and about 9 to 16 per cent (C.V. 8.53 to 15.94), respectively. Similarly in Tamil Nadu, variability in area, yield and price from year 2011-2012 to 2015-2016 were ranges from around 27 per cent to 42 per cent (C.V. 26.83 to 42.06), about 20 to 24 per cent (C.V. 19.81 to 24.00) and about 10 to 30 per cent (C.V. 9.67 to 29.90), respectively.

Risk mitigating strategies : Complementing the farm income with off farm income, planting pest resistance cultivars, going for low cost inputs, availing credit and investing on other crops, crop insurance enrolment, keeping one season fallow, mixed crops and

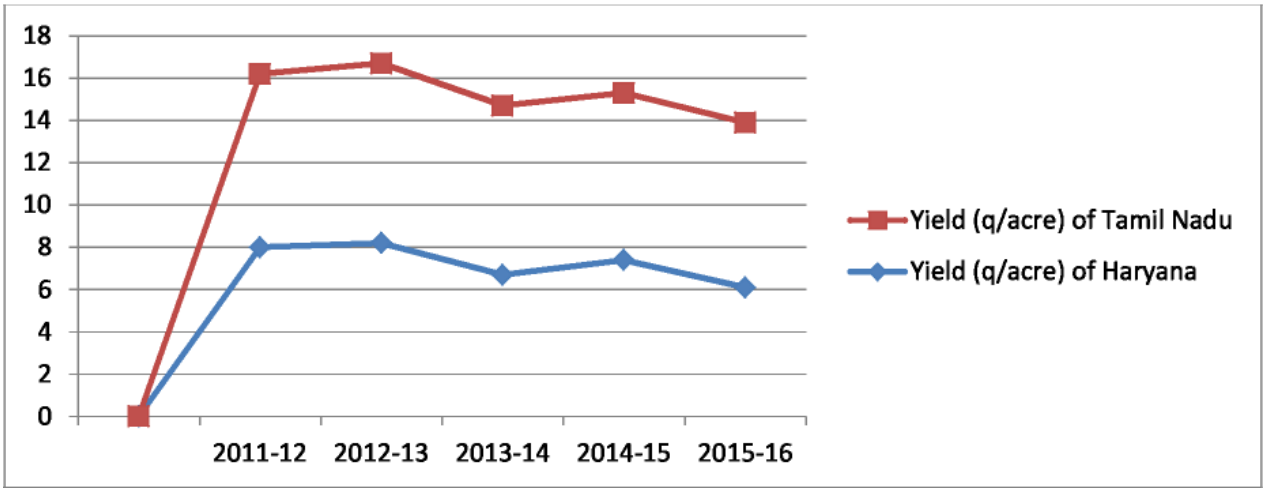

Fig. 3. Variation of yield during 2011-12 to 2015-16 in Haryana and Tamil Nadu

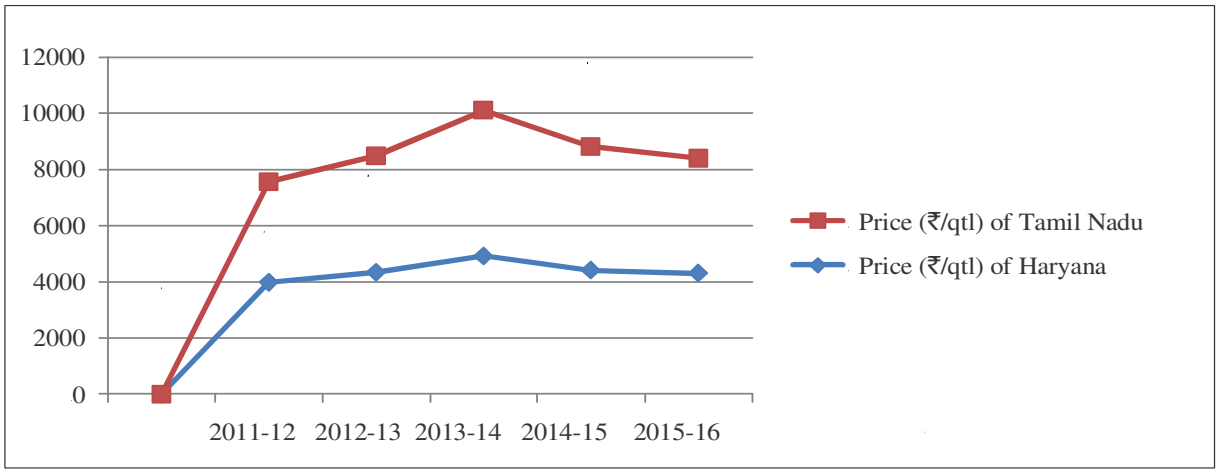

Fig. 4. Variation of price during 2011-12 to 2015-16 in Haryana and Tamil Nadu

obtaining market information before the sale of farm produce were the various risk mitigating strategies adopted by *Bt* cotton growers (Table 4). The strategies like planting pest resistance cultivars (86.67% of the total farmers), availing credit and investing on other crops (71.67% of the total farmers), keeping one season fallow (65.00% of total farmers) and obtaining market information before the sale of produce (56.67% of the total farmers) were adopted by most of the farmers in Haryana. Where as in case of Tamil Nadu, planting pest resistance cultivars (81.67% of the total farmers), availing credit and investing on other crops (76.67% of the total crops), complementing farm income with off-farm income (66.67% of the total farmers) and mixed crops (58.33% of the total farmers) were the major risk mitigating strategies adopted by the *Bt* cotton growers But the farmers of both the states of Haryana and Tamil Nadu were not aware of crop insurance programmes.

Table 4. Risk mitigating strategies adopted by farmers in *Bt* cotton cultivation

S. No.	Risk mitigating strategies	Haryana		Tamil Nadu	
		Number of farmers (N=60)	Respondent's response (%)	Number of farmers (N=60)	Respondent's response (%)
1	Complementing farm income with off farm income	30	50.00	40	66.67
2	Planting pest resistance cultivars	52	86.67	49	81.67
3	Going for low cost inputs	20	33.33	28	46.67
4	Availing credit and investing onother crops	43	71.67	46	76.67
5	Enrolled in crop insurance	5	8.33	7	11.67
6	Keeping one season fallow	39	65.00	23	38.33
7	Mixed crops	15	25.00	35	58.33
8	Obtaining market information before sale of farm produce	34	56.67	19	31.67

CONCLUSIONS

Extreme climatic events such as drought pose a major threat to the agricultural production and consequently to the livelihood of the people dependent directly or indirectly on agriculture. Mitigating post-drought effects requires financial resources for drought relief, safety nets and other development programmes. Thus, better management of risk and sustalnably enhancing productivity are critical to ensure future livelihoods of rural communities. Region-specific policies should be customized to different conditions in different areas. Formal weather indexed crop insurance programmes are crucial to stimulate farmers to invest on improved technologies so that in the event of crop failure, insured agency will pay the indemnities to the extent of crop damage. The risk cover is presently available in the form of crop insurance and cannot be said as sufficient and rarely cover all the risks. Hence, there is a need to develop a system of risk management that is responsive to the farmers needs. Cotton farming has become increasingly risky as farmers have become more commercial. Farmers need to understand risk and have risk management skills to better anticipate problems and reduce consequences.

REFERENCES

Zelda, A. and Sekar, C. 2015. *Bt* cotton: evaluating farmers' perception in Tamil Nadu, *Internat. Jour. Agri. Policy Res.* **3 :** 236-41.

Nagaraj, N., Kundu, K.K., Ardeshna, N.J., Singh, LP., Anusha, R. and Cynthia Bantilan 2015. Assess farmers behaviour in relation to risk associated with adoption of capital intensive technologies and mitigation strategies in western India for pearl millet, Dept of Agri. Economics, CCSHAU.

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