Why some Indian cotton farmers do not adopt Bt cotton..

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1. Introduction

The ongoing debate on the benefits of Bt cotton for Indian farmers is fuelled by contradictory reports. Sales figures from the industry suggest that cotton farmers are eager to plant Bt cotton, and several studies have found high benefits while other sources speak of poor performance of the Bt technology in some areas. In a study of 100 early adopters of Bt cotton carried out in two districts of Karnataka during 2002, Orphal (2005) found that in irrigated cotton farmers using Bt had higher gross margins while the opposite was found under rainfed conditions. Based on the results of a simulation model using stochastic partial budgeting it was shown that under the conditions in the surveyed area in 2002, Bt cotton is profitable only for a subset of farmers (Pemsl et al 2004). To confirm these results, a second survey was conducted in the area.

2. Objectives

Within the broader objective of contributing to the assesment of Bt cotton impacts in India, specific objectives are

- to analyse the early adopters' performance with Bt cotton after two years of experience

- to assess the profitability of the Bt technology at the farm level

- to identify factors that influence the adoption of Bt cotton.

3. Data collection

The study is based on the analysis of plot level data from a panel of 100 early adopters across 50 villages in two districts of Karnataka that were surveyed in the 2002 and 2004 cropping seasons, which was supplemented by 50 non-adopters in the second season. The surveys were focussed on cotton production and farmers' knowledge and perception of Bt cotton. This data set permits the comparison of Bt and non-Bt production data across two years using descriptive statistics.

4. Results

The second survey showed that about 90% of the early adopters had stopped growing Bt cotton, while continuing to cultivate cotton. The main reasons stated by the farmers for discontinuing Bt cotton cultivation are given in figure 1. An important factor is the lack of irrigation facilities. Rain has been deficient from 1999 through 2003, which was a drought year leading to a deterioration in water availability. Most reasons given by the farmers relate to a lack of economic attractiveness. The category labeled 'other reasons' includes a number of farmers who stated that Bt is not used as it reduces soil health, is not suited for the prevailing soil conditions or due to deficits in knowledge and information on Bt cotton, amongst others. The data for 2002 shows that total variable costs for Bt cotton were significantly higher than for conventional cotton, mainly due to higher seed costs (table 1). The profitability of Bt cotton was lower as the savings from reductions in insecticide costs failed to cover the premium on the new seed varieties, while the difference in yields was not significant.

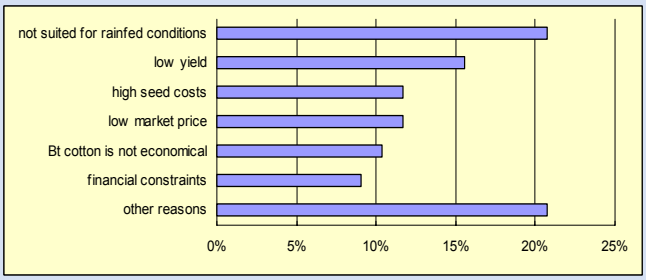

Figure 1: Farmers' reasons for disadoption
Source: field survey

In addition, market prices for Bt cotton were lower due to the lower staple length of the Bt varieties used. Similarly in 2004, seed costs of Bt cotton cultivation considerably exceeded seed costs for conventional cotton while savings in insecticides were comparatively small.

Table 1: Comparison of Bt and non-Bt cotton production data

2002/2003 season	non-Bt (n = 63)	Bt (n = 91)	[% diff.]
Yield [tonnes/ha]	1.14	1.25	0.10 ns
Price [US$/tonne]	477.55	442.50	-0.07 ***
Insecticide costs [US$/ha]	35.12	21.95	-0.38 ***
Seed costs [US$/ha]	18.29	76.51	3.18 ***
Total costs [US$/ha]	183.68	231.92	0.26 ***
Gross margin [US$/ha]	338.85	289.23	-0.15 ns
2004/2005 season	**non-Bt (n = 83)**	**Bt (n = 9)**	
Yield [tonnes/ha]	1.39	0.97	-0.30 **
Price [US$/tonne]	401.48	393.47	-0.02 ns
Insecticide costs [US$/ha]	47.54	34.49	-0.27 ns
Seed costs [US$/ha]	16.94	85.41	4.04 ***
Total costs [US$/ha]	284.69	339.66	0.19 ns
Gross margin [US$/ha]	272.55	35.89	-0.87 **

Source: field survey data
note: **,*** indicate statistical significance at .05 and .01% level respectively

5. Conclusions

Under the conditions prevailing in the survey area, the use of Bt cotton seems to be less profitable than the use of conventional hybrids as higher costs are not compensated by savings in insecticides. In areas with agro-ecological conditions similar to the survey area, the introduction of Bt technology for pest management may not lead to improvements of the economic situation of the cotton growers.

6. Further analysis

In order to better explain the disadoption behavior, work is ongoing to apply production function analysis using damage function specifications. The simulation model which has been applied to the situation prevailing in the survey area will be extended with expert information to scenarios that may be representative for irrigated and rainfed cotton systems in India.

References

ORPHAL, J. (2005). Comparative analysis of the economics of Bt and non-Bt cotton production. Pesticide Policy Project Publication Series Special Issue No. 8, Hannover.
PEMSL, D., H. WAIBEL and J. ORPHAL (2004). "A methodology to assess the profitability of Bt-cotton: case study results from the state of Karnataka, India." Crop Protection 23(12): 1249-1257.

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