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Economic Costs of the Application of Pesticides on Vegetables in Bardhaman West Bengal-An Emprial Analysis

Arnab Roy

University of Agricultural Sciences, GKVK, Bangalore- 560065

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ABSTRACT

The role of pesticides on vegetables has become censoriously important with transformation of Indian agriculture. Modernization of agriculture suggests augmented use of modem inputs. An comprehensive and inclusive study encouraged this investigation of the complex of economic costs consequential from the excessive dependence on pesticides on vegetables. Regardless of the pervasive application of pesticides on vegetables at recommended dosages, pests (insects, plant pathogens, and weeds) destroy 37% of all potential crops. Tomato, cabbage and brinjal, okra and leafy vegetables are important crops for small-scale farmers and migrants in the rural and peri-urban areas of West Bengal. Though pesticides are normally profitable in agriculture, their use does not always decrease crop losses. Expenditures on pesticides by Farmer are below the economic optimum level in most of the vegetables, and the estimated function for injury reduction shows that amounts of pesticide are significant determinants of leafy vegetables yields only. Stochastic budget analysis also indicates a higher rate of return to vegetable production with the use of resistant seeds relative to status quo, even considering the technology transfer fee for GM seeds.

1. Introduction

The use of pesticides carries several dangers. It is argued that increase in production cost, when associated health costs are counted due to use of pesticides, exceeds the improvement in crop productivity. Chemical controls have affected non-target as well as target species. In some cases, predator populations (*i.e.* elements of natural control) have been reduced. Although resistant predators have survived, they faced a reduced food supply. Pesticide use has increased over time in West Bengal and is particularly elevated in the production of high-value cash crops and vegetables. Biotic constraints that cause significant economic damage include yellow-leaf-curl-virus (TYLCV) in tomato, diamondback moth (DBM) in cabbage, and shoot and fruit borers in brinjal. These three crops (tomato, cabbage and garden egg) have distinctive economic characteristics.

From the various study it has been noted that, in India pesticide consumption is far less vis-a-vis other countries. However, we have the problem of pesticide residues in food products which mainly percolate from fruit and agriculture crops wherein pesticides are used to kill pests Pesticides used by them are not persistent. Several studies have been conducted on marketing and economic use of different agricultural inputs. But the studies on pesticides are scantly. Rahman (1978) emphasized on the study concerning correct application and economic viability of insecticides. Prabhu (1985) showed that pesticides use by farmers was excessive and their pesticides use decisions were based on their expectations regarding the timing and intensity of pest attack, the pest damage function and the effectiveness of pesticides. From the table 1 it has been revealed that majority of the farmer applied the pesticide at recommended dose, but the application of pesticide above the recommended dose also significant.

*Corresponding author:royarnab_94@rediffmail.com

Table 1. Using recommended quantity of pesticides (% of farmer)

Type of farmer	Recommended quantity	Less than recommended quantity	More than recommended quantity
Small	61.34	16.92	19.62
Medium	54.23	20.15	23.65
Large	60.20	24.13	10.25
All	62.12	14.75	21.43

Table 2. Awareness and use of different pest control measures (% of farmers)

Methods	Aware/Use effectiveness	IPM farmers	Non-IPM farmers
Pesticide applications	Aware	100	100
	Use	67.24	85.43
Cultural Methods	Aware	76.50	43.23
	Use	76.45	45.54
Biological Methods	Aware	76.20	15.32
	Use	32.45	9.10
Pest resistance seed	Aware	75.54	32.47
	Use	30.67	15.24

Rola and Pingali (1993) candidly recognized that frequent application and use of very toxic chemicals increased risk of farmer health damage due to chemical exposure and indiscriminate pesticide use leads to larger pest related yield losses than not applying pesticides at all.

2. Objective

The objectives of this study was to observe the pesticides use pattern on vegetables by the farmers, to examine the storage and safety practice of the farmers, to find out the relationship between pesticides use and vegetables productivity in West Bengal.

3. Methodology

On the basis of highest pesticide use per hectare for tomato and brinjal, four villages from four blocks namely Kantaberia, Galshi, Khandagram and Notunhat were selected for this study. One or two than as from each district was chosen based on highest pesticide used. Then farmers from each district totalling 40 farmers were selected for this study. All farmers cultivated vegetables were listed with the help of Block Supervisors of the respective villages. Farmers were classified into three groups such as small (< 2.51 acres), medium (2.51-5.00 acres) and large (> 5.00 acres). Sample was drawn in such a way that all groups of farmers might be included into the sample. On the basis of higher pesticides use, four vegetables namely Tomato, Brinjal, Cabbage, Bean, Potato and leafy vegetables. Regions where these selected vegetable are grown intensively were chosen for this study. Using data collected

From a statistical sample of farmers in West Bengal, we evaluated insecticide use as an indicator of the potential adoption of high breed varieties. The approaches they propose are suitable for estimating the effect of inputs on yield, as well as the interaction effects among inputs.

4. Results and Discussion

More than half of the farmers use recommended quantity of pesticides in their crops (Table 1). On the other hand, each one-fifth of them either uses more or less than the required quantity. The study shows interesting result that more proportion of small and medium farmers use excess quantity compared with large farmers. However, this is reverse in the case of using less quantity. This indicates that there is no relation between the financial solvency and use of pesticides in the study area. Farmers use higher amounts of pesticides than recommended doses because of ignorance, lack of training, experience, awareness *etc.* Farmers believe that production will be more if they apply more of pesticides. For that reason they use excess pesticides. For selling more pesticides the traders advise farmers to use more pesticides. As Block Supervisors do not meet farmers regularly, the farmers remain unaware about the recommended doses of pesticides. The estimation of the cost of cultivation of crops and returns is very important in farm economics as it helps in decision making at various levels: the farmers, researchers, policy makers, bankers and the administrators. The cost of cultivation and returns from various crops were computed based on the information collected from the sample villages through rapid rural appraisal approach. Proportionately more large farmers use pesticides after fertilizer application but it is reverse in case of applying pesticides after ploughing land.

Majority of farmers (80%) reported to use pesticides during initial attack. About two fifths of them apply during severe attack. Hundred percent of large farmers reported using during initial attack. However, only a few of them apply during severe attack.

Table 3.Cost of cultivation of tomato in Burdwan Districts (Per ha)

Particulars	**Rs/ha**	**% toTC**
A) Material cost	4350	1.17
i. Seed/Seedlings	38950	10.47
ii. FYM	3575	0.96
iii. Fertilizers	17875	4.80
iv. Pesticides/Chemicals	**64750**	**17.40**
Sub-Total	1200	3.23
B) Bullock Labour/ Tractor Charges	4350	% to TC
C) Human Labour	38950	1.17
Total Cost (Rs.)	59338.8	
Gross Returns (Rs.)	190000	
Net Returns (Rs.)	130661.2	

5. Suggestions and Policy Inputs

In a regime of inexorably changing socio-economic milieu both within the country as well as across the globe, the cultivation of cash crops is going to play a pivotal role in not only providing the livelihood security to the enterprising peasantry in the developing countries but also to provide them opportunities for having a decent living.

It is true for the regions that are naturally endowed with the varying agro-climatic conditions such as hill and mountain agro-ecosystems and where alternative livelihood options are scanty.

Conclusions

The simulations show that there are high probabilities of higher profits in all three crops if farmers decide to adopt GM seeds, despite the technology fee. Variability in price and yield, as well as expected yield losses are the factors that cause the largest changes in rate of returns in our estimations. Despite the variability, these factors tend to increase the profitability of the vegetables. Many issues are important, but from the economist's viewpoint, several points appear to be worth noting. Primary the scope for economic work is broad, involving activities which cut across the traditional areas within agricultural economics. Further, the bulk of the work is by nature interdisciplinary. Secondly the economic issues are deeper than those embodied in the traditional request from the physical scientist for an economist to calculate profitability or provide information on the returns to a particular line of research. At the same time, public pesticide poisonings have been reduced by 60%. It would be helpful, if the districts adopted a similar goal to that of districts of Punjab. Unfortunately with some groups in these districts, IPM is being used as a means of justifying pesticide use.

Table 4.Cost of cultivation of pea in Burdwan Districts (Per ha)

Particulars Quantity	**Value (Rs.)**	**% to TC**
A.Variable Costs		
1.Seed (kg)127	7747	12.74
2.Farm yard manure (q)166	17430	28.67
3.Fertilizers (q)		
i IFFCO mixture1.41	1207	1.99
ii DAP0.50	110	0.18
4.Plant protection material (1 spray + 1 seed treatments	**539**	**0.89**
Total Cost (Rs.)	28341	
Gross Returns (Rs.)	36658	
Net Returns (Rs.)	8317	

Tables 5.Cost of cultivation of potato in Burdwan Districts (Per ha)

Particulars	Value	% to TC
A. Variable cost		
1.Seed (q)	27000	16.62
2.FYM (q)	18750	11.54
B. Fertilizers		
IFFCO mixture (kg)	11440	7.04
ii. Urea (kg)	1050	0.65
C. Plant protection	**12500**	**7.69**
Total Cost (Rs.)	17067	
Gross Returns (Rs.)	17656	
Net Returns (Rs.)	4953	

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Table 6.Cost of cultivation of cabbage in Burdwan Districts (Per ha)

Particulars	Value(Rs.)	% to TC
A. Variable cost		
1.Seed (q)	9800	6.27
2.FYM (q)	7000	4.48
B. Fertilizers		
IFFCO mixture (kg)	2400	1.54
ii. Urea (kg)	600	0.38
C. Plant protection	**6075**	**3.89**
Total Cost (Rs.)	44747	
Gross Returns (Rs.)	73097	
Net Returns (Rs.)	28350	