

## Short Communication

## Impact of Fertiliser Consumption and Drought Incidence on Pesticide Consumption

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There has been a steady growth in the consumption of fertilisers and pesticides in India, the consumption being about 784 thousand tonnes in 1966 and 11567 thousand tonnes in 1990. The consumption of pesticides (including insecticides, fungicides, herbicides and rodenticides) increased from about 14630 tonnes in 1966 to 69781 tonnes in 1990. Whereas, fertilisers are definite yield promoters, they are also known to influence the susceptibility of crops to pests. Fertilisers enhance the plant nutrition, which can influence the longevity and fecundity of insects and the degree of damage they cause (Verma and Singh, 1987). Thus, higher consumption of fertilisers leads to increased use of pesticides as well. As such, the relationship between pesticide consumption and fertiliser consumption was examined.

Pesticide consumption is the response of farmers to the incidence of pests and diseases, and it is influenced by many factors. Irrigation and fertiliser application are two important variables that will not only influence pest incidence but are also indicative of the farmers' accessibility to resources. Hence, it will be useful to examine the impact of these two factors on pesticide consumption. But, preliminary examination of data revealed a high degree of multi-colinearity ( $r = 0.94$ ) between these two variables, and hence, could not be included in regression model. Therefore, the drought variable was included in the regression model, along with fertilisers as a rainfall index in order to get the effect of moisture availability. Thus, pesticide consumption is regressed on fertiliser consumption and drought, using the time series data for the period, 1966-90.

Since the consumption of nitrogen considerably influences the vulnerability of the crop plants to pests and diseases, two separate regression equations, one with nitrogen only and the other with total nutrients (N+P+K), were estimated. The difference between the two coefficients may be attributed to the other two nutrients.

The equation is as given below :

$$\text{PESCONS} = b_0 + b_1X + b_2D + u_t$$

( $b_1 > 0, b_2 < 0$ )

where,

PESCONS = Consumption of pesticides  
 (Technical Grade in Tonnes)

X = Consumption of fertiliser  
 nutrients/Nitrogen ('000 tonnes)

D = Dummy variable for drought  
 D = 1 if it is a drought year  
 D = 0 if it is a normal year

$u_t$  = Error term

The data on consumption of pesticides were collected from various issues of Pesticides Information, Pesticides annual, Agricultural Statistics at a glance and Indian Agriculture in Brief. The data related to fertiliser consumption and drought years were taken from Fertiliser Statistics.

The estimated regressions equation between pesticide consumption and nitrogen and total fertiliser consumption and drought are given in Table 1.

As is evident from the estimated equation, fertiliser consumption was found to have significant positive effect on the aggregate pesticide consumption, whereas, the incidence of drought

Table 1. Effect of consumption of fertilisers and drought on pesticide consumption, 1966-90

Dependant variable	Constant	Coefficients		Drought	R <sup>2</sup>
		Nitrogen	(N+P+K)		
PESCONS	27836.591 (4787.251)	6.609 (1.073)		-8499.473* (4351.817)	0.65
PESCONS	28659.598 (4759.172)		4.253 (0.704)	-8625.050* (4402.440)	0.64

Figures in parentheses are standard errors.

\* Significant at 10% level; all others are significant at 1% level.

was found to have significant negative effect. It is well known that higher use of fertilisers, especially nitrogen, by way of making the plants more succulent and vulnerable, will attract higher pest infestation levels. The coefficient associated with nitrogen is more than that of total nutrients. This is probably due to the resistance imparting effects of phosphorus and potassium. There are many studies reporting higher incidence of different pests at higher levels of fertiliser application especially at higher nitrogen levels (Kashyap *et al.*, 1982; Ilango and Uthama Samy, 1989; Singh 1990). Higher pest infestation necessitates higher pesticide use.

Incidence of drought will cause low pest infestation in some crop pests and higher infestation in some others depending upon the physiological responses of the particular crop and pest (Wheatley *et al.*, 1989). In any case the yield uncertainty will be more during drought years and farmers will hesitate to invest in plant protection measures. Also the cropped area during the drought years will be less than what it would have been during a normal year. Cropped area, fertiliser application, pesticidal use will all be affected by drought (Katyal *et al.*, 1993).

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