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ESTIMATES ON THE EXTENT OF LOSS DUE TO QUICK WILT DISEASE OF BLACK PEPPER (*PIPER NIGRUM* L.) IN CALICUT DISTRICT OF KERALA*

R. BALAKRISHNAN**, M. ANANDARAJ, K. K. N. NAMBIAR***, Y. R. SARMA, R. N. BRAHMA**** and M. V. GEORGE***

Central Plantation Crops Research Institute, Regional Station, Calicut 673 012, Kerala, India.

ABSTRACT

A survey was conducted in Calicut district of Kerala State (India) to assess the extent of loss in yield due to quick wilt disease of black pepper. The study was conducted for a period of three years (1982-1984) and it was estimated that on an average about 1,88,900 vines perish due to quick wilt disease per year and the consequent yield loss amounting to about 119 metric tonnes of black pepper per year. It was also estimated that a total of 11% of plants were lost due to the disease during the course of three years (1982-1984)

INTRODUCTION

Foot rot or quick wilt is the major disease black pepper causing complete death of the vines, thereby causing extensive yield loss. In India, Samraj and Jose (1966) recorded vine death upto 20 per cent in Cannanore district, while Nambiar and Sarma (1976) reported 25-30% loss in some gardens of Cannanore and Calicut districts of Kerala State. However, no systematic study have been made in India to estimate the overall loss caused by quick wilt. The present study was undertaken in order to get an objective and reliable estimate of the total number of vines lost due to the disease and the consequent production loss, restricting the study only to Calicut district, which is one of the major pepper growing districts of Kerala State.

MATERIALS AND METHODS

Details of field survey

The design of the survey was startified multistage, with two strata of villages. The villages with large scale pepper cultivation were grouped into one stratum and the villages with moderate scale pepper cultivation were grouped into another stratum. Other villages were omitted from the purview of the survey. Based on the information collected from the District Agricultural Office, Calicut, a list of 18 and 10

* *Contribution No. 436 of Central Plantation Crops Research Institute, Kasaragod, Kerala.*

** *Dirctorate of Oilseeds Research, Rajendranagar, Hyderabad 500 030, Andhra Pradesh.*

*** *Central Plantation Crops Research Institute, Kasaragod, Kerala.*

**** *Indian Agricultural Research Institute, Regional Station, Wellington 643 231, Tamil Nadu.*

villages were identified as belonging to the first and second stratum respectively. Four and three villages were selected at random from the first and second stratum respectively and from each selected village five survey subdivisions were selected at random. Four adjacent subdivisions were added to the originally selected survey subdivisions to form clusters of five survey subdivisions each. The selected survey subdivisions were visited for three consecutive years, namely 1982, 1983 and 1984 for complete enumeration of total number of healthy vines existing and number of vines/plants diseased. Additional information on the cultivation practices were recorded by interviewing the farmers. Even though the mean yield per standard/plant could not be estimated by crop cutting methods, an indirect estimation procedure was followed. In each garden, a random sample of vines/standard were selected and the number of spikes in one metre portion of the vines at breast height was recorded. In addition, each metre of the vines was categorised into poor, medium or high yielding based on visual judgement of spike density and was given a numerical score of 1, 2 or 4 accordingly. Thus a total yield score was given for each plant.

Estimation procedures

a) General: The estimates of mean number of vines lost due to the disease per survey subdivision and the variances of the estimates were obtained using standard procedures (Sukhatme and Sukhatme, 1976). However, for purpose of estimating the total loss for the district, an additional list of 13 villages collected from the Agricultural Census records of Bureau of Economics and Statistics, Kerala were taken into consideration. These additional villages were from the areas where pepper is cultivated on a moderate scale.

b) Mean yield per plant: The yield of an individual plant was estimated using the following relation obtained by Balakrishnan and Jose Abraham (Unpublished):

$$\text{Yield} = \exp\left(3.73 + 0.78 \log_e (ys) + 0.58 \log_e (ns)/3\right)$$

where 'ys' stands for total yield score of the plant, 'ns' the number of spikes in one metre portion of the vine at breast height and 'exp' stands for exponential.

RESULTS AND DISCUSSION

Table I gives the mean number of vines lost due to quick wilt disease per survey subdivision for the district alongwith the standard errors of the estimates. Table II gives the estimates of the total number of vines lost in the district and also the total yield in metric tonnes lost in each year of the study. The mean number of vines and the total number of vines lost per year is also presented in Tables I and II.

The loss in yield of pepper due to disease was evaluated in the present study based on the estimate of the mean yield per plant as 725 g and 530 g of black pepper respectively for the first and second stratum. This yield estimate was evaluated based on observations recorded on 521 individual plants.

Table I. *Mean number of vines lost due to disease per survey subdivision in Calicut district*

Year	Estimated number of vines lost	Standard error
1982	4.48	1.16
1983	1.22	0.43
1984	1.61	0.22
Average/year	2.35	0.42

Table II. *Estimate of total number of vines lost and the consequent yield loss of black pepper*

Year	Total number of vines lost*	Loss in metric tonnes**
1982	3,46,684 (5.45)	209.7
1983	1,05,955 (1.92)	72.6
1984	1,32,866 (3.73)	86.6
Avarage/ year	1,88,947 (3.70)	119.6

* Figures in parenthesis are estimated percentage of vines lost in the district due to the disease.

** Pepper production in Calicut district in 1982 is about 4700 metric tonnes.

The stagnation in pepper production is due to several reasons, one of the main reasons being the loss incurred due to death of vines caused by quick wilt. De waard (1979) had estimated that the overall loss due to foot rot (quick wilt) in major pepper growing countries of the world would amount to $ 4.5–7.5 million per annum. The results of the present study indicated that in Calicut district alone, the mean number of vines lost per year amounts to about 1,88,900 with a consequent production loss of about 119 metric tonnes. It was also estimated that a total of 11 per cent of vines were lost during a period of three years namely, 1982 to 1984, in spite of the fact that the value of estimated loss had come down in the second year of study. The reason for this was an unprecedented drought in first half of 1983 resulting in heavy loss of vines, thereby reducing the incidence of quick wilt.

Even though the survey had been restricted to Calicut district, similar trend may prevail in other important pepper growing tracts of Kerala. While the loss of vines was very obvious, the study indicated that only 9 per cent of the farmers had undertaken control measures against the disease; even among these farmers majority of them were not taking up timely spraying schedule and phyto-sanitary measures to control further spread of the disease. The farmers also do not appear to have any inclination of replanting with pepper to compensate for the loss incurred. There is a tendency for replanting with cash crops like rubber for which adequate subsidy is being provided.

The present investigation indicated that unless sustained efforts are made by the extension agencies in providing necessary advice to the farmers in arresting the spread of the disease, and also to adequately take up replanting programme, India may lose the present status of being a major pepper producer in the world.

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REFERENCES

NAMBIAR, K. K. N. and SARMA, Y. R. 1976. Wilt disease of black pepper. *J. Plant. Crops.* **5**: 92–103.

SAMRAJ, J. and JOSE, P. C. 1966. A *Phytophthora* wilt of pepper. *Sci. & Cult.* **32**: 90–92.

SUKHATME, P. V. and SUKHATME, B. V. 1976. Sampling theory of survey with applications. pp 452. Indian Society of Agricultural Statistics, New Delhi.

WAARD, P. W. F. DE 1979. Evaluation of the results of research on eradication of *Phytophthora* foot rot of black pepper (*Piper nigrum* L.). pp 1-47. Circulated during the first meeting of the Pepper Community permanent panel on Techno Economic Studies. 31st January – 4th February, 1979, Cochin, India.