

Effect of planting seasons and the associated weather conditions on the incidence of the rice gall midge *pachytiplosis oryzae* (Wood-Mason)

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ABSTRACT. Studies were carried out at the Rice Research Station, Pattambi (Kerala) to ascertain the extent of damage caused by the rice gall midge *Pachytiplosis oryzae* (Wood-Mason) to IR. 8 paddy crop planted at different fortnightly intervals during 1967-68 to 1971-72. The influence of rainfall, relative humidity, minimum and maximum temperatures on infestation by the pest was also investigated. The pest incidence was found to be maximum and sharp decline for crops planted in June and first fortnight of July respectively, on the basis of the occurrence of silver shoots at 45 days after planting.

The percentage incidence of silver shoots caused by the pest is correlated positively with rainfall and negatively with maximum temperature. Partial correlation studies have revealed the independent influence of rainfall and maximum temperature on gall midge infestation.

1. Introduction

The rice gall midge is one of the major pests of rice in Kerala, particularly in the crop grown during the autumn season (April-May to September-October), often causing substantial losses in yield. The occurrence of seasonal variations in the intensity of pest infestation has been reported by different workers (Gopalakrishnan *et al.* 1954, Khan and Murthi 1955, Krishnamurthy Rao and Krishnamurthy 1960 and Israel 1963). Studies were carried out at the Rice Research Station, Pattambi, Kerala, to ascertain the extent of damage caused by *P. oryzae* to paddy crop planted at different periods of the year as influenced by different climatic factors, in view of the scanty information available on these aspects.

2. Materials and methods

Twenty-five-day old seedlings of the variety IR-8 were planted in doubles with a spacing of 20 cm × 15 cm in plots of size 25 m × 4 m at regular fortnightly intervals during the periods 1967-1968 to 1971-72 commencing from the first fortnight of June upto the second fortnight of January. Cattle manure at 5 tonnes per hectare and fertilizers to supply N, P₂O₅ and K₂O at 100, 50, 50 kg/ha respectively were applied to each plot. No insecticidal applications were adopted so as to allow natural infestation by the pest. Dithane Z-78 at 2 kg/ha was applied at 20

and 60 days after planting for protection against diseases.

Infestation by the gall midge was estimated in terms of per cent silver shoots at 45 days after planting, against the total number of tillers occurring in randomly located area samples of 1 sq. m size. The weather data collected at the Agricultural Meteorological Observatory of the Research Station were utilized for the study. From the daily observations on the maximum and minimum temperatures, rainfall and relative humidity recorded for upto 45 days after planting, the daily means were worked out.

The percentage of silver shoots recorded on crops planted at different fortnightly intervals for the years 1967-1968 to 1971-1972 are depicted in Fig. 1. The mean rainfall and maximum temperature for the first 45 days after planting for the different planting seasons are presented in Fig. 2.

The correlation coefficients between percentage of silver shoots on one hand and different climatic factors on the other are given in Table 1.

A strong positive correlation was found to exist between the percentage of silver shoots and mean rainfall. This positive relationship retained the same association even when maximum temperature was eliminated ($r_{12.5} = +0.5010^{**}$) indicating that irrespective of the

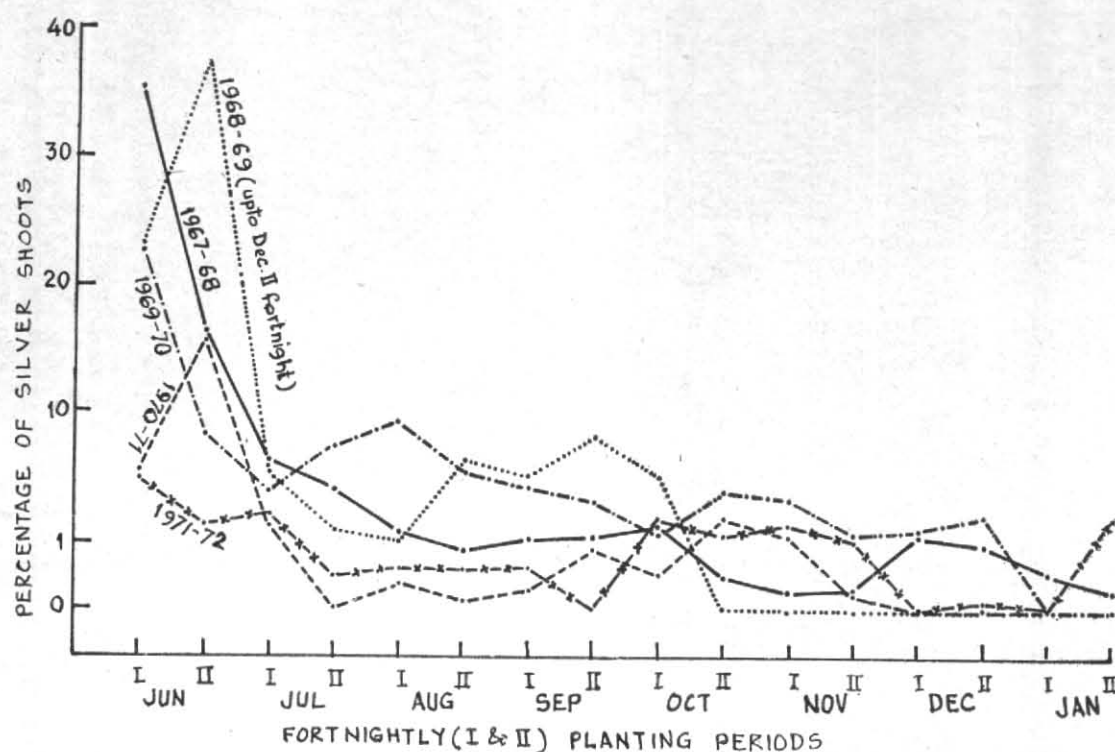


Fig. 1. Percentage of 'silver shoots' recorded at 45 days' after planting in IR-8 paddy crop planted at fortnightly intervals

TABLE 1

Correlations			Correlation coefficients ($n=78$)	
Percentage of silver shoots	(1)	V_s	Mean rainfall	(2) $r_{12} = +0.5682^{**}$
Percentage of silver shoots	(1)	V_s	Mean relative humidity	(3) $r_{13} = +0.1855^{NS}$
Percentage of silver shoots	(1)	V_s	Mean min. temp. ($^{\circ}C$)	(4) $r_{14} = +0.1096^{NS}$
Percentage of silver shoots	(1)	V_s	Mean max. temp. ($^{\circ}C$)	(5) $r_{15} = -0.4322^{**}$

** = Significant at 1% level.

NS = Non-significant.

fluctuations in maximum temperature, the rainfall could itself independently influence gall midge infestation.

The percentage incidence of the pest was found to be unaffected by fluctuations in relative humidity or minimum temperature.

Further, a strong negative relationship was indicated between the per cent silver shoots and the mean maximum temperature. Even on elimination of rainfall, this relation retained strong negative trend ($r_{15.2} = -0.5510^{**}$).

The nature of correlations established in the present studies, *i.e.*, positive relation between percentage incidence of gall midge and rainfall and negative relationship between the former and maximum temperature substantiate the early observations that the monsoon crop is

relatively more susceptible to the pest infestation (Ramachandra Rao 1925, Gopalakrishnan *et al.* 1954, Khan and Murthy 1955, Patel *et al.* 1957, Krishnamurthy Rao and Krishnamurthy 1960). The positive correlation between pest incidence and rainfall is explicable on the basis of high humidity requirement of the maggots for development (Li and Chiu 1951 and Huang 1957) and for their successful migration from the site of hatching to the site of attack (Fernando 1962). The nature of relationship existing between gall midge incidence and temperature has not been reported previously.

Ramachandra Rao (1925) and Murthy (1958) have reported that the gall midge infestation increased with the lateness of sowing of the monsoon crop. But according to Pai and Rao (1958) earliness or lateness of planting does not influence

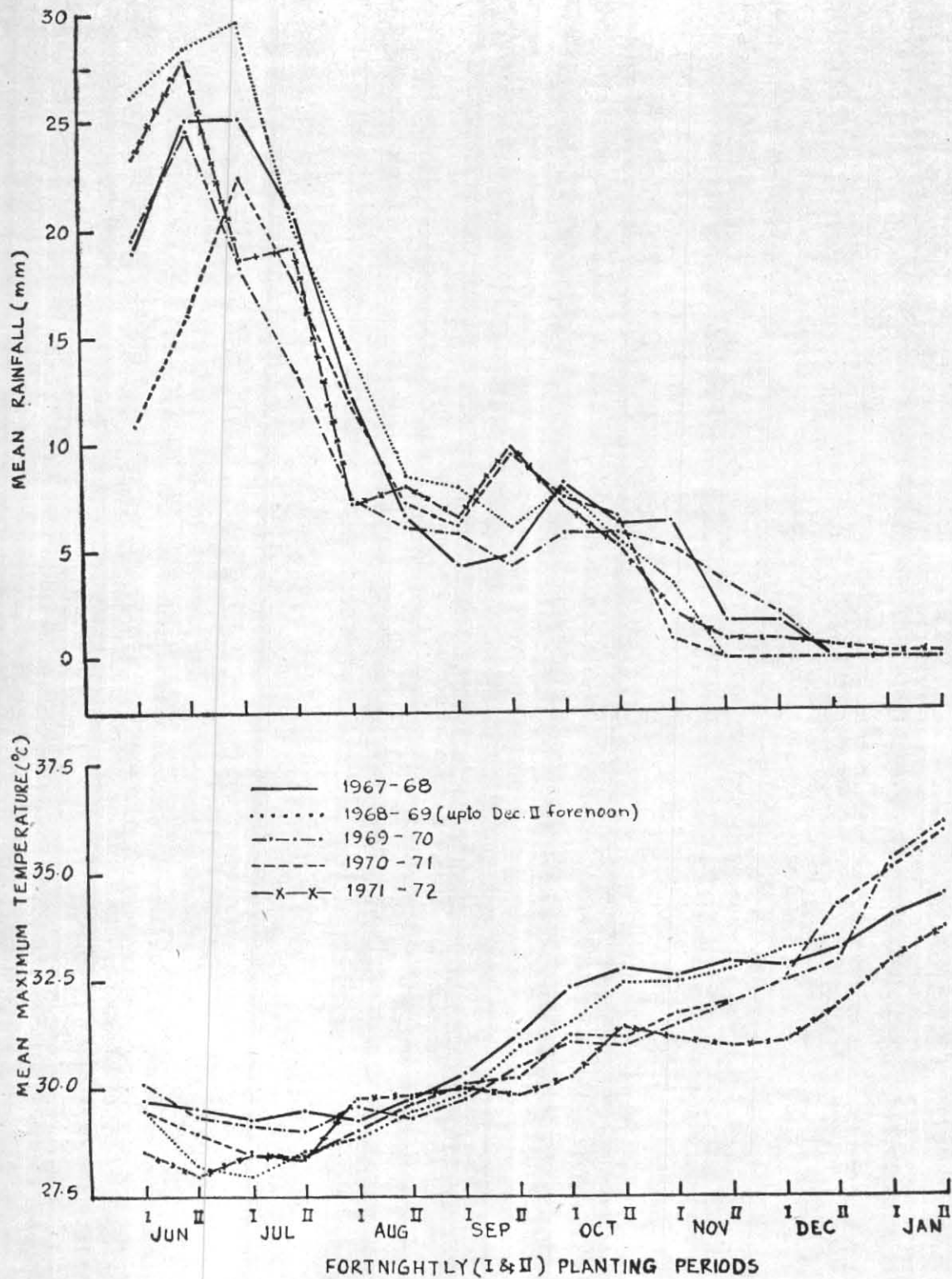


Fig. 2. Mean rainfall and mean maximum temperature upto 45 days after planting for different fortnightly planting periods of the years 1967-68 to 1971-72

pest incidence. In the present studies also it is observed that the earliness or lateness of planting may only indirectly influence pest infestation either through the amount of rainfall received during the first 45 days after planting or through the maximum temperature limits for this period of crop growth. Thus, in all the four years from 1967-1968 to 1970-71, maximum infestation by the pest was recorded on crops planted during June in association with higher rainfall and lower maximum temperature. The crop subsequently, planted, *i.e.*, in the first fort-

night of July recorded a sharp decline in pest incidence. The relatively low level of pest infestation during the year 1971-1972 may be due to the higher degree of parasitism by the pupal parasite *Platygyaster oryzae* observed during this period.

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