

Short communication

Crop - weather - disease interactions in Brassica crop - a case study

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Crop-weather-disease interaction studies play a major role in quantifying the adverse effect of the diseases on the crop production, which is also useful in crop simulation modeling. It was reported that the losses in mustard due to alternaria blight could vary from as low as 13 per cent to as high as 47 per cent (Kolte, 1985) or even up to 56 per cent (Jain, 1992). Incidence of 50 per cent of this disease is recognized as natural calamity. Awasthi and Kolte (1994) reported that the combined effect of rainfall, relative humidity and minimum temperature influenced the blight severity on leaves while the total number of rainy days, relative humidity, maximum and minimum temperatures affected the same on pods. Hong *et al.*, (1996) found a strong correlation of the disease (alternaria blight) development with leaf wetness duration and temperature.

With an aim to develop crop-weather-disease interactions on the incidence, spread and severity of alternaria blight and white rust with a special reference to crop phenological stages, field experiments were carried out on the sandy loam soils of IARI with two *Brassica* Varieties Pusa Jaikisan and Varuna sown on ten different dates at weekly intervals starting from 1st October, 2001. Observations on the occurrence and severity of the disease (on pe cent basis of

individual plants) from ten labeled plants were taken once in three days. Daily meteorological data recorded in the observatory of the Division of Agricultural Physics, IARI, were taken.

Simultaneously, weekly observations were recorded on the farmers' fields around Delhi area to compare the relative disease spread. Five fields each were selected from two villages viz., Pandwala Khurd located south west of IARI and the other Kanjhawala village located to the north west of IARI. In the farmers' fields, variety T59 was sown during the first fortnight of October 2001. In the absence of any standard meteorological observatory in these two villages, since the aerial distance is about 15 kilometers, the data from IARI observatory is assumed to represent the two locations. A total of 37.5 mm of rainfall was received during January month. Results of preliminary investigations during the first crop season of the two years study are being reported in this paper. It was observed that the weather conditions were congenial for a good crop and partly for the onset and spread of the disease.

Alternaria blight

In the experimental plots of IARI, the alternaria blight was as low as 5 per cent in

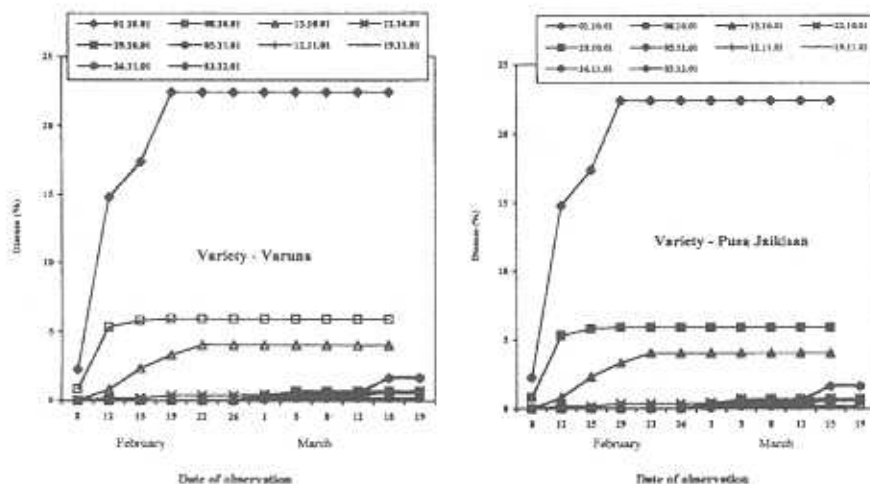


Fig. 1 : Progress of Alternaria blight in the two varieties grown at the experimental field of IARI.

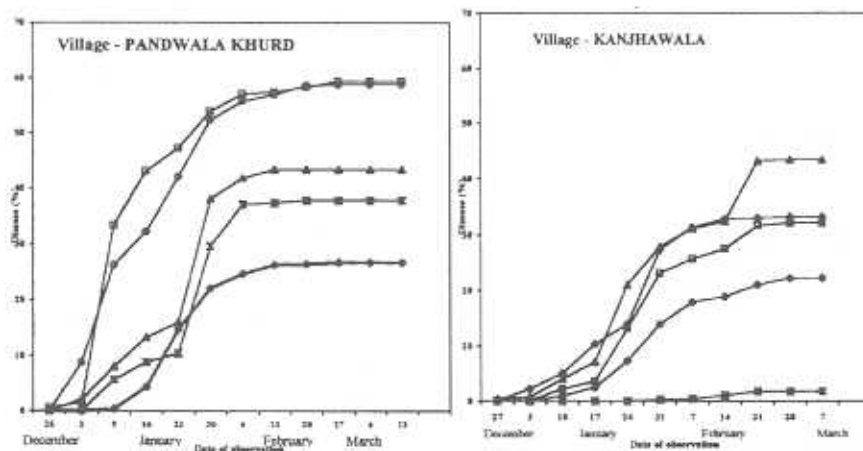


Fig. 2 : Progress of Alternaria blight at the five farmers' fields in the two locations.

the variety Pusa Jaikisan as compared to the variety Varuna where in the disease was found to be much lower, only 2 per cent (Fig.1). On the other hand, in the farmers' fields, which are located in the south west of IARI, the alternaria blight was of the order of 40 to 60 per cent (Fig.2) and in the second

location (located in the north west of IARI), the plant were affected by 30 per cent.

Alternaria blight first appeared at Pandwala 80 days after sowing whereas at Kanjhawala the disease appeared after 90 days of sowing. The disease severity ranged

from 1.75 to 59.4 per cent. This variation could be probably due to the number of irrigations, type of irrigation water used (village sewage water was used for irrigation) and plant growth pattern. The two fields where sewage water was used for irrigating the field showed a high disease incidence of 59 per cent. In the other fields where ground water was used for irrigation and only one post sowing irrigation was given the disease incidence ranged from 22 to 33 per cent and in the fields irrigated twice, it was 37 to 43 per cent. In one field at Kanjhawala where the plants were growing erect and no irrigation was given the disease incidence was only 1.75 per cent. The incidence of white rust was fairly low or absent and a maximum incidence of 12.3 per cent was recorded in one field at Kanjhawala. In the experimental field at IARI where the trial was laid in split plot design with two crop varieties, alternaria blight appeared in the 2nd week of February and the incidence was 5 to 25 per cent in the plots sown on 1st, 8th and 15th October, in the later sown plots the disease was nil to below 5 per cent.

White rust

As far as the white rust is concerned, it was observed that in the experimental plot at IARI, the plants sown between 19th November and 3rd December 2001 were affected while the other sowings escaped this disease. White rust appeared in the later half of February and the incidence was 5 to 28 per cent in the plots sown on 19 Nov., 26 Nov. and 3 Dec. In the plots sown from first week of October to first week of November the white rust incidence was nil to below 5

per cent. The severity of the white rust disease in both the varieties was more or less the same, with Varuna slightly on the higher side (28 per cent) where as in the farmers' fields; the plants affected by the disease were of the order of 25 per cent.

Thus these preliminary studies indicate that the mustard crop can be managed to be free from these two diseases if sown after 8th October around Delhi region as far as these two varieties Pusa Jaikisan and Varuna are concerned. The quality of irrigation water and radiation transmission within the canopy need to be monitored to save the crop from the diseases.

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