

EFFECT OF TEMPERATURE ON THE INCIDENCE OF BLACKROT DISEASE
OF CABBAGE AND CAULIFLOWER CAUSED BY *XANTHOMONAS*
CAMPESTRIS PV. *CAMPESTRIS*

BY

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Study on effect of temperature on incidence of blackrot of crucifers showed that lower temperatures of 20°C–25°C was more congenial than higher temperature. Marginal lesions were more frequent than chlorotic spots.

INTRODUCTION

Blackrot disease incited by *Xanthomonas campestris* pv. *campestris* (Pammel) Dowson is a major disease of cruciferous vegetables, particularly cabbage and cauliflower. In India this disease was first reported by Patwardhan in 1928. Subsequently Patel *et al.* (1949) made a detailed study of the disease. Severe epidemic in cabbage and cauliflower was reported from West Bengal by Chattopadhyay and Mukherji (1955). Cook *et al.* (1952) made a study of this disease expression at varying temperature. They noted symptoms to vary to a great extent at different temperature.

Cabbage and cauliflower crops in India in general, and in West Bengal, in particular, are planted in commercial scale over a period of about four months starting from August–September till December–January. There is considerable change in temperature and humidity during this period particularly the plants during early stages of growth are exposed to different temperature regimes. It was therefore considered necessary to study the effect of temperature on disease incidence on seedlings or young plants of cabbage and cauliflower.

MATERIALS AND METHODS

Six weeks old cabbage (var. Eclipse Drumhead) and cauliflower (var. Snowball) plants grown in pots were inoculated with bacterial suspension (8.6×10^8 cells per ml) and were kept at three different temperature (20°C, 25°C and 30°C). Inoculation was done by applying inoculum through pin pricking of the two lower most leaves of each plant. Twenty plants were used for each temperature.

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The experimental pots were kept inside growth room in which temperature was adjusted. Relative humidity between 90 and 93 per cent was maintained throughout the experiments. Observations were recorded on the following aspects :

- (a) number of plants infected.
- (b) number of leaves with chlorotic spots
- (c) number of leaves with marginal lesions.

Data were recorded at one week interval starting from seventh day and ending on forty two days following inoculation. A control set was kept separately for each temperature in which sterile distilled water was used instead of bacterial suspension.

RESULTS

From the data (Table 1) it would be seen that infection appeared by second week after inoculation and it increased progressively in subsequent weeks upto a period. At the end of the fourth week maximum number of plants showed symptoms at 20°C and 25°C after which there was no increase, but at 30°C maximum level of incidence of the diseased plants were delayed which appeared at the next i. e. 5th week. The control plants remained healthy.

Results from the identical experiments on cauliflower (Table 2) showed similar trend. It was however, noted that at 25°C the number of leaves with marginal lesions were intermediate between those at 20°C and 30°C in comparison with the data recorded on cabbage where the intensity of infection of plants at 20°C and 25°C were almost similar.

TABLE 1. *Effect of temperature on disease incidence in cabbage (Variety—Eclipse Drumhead) plants (No. of plants inoculated—20 in each case)*

Days after inoculation	No. of plants infected (progressive total)			Number of leaves infected					
				Chlorotic spots (progressive total)			Marginal lesions (progressive total)		
	20°C	25°C	30°C	20°C	25°C	30°C	20°C	25°C	30°C
7	0	0	0	0	0	0	0	0	0
14	11	8	6	0	0	0	14	12	8
21	14	10	8	0	0	5	32	24	15
28	16	12	8	5	0	9	55	43	22
35	16	12	12	12	8	10	58	51	22
42	16	13	12	14	10	10	58	52	24

FIG. 1 . EFFECT OF TEMPERATURE ON DISEASE INCIDENCE
IN CABBAGE PLANTS

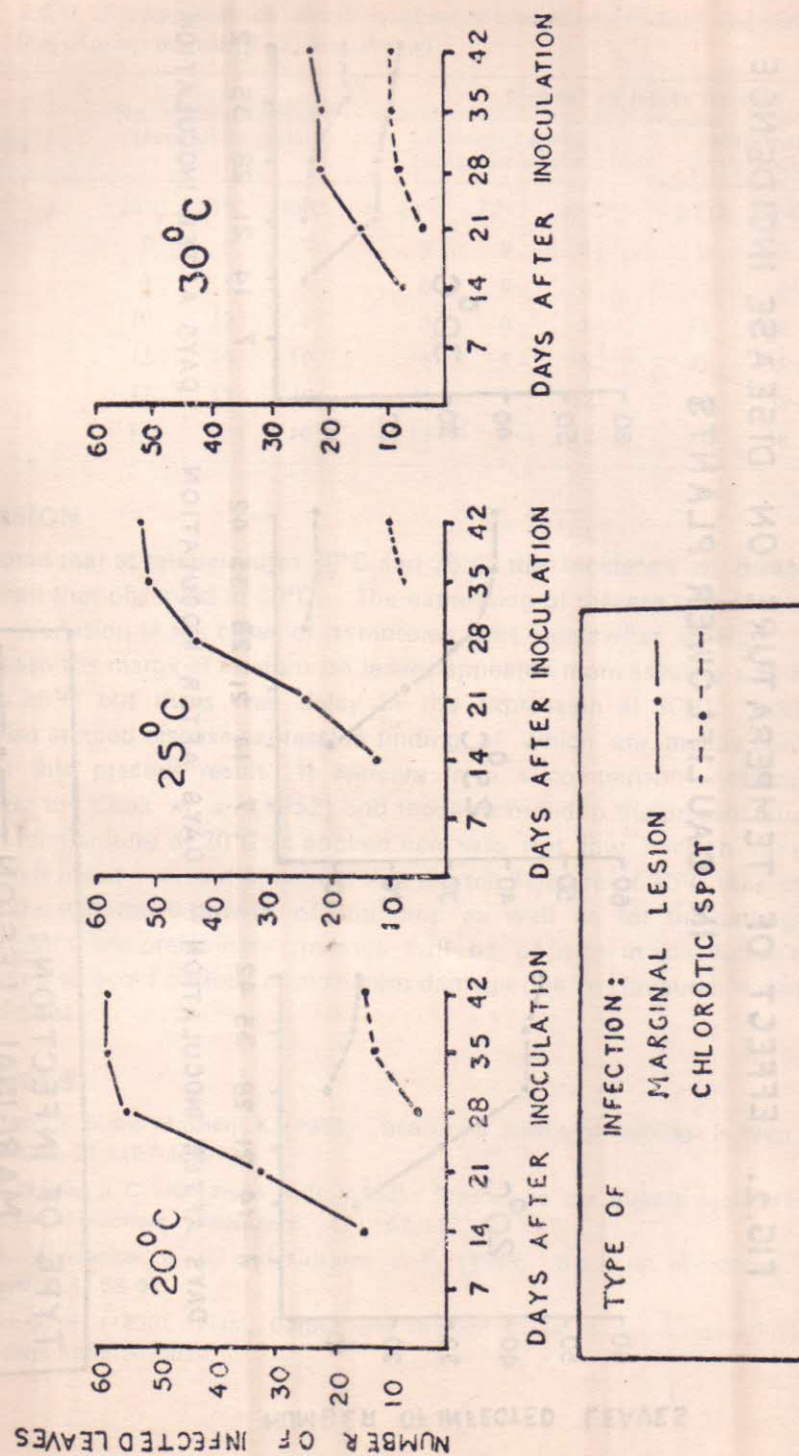


FIG.2. EFFECT OF TEMPERATURE ON DISEASE INCIDENCE
IN CAULIFLOWER PLANTS

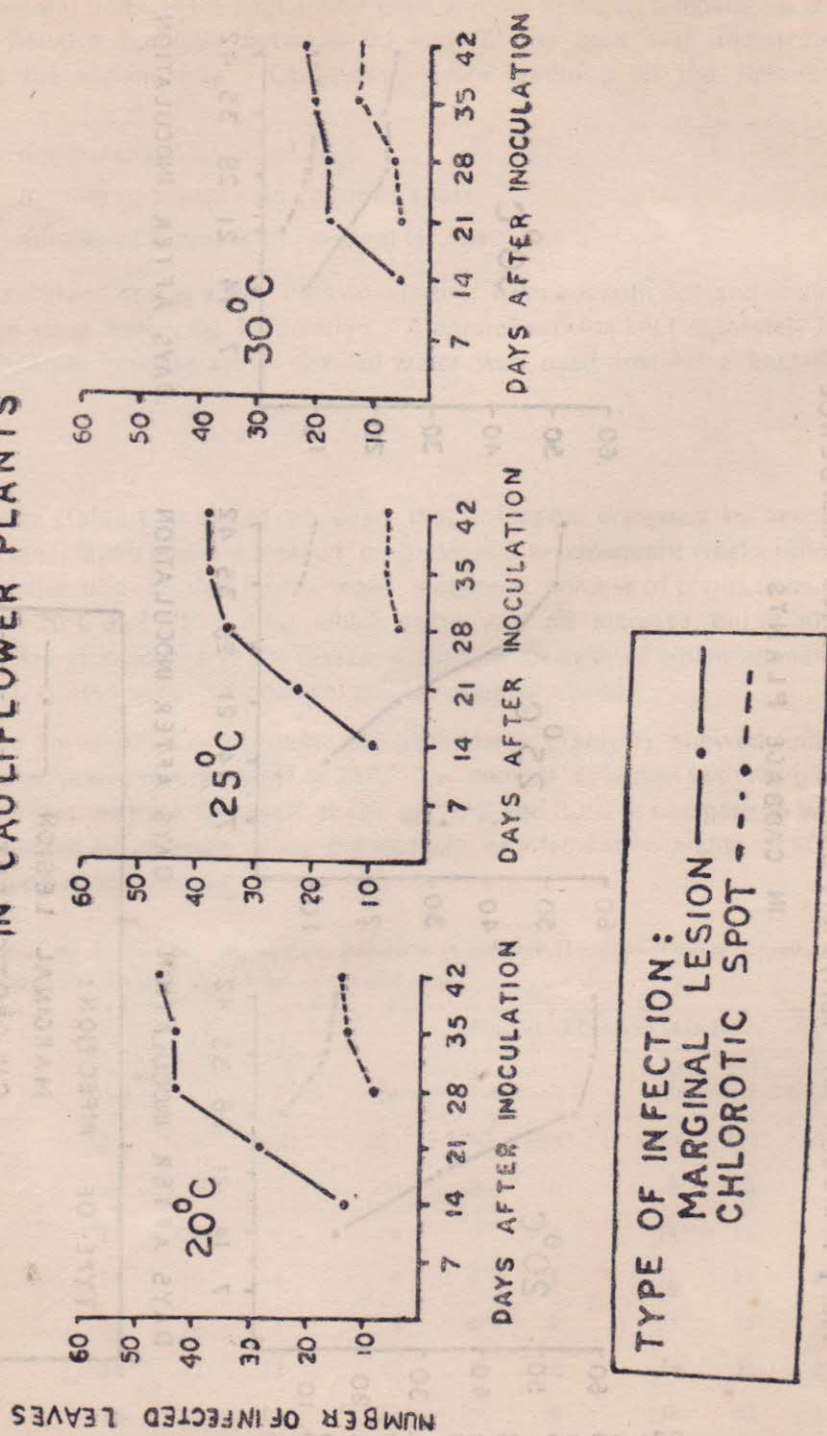


TABLE 2. Effect of temperature on disease incidence in cauliflower (Variety—Snowball) plants (No. of plants inoculated—20 in each case)

Days after inoculation	No. of plants infected (Progressive total)			Number of leaves infected					
				Chlorotic spots (Progressive total)			Marginal spots (Progressive total)		
	20°C	25°C	30°C	20°C	25°C	30°C	20°C	25°C	30°C
7	0	0	0	0	0	0	0	0	0
14	7	8	4	0	0	0	13	9	5
21	10	10	8	0	0	5	28	22	18
28	12	10	10	8	5	6	43	35	18
35	12	12	10	13	7	12	43	38	20
42	14	12	10	14	7	12	46	38	22

DISCUSSION

It was noted that at temperatures 20°C and 25°C the incidence of disease was greater than that observed at 30°C. The expression of disease was also delayed at 30°C. Variation in the types of symptoms was somewhat striking. In the present case the marginal lesions on leaves appeared more severely and early at 20°C and 25°C but there was delay in the expression at 30°C. Cock *et al.* (1952) also studied disease expression finding of which are mostly corroborative with this present result. It appears from a comparison between the observation by Cook *et al.* (1952) and those recorded in the present study that minimum temperature of 20°C as applied here was not low enough for getting such distinct result. Also it appeared that the temperature of 30°C was prohibitive for the vegetative growth of the crop as well as for the pathogen. It appeared that these preliminary findings will be of value in scheduling time of transplanting to avoid periods of maximum damage due to favourable temperature conditions.

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