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EFFECT OF *XANTHOMONAS CAMPESTRIS* PV. *MALVACEARUM* ON THE YIELD OF COTTON PLANT

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Inoculation of one or both the cotyledonary leaves or all leaves of cotton seedlings by Xanthomonas campestris pv. malvacearum resulted into water soaking and necrosis at the infection site. Inoculated plants supported significantly less number of leaves, branches, bolls and yield of seed cotton. The most severe effect of inoculation on these parameters was observed when all the leaves of cotton plant were inoculated.

INTRODUCTION

Cotton is an important cash crop of Pakistan and its export is a source of foreign exchange. However, average cotton yield in Pakistan is low as compared to major cotton producing countries of the world. Many factors contribute to low yield but bacterial blight, caused by Xanthomonas campestris pv. malvacearum is one of the factors which may reduce the yield of cotton crop in Pakistan (Brinkerhoff, 1977) . The studies reported in this paper quantify the effect of X. campestris pv. malvacearum inoculation on the yield components of cotton plant.

MATERIALS AND METHODS

Seedlings of cotton cultivar, AU-59 were raised in earthen pots in the glasshouse under natural daylight supplemented by light obtained from 500W electric bulbs and with temperature of the glass house at 25 ±10 °C. When the plants were 20 days old, following four types of inoculations were made on them .

Only one cotyledonary leaf inoculated
Both the cotyledonary leaves inoculated
All the leaves of the seedlings inoculated.
Non inoculated (distilled water sprayed) control plants

Two hours before inoculation plants were covered with polyethene bages and irrigated to create conditions for artificial humidity and placed under natural sunlight for maximum stomatal opening (Gunn, 1962). At the time of inoculation, abaxial surface of the leaves was sprayed with aquous suspension of Xanthomonas campestris pv. malvacearum prepared from an actively growing 48 hours old culture which was identified by morphological and biochemical characters (Breed et al., 1957) and usual pathogenicity tests. Inoculations were made by a high pressure automizer until the inculated tissue appeared water soaked. The distilled water sprayed plants served as control. Inoculated and control plants were divided into three replications having six plants per repeat. Data for mature plants were recorded on the number of leaves dropped due to infection, sympodial branches, number of bolls and yield of seed cotton. In order to visualize the effect of types of inoculations on yield parameters, recorded data were statistically analyzed.

RESULTS AND DISCUSSION

Inoculated leaves developed the symptoms of disease in the form of water soaking at the infection site within eight to ten days after inoculation. Water soaked and necrotic angular spots appeared on the secondary leaves of inoculated plants which had black elongated lesions on the stem. This indicated systemic phase of the pathogen. In case of all leaves inoculated plants 80 percent more leaf fall over the non inoculated control plants was observed while a reduction of 36.4 percent in sympodial branches, 52.6 percent in the number of

TABLE 1

Effect of incoculation of cotton plant by Xanthomonas campestris pv. malvacearum on leaves dropped due to infection, number of sympodial branches, number of bolls and yield of seed cotton.

Treatments	Leaves dropped due to infection	Percent leave fall over non inoculated control	Number of sympodial branches	Percent reduction in number of sympodial branches over non-inoculated control	Number of bolls per plant	Percent reduction in boll number over non-inoculated control	Yield of of seed cotton per plant (g)	Percent reduction in yield of seed cotton over non-inoculated control
T_1 = Only one cotyledonary leaf inoculated	3.6^{bc*}	36.3	6.3^{ab}	13.6	4.7^{b}	26.4	6.3^{b}	20.1
T_2 = Both the cotyledonary leaves inoculated	6.0^{b}	61.2	5.6^{ab}	22.8	4.0^{b}	36.8	5.7^{bc}	29.2
T_3 = All the leaves of seedling inoculated	11.6^{a}	80.0	4.6^{b}	36.4	3.0^{bc}	52.6	4.6^{cd}	41.7
T_0 = Non-inoculated control	2.3^{cd}	–	7.3^{a}	–	6.3^{a}	–	8.0^{a}	–

*Any two mean values sharing similar letter in the same column do not differ significantly at 1% level of significance (DMRtest)

bolls and 41.7 percent in yield of seed cotton respectively, was observed. In case of single or both cotyledonary leaves ioculated, yield parameters were comparartively less affected (Table 1). Reduction in yield due to this disease has been reportedu about 10-20 percent and 35-50 percent by Ramapand et al. (1979) and Leyendecker (1950) respectively. El Nur (1970) reported77 percent reduction in yield in a partially resisstant variety. Loss in the yield parameters due to bacterial blight of cotton may depend upon many factors such as the stage of plant infection, environmmental conditions at the time of and subsequent to infection and the capacity of the plants to grow away from the disease. However, infection at primary leaf stage is of great importance in the subsequent development of cotton plants, because these leaves on account of their succulence and parenchymatous nature probably provide comparatively favourable conditions for the rapid multiplication on the bacterium which when moves systemically through the xylem vessels, blocks the vessles (Bhagwat ands Bhide, 1962; Wickens, 1956). Thus interferrence with water and nutrients uptake coupled with necrosis and yellowing of subsequent secondary leaves affect the photosynthesis which in turn affect various parameters and ultimately yield of the inoculated plants.

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