EFFECT OF CEMENT DUST TREATMENT ON SOME PHYLLOPLANE FUNGI OF WHEAT

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(Received May 23, 1989; revised November 22, 1989)

Abstract. The percent frequency and number of colonies cm\(^{-2}\) leaf area of all the test fungi decreased significantly at the higher doses of cement dust during both pre- and post inoculation treatments. However, the population of some fungi increased at the low dose only. Stimulatory as well as inhibitory effect of cement dust on colony growth of the test fungi were observed at different concentrations of cement dust (500, 1000, 1500, and 2000 \(\mu\)m mL\(^{-1}\)).

1. Introduction

Cement dust adversely affects the population of phylloplane microorganisms on aerial plant surfaces of certain crops grown in the vicinity of a factory producing cement (Rai and Pathak, 1981; Singh et al., 1987; Singh, 1988). The present study deals with the effects of foliar application of cement dust on dominant phylloplane fungi of wheat in pre- and post-inoculative conditions and its effect on linear growth of the test fungi in \textit{in vitro}.

2. Materials and Method

2.1. PHYLLOPLANE FUNGI AND FOLIAR APPLICATION OF CEMENT DUST

Wheat plants grown in earthenware pots were kept in 4 sets of an open top polythene chamber and experiments were performed after 40 days of the establishment of the plant. Spore suspensions of the test fungi viz. \textit{Alternaria alternata}, \textit{Aspergillus flavus}, \textit{A. niger}, \textit{Cladosporium cladosporioides}, \textit{Curvularia lunata}, \textit{Drechslera australiensis}, \textit{Epicoccum purpurascens}, \textit{Fusarium oxysporum}, \textit{Penicillium chrysogenum} and \textit{P. citrinum} were prepared in sterilized distilled water from a 7 days old culture and, \(2.5 \times 10^3\) spores mL\(^{-1}\), spore concentration was adjusted. The leaves of the plants were surface sterilized and rubbed gently with a sterile wet cotton swab before inoculation to increase wettability and mass inoculations were done. The plants, inoculated with fungal spores in 3 sets of chambers were uniformly sprayed with cement dust by a hand rotary duster and the dusting was done every day between 8 A.M. and 9 A.M. in separate chambers at the rate of 1, 2, and 3 g m\(^{-2}\), respectively, for 10 days.

In pre-inoculative treatments, the plants were dusted at the rate of 1, 2, and

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3 g m$^{-2}$ for 10 days and thereafter inoculation of fungal spores was done by the method described earlier. The untreated plants in one set of chamber served as control. The phylloplane fungi were isolated and studied after completion of treatments.

2.2. LINEAR GROWTH OF TEST FUNGI AND CEMENT DUST TREATMENT

Cement dust was mixed in Potato Dextrose Agar (PDA) medium at the concentrations 500, 1000, 1500, and 2000 µg mL$^{-1}$, separately, and the medium was autoclaved thereafter. The mycelial blocks cut from actively growing margin of the test fungi were transferred onto lower halves of Petri plates in triplicate containing 20 mL of sterilized cooled PDA + cement dust or only PDA medium (control) and lids of Petri plates were placed simultaneously. All the treated and untreated Petri plates were incubated at 24 ± 2 °C and radial growth of the test fungi were measured after 3 days of incubation. The percent stimulation/inhibition was calculated by following formula:

$$\% \text{ Stimulation/inhibition} = \frac{T - C}{C} \times 100,$$

where

- $C = \text{Radial growth of test species in controlled condition.}$
- $T = \text{Radial growth of test species in treated condition.}$

3. Results and Discussion

The population of generally all the test fungi decreased significantly ($P=0.01$) in both pre- and post-inoculation treatments. However, the effect of cement dust varied more significantly in case of post inoculation treatment. The percent frequency of all the test fungi decreased considerably at the higher doses during both the treatments. $E. \text{ purpurascens}$ exhibited increased frequency in post-inoculation treatment at the lower dose only (Figure 1).

The number of colonies of $A. \text{ flavus}$, $A. \text{ niger}$ and $D. \text{ australiensis}$ increased at the lower dose during pre- and post-inoculation treatments (Figure 2). $C. \text{ lunata}$, $E. \text{ purpurascens}$ and $F. \text{ oxysporum}$ also showed an increase but the former two during pre- and the latter one during post inoculation treatment only (Figure 2). The number of colonies of all the test fungi decreased at high doses of cement dust.

Cement dust exhibited stimulatory as well as inhibitory effects on growth behaviour of the test fungi and the effects varied significantly ($P = 0.01/0.05$). $A. \text{ niger}$, $D. \text{ australiensis}$, $E. \text{ purpurascens}$ and $F. \text{ oxysporum}$ exhibited increased growth at all the used concentrations (Table I). However, the maximum growth stimulation was noticed generally at the lower concentrations. The growth of $A. \text{ alternata}$ and $A. \text{ flavus}$ was stimulated significantly only at the lowest concentration (Table I). $C. \text{ cladosporioides}$ and $C. \text{ lunata}$ showed inhibition of growth only at the highest