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STUDIES ON THE DISTRIBUTION PATTERN OF FUNGI ON TWO SURFACES OF POTATO LEAVES IN RELATION TO INCIDENCE OF *PHYTOPHTHORA INFESTANS* (MONT.) DE BARY.

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Variation in the distribution pattern of fungi on the two surfaces of leaves of potato cv. Up-to-date was studied. The adaxial surface comparatively contained higher number of fungal flora than the abaxial surface in the early stages of growth of plants. With the increase in the age of the plants, the difference was found to be gradually diminished. However, *Phytophthora infestans* was found in higher number on the adaxial surface. The variable pattern of distribution of fungi on the two surfaces has been attributed to morpho-anatomical characteristics of the leaves, besides other environmental factors.

Key words : *Phytophthora infestans*, distribution pattern.

INTRODUCTION

The distribution pattern of microflora on the two surfaces of leaves have been studied by Last and Deighton (1965) on *Phyllanthus discoidens*, Lindsay and Pugh (1976) on *Hippophae rhamnoides* and Thakur *et al.* (1978) on *Azadirachta indica*. All these workers have reported significant variation in the composition as well as population of microflora on the two surfaces. The present investigation aims at studying the distribution pattern of fungi on the two surfaces of potato (*Solanum tuberosum* L.) leaves.

MATERIALS AND METHODS

(i) *Cultivar* : The investigation was carried out on three field plots of potato cv. Up-to-date (susceptible). Seed tubers were obtained from the Central Potato Research Station, Shillong.

(ii) *Culture media* : Martin's Peptone rose bengal agar medium (Martin 1950), was used for the determination of total fungal population. Limabean agar medium was used for specific determination of total population of *P. infestans*.

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(iii) *Isolation of fungi* : Isolation of fungi from adaxial and abaxial surfaces of leaves was done by 'leaf imprint' method adopted by Garg and Sharma (1983). Ten pieces of leaves measuring 10 mm × 10 mm in diameter, collected from different sites of the plots, were momentarily and gently pressed against solid sterile Peptone agar medium in separate sterile 9 cm Petri dishes. Three replications were made each for adaxial and abaxial surfaces. The dishes were incubated for 7 days at 28° ± 1°C and observed for the occurence of fungi. For specific isolation of *P. infestans* dishes were incubated at 23° ± 1°C. Results were expressed as no. of colonies per 100 cm^2 area of leaf surface. Collection were done thrice in a month, from the months of November to March.

RESULTS

Results show that the adaxial surface contained significantly higher number of fungal propagules than the abaxial surface during early stages of plant growth (Fig. 1). During November, when the plants were 30 days old, the adaxial surface contained 763.6 colonies while the abaxial surface contained 380.2 colonies

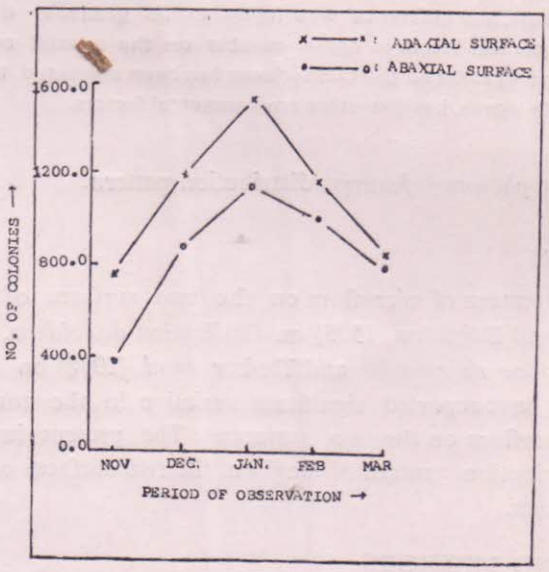

Fig. 1. Population of fungi (colonies/100 CM^2) on adaxial and abaxial surface of leaves of potato.

per 100 cm^2. The difference gradually decreased with age of plants. In the month of March, when the plants were 150 days old, the adaxial and abaxial surfaces of leaves contained 863.7 and 806.7 colonies respectively. The average population of fungi on the two surfaces throughout the crop season were 806 8 and 857.88 colonies respectively. All the fungi except *Fusarium* and *Rhizopus* showed higher population on adaxial surface. These two fungi were detected

Table 1 *Total fungi population (No of colonies/100 cm²) on adaxial and abaxial surfaces of potato leaves during the period from November to March*

Fungi	November		December		January		February		March	
	Ad.	Ab.	Ad.	Ab.	Ad.	Ab.	Ad.	Ab.	Ad.	Ab.
Aspergillus	100.0	56.7	140.0	106.6	193.3	153.4	156.7	110.0	90.0	100.0
Penicillium	66.7	26.7	173.3	133.4	240.0	216.0	166.7	133.3	86.7	73.3
Mucor	123.4	70.0	160.0	100.0	193.4	156.6	143.4	150.0	176.7	56.7
Cladosporium	93.3	36.7	106.7	76.7	156.7	100.0	136.7	103.3	96.7	83.3
Fusarium	56.7	56.7	116.6	113.3	180.0	193.4	156.7	163.3	113.3	130.0
Alternaria	96.7	43.3	170.0	143.4	186.6	163.4	50.0	36.7	43.3	36.7
Rhizopus	33.3	16.7	56.7	56.7	93.3	100.0	66.7	73.3	46.7	73.3
Curvulariaa	56.7	36.7	93.7	66.7	90.0	66.7	63.3	56.7	40.0	36.7
Epicoccum	—	—	6.7	6.7	16.7	10.0	—	—	—	—
Trichoderma	40.0	36.7	56.7	56.0	26.7	26.7	—	—	—	—
Chaetomium	16.7	—	26.7	—	43.3	—	46.7	40.0	66.7	66.7
Nigrospora	26.7	—	16.7	—	33.3	—	23.3	16.7	36.7	46.7
Verticillium	26.7	—	36.7	—	40.0	—	26.7	30.0	—	—
Cercospora	26.7	20.0	40.0	40.0	10.0	16.7	—	—	—	—
Phytophthora infestans	—	—	—	—	33.3	—	133.3	103.3	136.7	120.0

Figures are av. of 3 replicates Ad : Adaxial surface Ad : Abaxial surface.

at higher amounts on the abaxial surface also. *Chaetomium, Nigrospora* and *Verticillium* were not found on the abaxial surface till the plants were 90 days old.

Results showed variation in the distribution of *P. infestans* on the two surfaces of the potato leaves (Table 1). The adaxial surface contained 60 66 colonies as compared to the abaxial surface which contained 44 66 colonies. During January, the fungus was not detected on the abaxial surface.

DISCUSSION

Variation in the distribution pattern of fungi on the two surfaces of a susceptible cultivar of potato has been recorded in the present investigation. The adaxial surface of leaves carried higher population of fungi including *P. infestans* than the abaxial surface. Similar observations were made by Sharma *et al.* (1974) and Garg and Sharma (1983), who also isolated higher population of fungi from adaxial surface of *Lantana camera* and Triticale and Guar leaves also.

The variation in the distribution pattern of microflora on the two surfaces of leaves have been attributed mainly to possible morpho-anatomical characteristics of leaf surfaces and to the quality and quantity of leaf leachates. The extensive growth of some fungi on the adaxial surface of leaves has been attributed by Bainbridge and Dickinson (1972) to the rough texture of leaves and greater leaching of nutrients from their adaxial surfaces. The higher pollen densities on the adaxial surface (Garg and Sharma, 1983), and the extent of exposure of leaf surfaces may also be considered as possible factors for uneqal distribution of microflora on two surfaces of dorsiventral leaves.

The adverse effect of phylloplane microflora on the incidence and deposition of *P. infestans* on leaf surfaces have been found earlier (Phukan, 1987). In the present investigation, however, no direct correlation between distribution of other fungi and *P. infestans* on two surfaces of leaves have been observed. Of course, the absence of the fungus on the abaxial surface during January may be, to some extent, attributed to the overgrowth and antagonistic effects of some fungi present on the leaf surface during the period.

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