

DIFFERENTIAL SURVIVAL OF TWO RACES OF PHYTOPHTHORA INFESTANS*

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The effect of forced air-drying for varying periods has been studied on race A and race BD of blight of potato fungus, *Phytophthora infestans* (Mont) de Bary. The very much greater resistance of race A is connected with its dominance.

Introduction

In nature, the late blight of potato fungus, *Phytophthora infestans* (Mont) de Bary spreads from one plant to the other by splashing of rain or they may be blown around by wind. If they fall on a potato leaf and moisture is present they quickly germinate to start new infection. In absence of moisture, sporangia soon dry and die. In nature, race A for *Phytophthora infestans* is more commonly found on susceptible varieties of potato as compared with other races, which are equally virulent on these varieties. The purpose of this experiment, in addition to demonstrating the general effect of drying, is to show the lower sensitivity of the prevalent race A to the absence of moisture as compared with a race less prevalent, viz., race BD, which might help to account for race A's dominance and survival.

Material and Methods

The material include 36 Cobbler potato plants in 4 inch pots, water suspensions of sporangia of race A and BD, hand sprayers, electric fans and incubators. Seed pieces were planted in flats and left to grow until 1 to 2 inches above ground, when 36 plants of uniform size were transferred to 4" pots.

Potato plants were inoculated when approximately 14 inches high and having at least 4 well-formed leaves. The inoculum consisted of sporangia, which were harvested from cultures¹ grown on whole yellow peas at 20°C. for 2 weeks. The concentration of sporangia of each race was adjusted to give approximately equal concentration of sporangia, i.e., 30,000 and 50,000 per ml. for race A and BD, respectively.

One set of plants for each race was then sprayed with inoculums as uniformly as possible. All plants except the controls were dried after inoculation by placing them in front of fans for about 1½ to 2 minutes; then, after 5, 10, 20 and 30 minutes, sets

of three plants were remoistened with a knapsack sprayer and placed in the incubators. The approximate temperature of the green house at the time of inoculation was about 74°F. and relative humidity between 66 and 68%. The plants were kept overnight in the incubators.

The lesions on the terminal and 2 lateral leaflets of each 4 leaves of each plant were counted 4 days after inoculation.

Results

Each treatment by either of the isolates were in triplicate. Results on the count of infection in all the three replicates in each set of treatment are given in Table I.

TABLE I.—NUMBER OF LESIONS PER PLANT INOCULATED WITH RACES A AND BD OF *Phytophthora infestans*.

Race	Time of drying	Replicates			Total
		i	ii	iii	
Race A	0 min.	179	265	185	629
	5 "	27	23	61	111
	10 "	27	23	40	90
	20 "	23	11	5	39
	30 "	1	1	12	14
Race B D	0 min.	218	160	215	593
	5 "	49	38	14	101
	10 "	5	10	5	20
	20 "	7	1	1	9
	30 "	0	0	0	0

The results in Table I show that the total number of lesions produced by race A on the controls are slightly higher than that produced by race BD. The effect of drying for 5 minutes is more or less equal on race A and BD of *Phytophthora infestans*. But after 10 minutes they differed: race BD consistently caused smaller number of lesions than race A, until after 30 minutes of drying race

* The experimental work was done in the Plant Pathological Laboratory of the University of Minnesota, Minneapolis, Minn., U.S.A.

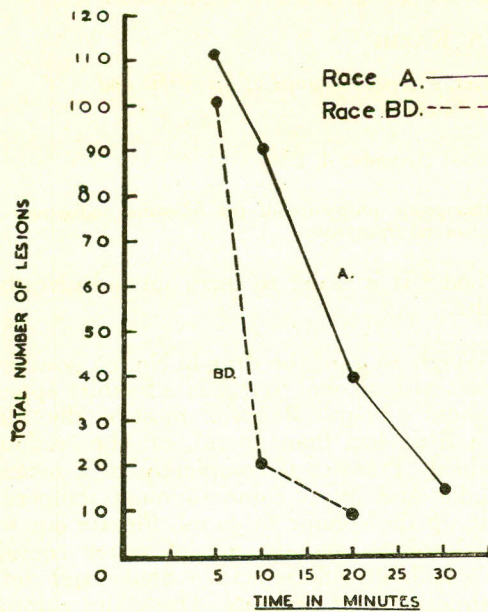


Fig. 1.—Effects of drying on infection potentiality of two races of *Phytophthora Infestans*.

BD produced no lesions while race A produced 14. Fig. 1 shows a graph of the results.

The results indicate that the sporangia of the race BD is more sensitive to drying than that of

race A. Drying period over 5 minutes has a vital effect for race BD, when there is a sharp decline in the number of lesions from 101 to 20. On the other hand, the decline in the number of lesions produced by race A is gradual with increase in drying period. No lesions was found for race BD after more than 20 minutes drying.

Discussion and Conclusions

Race A of *Phytophthora infestans* can stand longer drying period than race BD as observed in the experiment and on the whole the number of lesions produced by race A for all drying periods are more than those of race BD, though initially concentration of race BD (number of sporangia per m/l) was slightly higher that of race A. After 20 minutes drying, no lesion was produced by race BD. All these indicate that, as race A can produce more infection than race BD and can withstand more drying period, it has a greater chance of survival and therefore spreads in the field under natural conditions.

Although other factors like overwintering, amount of sporulation, speed of producing germ tubes and so on may also play important roles for the prevalence of races in the field, yet ability to withstand dryness is most important of them all, and race A has this ability, which thus largely accounts for its prevalence under natural conditions.