VARIATION IN VIRULENCE IN ISOLATES OF SEPTORIA TRITICI ROB. EX. DESM. ON WHEAT

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Knowledge of the physiologic specialization of S. tritici on wheat is a necessary prerequisite to any reliable breeding program for disease resistance (Eyal et al., 1983). All around the world many reports do not agree when referring to the identification of physiological races (Arjona et al., 1976; Arsenijevic, 1965; Díaz, 1983; Eyal et al., 1973; Prestes & Hendrix, 1977; Shipton et al., 1971). In Argentina, previous work revealed the existence of certain degree of specialization (Cordo y Arriagea, 1987; Perelló et al., 1987). Nevertheless, the insufficient existence of judging elements does not allow isolates to be classified into physiological races. It is said that, for a particular pathogen (Buxton, 1960), the number of pathogenic races identifiable by artificial inoculations on different wheats is related to the differential host that allows its differentiation. Thus, the present work attempts to identify physiologic races of S. tritici including a differential set already selected in Israel. Also it attempts to analyze the varietal reaction using two different variables to determine the significance of the evaluation method in the differentiation of the isolates.

Nineteen wheat cultivars (Table 1) were used as host differentials to assay virulence variability in ten S. tritici isolates obained from various geographic areas of Buenos Aires (Argentina) (Figure 1). The isolates were obtained from leaves with typical lesions. Inoculations and testing were done using techniques already applied (Perelló et al., 1987). The suspension concentration was adjusted to 1 x 10^4 spore/ml. A randomized design with four replicates was used, with one pot considered as a replicate. The experiment was carried out in a greenhouse under controlled conditions of temperature and relaive humidity. Symptoms were evaluated 28 days after inoculation, on the third leaf of 20 plants from each isolate x variety combination. Varietal reaction was measured through 2 variables: pycnidial leaf coverage percentage (PC) and necrotic lesion percentage (NL) on the leaves, both in reference to the total leaf area. There were also observed qualitative differences within the type of lesion developed. For the statistical analysis Friedman's test (Friedman, 1937) was applied to determine differences of isolates behavior in the varieties, and Page's test, to classify them according to the growth stages of the virulence (Page, 1963). Isolate x variety interactions with similar levels of virulence-susceptibility were grouped into 3 classes with a cluster algorhythm without supervision (Duda & Hart, 1973). Standard variance analysis was performed with main emphasis on the isolate x cultivar interaction.

The isolates showed different behavior (P=0.005) on the different wheat cultivars. Both variables constituted good parameters to discriminate those isolates that act similarly from the ones that act

differently; however, PC is a better parameter to detect those differences (Table 2). Necrotic leaf area and pycnidial coverage percentage were different for each isolate x variety combination; few cases showed coincidence between the two patterns. Only Bobwhite "S", Iassul 20 and B. Puan presented as much NL as PC with the isolates assayed. The other varieties showed no coincidence in the order of the reactions induced by the two variables. In general, local isolates induced more PC than NL in the Argentine varieties. Two isolates (I_{11} and I_{19}) behaved as the most virulent whereas other two (I_{21} and I_{25}) provoked the major percentage of resistant reactions on the 17 cultivars tested. Isolate x variety interactions with similar levels of virulence-susceptibility were grouped in 3 classes for PC (Table 3) and in 2 for NL (Table 4). The fact that NL variable discriminates data in fewer classes than PC reflects that this variable provides less information. Although NL is a good indicator of the degree of disease developed, the existence of aberrant lesions (with few of no pycnidia) complicates the interpretation. On the other hand, PC allowed a major differentiation within isolate behaviors, resulting a more sensible indicator of differences; in consequence, its use is more advisable. The results of variance analysis indicate that interaction varied according to the evaluation parameter considered. A significant value (P=0.01) for PC (Table 5) can be considered as physiologic specialization index of the pathogen. However, a non-significant value (P=0.01) for NL could indicate only differences between virulence or aggressiveness degree of the isolates. Moreover, the low specificity degree of the interactions and similar order in severity ranking of the disease in some cultivars, indicate that they are not "true physiological races". The use of the international differential set did not contribute to a clear and consistent differntiation of races.

In the end, as several researchers apply different methodologies to study S. tritici physiological specialization, it is not possible to compare scientific information on an international basis. This indicates, as has been already suggested (Shipton et al., 1971), the need to standardize working conditions to obtain coparable results from the work on S. tritici-Triticum sp.

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