

Tolerance to leaf rust (*Puccinia triticina*) in durum wheat

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Introduction

Tolerance is an alternative way to fight diseases. While resistance aims at reducing growing of the pathogen within the plant, tolerance only restricts the (harmful) consequences caused by it. Tolerance reduces the damage the pathogen produces. This damage is normally assessed as reduction of yield compared with a clean check.

Resistance has been used much more than tolerance in fungal diseases. It protects largely the plant against the pathogen, and normally it is monogenic, although virulent races may come up easily and defeat it. However, in a more organic environment, tolerance permits normal growing of all races of the pathogen, maintaining a natural balance and thus, preventing appearance of virulent pathotypes. There have been only a few studies about tolerance to leaf rust in wheat (Cadwell *et al.* 1958, Roberts *et al.* 1984).

The goal of this work is characterize the tolerance of different cultivars.

Table 1. Leaf rust severity and yield losses in a set of cultivars with different levels of tolerance.

Cultivar	Treatment	Severity (%)	Yield loss (%)
'Amilcar'	- Flag leaf	51 a ¹	36,0 b
'Avispa'	- Flag leaf	58 a	57,4 ab
'Don Manuel'	- Flag leaf	55 a	62,4 c
'Ítalo' ²	- Flag leaf	-	-
'Negriduro'	- Flag leaf	59 a	58,7 ab
'Vitrón'	- Flag leaf	47 a	49,9 ab
'Amilcar'	+ Flag leaf	50 a	51,3 a
'Avispa'	+ Flag leaf	43 a	23,1 a
'Don Manuel'	+ Flag leaf	40 a	54,6 a
'Ítalo'	+ Flag leaf	-	-
'Negriduro'	+ Flag leaf	50 a	43,1 a

¹ Data organized by column. Different letters show significant differences (Duncan, 0.05).

² Cultivar 'Ítalo' displays complete resistance.

Materials and methods

In this experiment six cultivars, grown in Southern Spain, were selected for their different level of tolerance from a previous field study. Cvs. 'Amilcar' and 'Avispa' were selected as tolerant, 'Negriduro' and 'Don Manuel' as sensitive, 'Vitrón' as mid-tolerant, and 'Ítalo' as resistant check.

Inoculations were performed on adult plants, grown on pots (5 l., one plant per pot), in greenhouse experiments in two stages: before and after flag leaf emergence. Another non inoculated set of plants acted as check.

Figure 1. Different steps of inoculation and assessing yield losses.



Results and discussion

Tolerance of cv. 'Amilcar' was displayed before flag leaf emergence (only 36% yield loss and about 60% in sensitive checks). On the contrary, tolerance of cv. 'Avispa' was presented after flag leaf emergence (only 23% yield loss and about 50% in sensitive checks). This suggests a different genetic control of the tolerance presented by both cultivars. Crosses between both cultivars may lead to an increase of the level of tolerance, by combining favourable alleles of both cultivars.

References

Caldwell, R.M., J.F. Schafer, L.E. Compton y F.L. Patterson. 1958. Tolerance to Cereal Leaf Rusts. Science 128:714-715.

Roberts, J.J., Hendricks, L.T. and Patterson, F. L. 1984. Tolerance of leaf rust in Susceptible wheat cultivars. Phytopathology 74(3): 349-351.