

Preliminary Essay on the Effect of Foliar Treatment with the Fungicide Triadimenol on Barley Culture Infected by Scald

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Summary

This study deals with the foliar treatment by the fungicide triadimenol against barley scald. Results have shown that two or three triadimenol treatments have practically stopped the infection evolution. The disease have slightly extended with only one treatment. Moreover, other assessment showed that one, two or three triadimenol treatments were significantly associated to the same increase in the yield.

Résumé

Cette étude concerne le traitement foliaire avec le fongicide triadiménol contre la rhynchosporiose de l'orge. Les résultats obtenus ont montré que deux ou trois traitements avec le triadiménol ont pratiquement stoppé l'évolution de l'infection. La maladie ne s'est propagée que légèrement avec un seul traitement au fongicide. Par ailleurs, une autre évaluation a montré qu'un, deux ou trois traitements au triadiménol sont associés significativement au même accroissement de rendement.

Introduction

Scald is among the most important barley diseases in the world, and in Tunisia, heavy infections were observed on barley during many years. Several studies on this disease were performed, among which investigations on fungicide treatments represent an important research area. Thus, numerous fungicides were tried and generally found effective. This is the case of cyproconazole (6), flusilazole, prochloraz and propiconazole (7), flutriafol and triadimenol (3), carbendazim (2), ...

In a previous work, three treatments against barley scald were performed (5). We have shown that triadimenol was very effective against the disease and increased barley yield. Flusilazole + carbendazim was significantly as effective as triadimenol against the infection, but did not increase the yield. In contrast, iprodion and Folicote (an antitranspirant film) have no effect on the disease development (5).

In the present study, we have chosen to treat by the best fungicide found (triadimenol), in order to investigate the possibility to reduce the number of treatments to two or only one, since three treatments still non economic for the farmers.

Material and methods

Biological materials

This study was performed with the fungal species *Rhynchosporium secalis* (Anamorph), the responsible of barley scald, which was identified as previously (4). The host used was the widest cultured variety (cv "Rihane") of barley (*Hordeum vulgare*) in Tunisia.

General conditions

Field trial in Randomized Complet Blocs Design (three replicates) was performed in the research station of the Ecole Supérieure d'Agriculture du Kef (North-West of Tunisia, Semi-Aride Bioclimat). The plot used was the year before, planted in barley which was heavily infected with scald. The straw of the previous barley was ground and powdered two times of the culture barley (2-3 leaves and tillering stages) by putting 30 g/elementary plot (1.2 m x 5 m).

Rainfall was sufficient from October to February (158.9 mm) but very insufficient from March to May (39.1 mm). We have then performed, during this period, a complementary irrigation by aspersion evaluated to 60 mm.

Fungicide treatment

Barley culture treatment was performed by spraying with a manual sprayer the fungicide triadimenol 5% (Baytan 5 WP at the dose of 3500 g/ha). One, two or three treatments were carried out at tillering, jointing and heading stages.

Infection and yield components assessment

The level infection of barley by scald was evaluated at tillering stage (just before the first treatment) and two weeks after the last treatment. Classic O (no infection) to 9 (all plant infected) scale was used.

Yield components studied were grain number per spike, thousand grain weight, spike number per meter square and yield.

Statistical analysis

All results were submitted to an analysis of variance. Means obtained were presented in figures and least significant differences (l.s.d.) were calculated.

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Results

Infection assessments

At the tillering stage (just before the first treatment), all barley elementary plots were slightly and homogeneously infected by scald (nearly level 2 in the 0-9 scale).

Results in figure 1 represent the second level infection evaluation (three weeks after the last treatment). They showed that without fungicide treatment, the infection level was the highest (more than 7 in the 0-9 scale). When the fungicide triadimenol was sprayed two or three times, the level 2 was not exceeded. This level was less than 3.5 when only one treatment was performed.

Yield components assessment

The grain number per spike was the lowest (less than 37) without triadimenol treatment, although no significant difference with the other cases was obtained (figure 2).

This situation was also noticed with the assessment of the thousand grain weight (less than 31 g for the control, figure 3) and the spike number per meter square (nearly 137 spikes/m² for the control, figure 4).

In contrast, figure 5 showed that with fungicide treatment, yield was significantly the lowest (nearly 15.3 q/ha). One, two or three sprayings of triadimenol were associated to the significantly same yield (between 18 and 19 q/ha).

Discussion

Among some fungicides (triadimenol, flusilazole+carbendazim and iprodione), triadimenol was shown to be the best in the limitation of the scald development and in the increase of the yield (5). In the present work, we have tried to investigate which number of treatments was enough to limit the disease and increase the barley production.

The infection assessment showed that two or three fungicide treatments gave the same result. With only one treatment, the level infection was slightly higher (figure 1).

Apart from yield, the other yield components (figures 2, 3 and 4) did not show any significant difference between all treatments, although the control has always the lowest level. But, the combination of those components showed that only one treatment (as two or three treatments) was able to increase the yield by nearly 3 q/ha (figure 5).

Our overall results showed, then, that one triadimenol treatment is sufficient to limit the infection and increase the yield. The second and the third treatments were practically useless. Since the cost of 1 pesticide treatment/ha is nearly equal to the price of 1 quintal of cereal in Tunisia, we can consider that only one triadimenol treatment against scald allows the farmer to earn 2 q/ha of barley. Earnings would probably be better if the year was rainier (higher scald infection without the treatment).

This preliminary study will be repeated for confirmation and followed by more research on the subject.

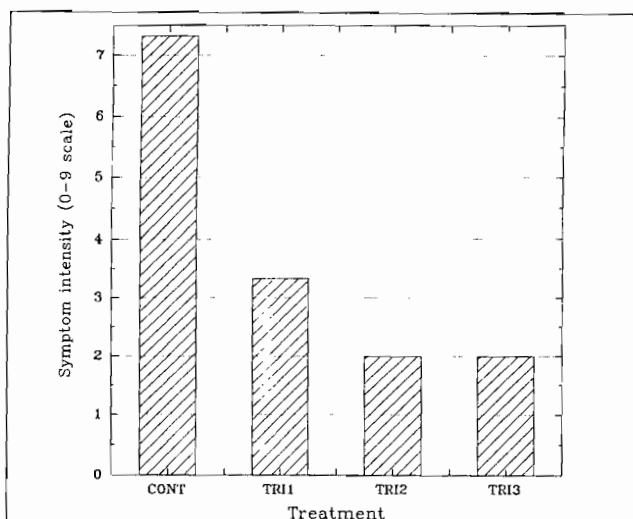


Figure 1. Assessment of the level of barley scald, three weeks after the last treatment (CONT: control, TRI1: one triadimenol treatment, TRI2: two triadimenol treatments, TRI3: three triadimenol treatments, l.s.d.: 0.47, α : 0.05).

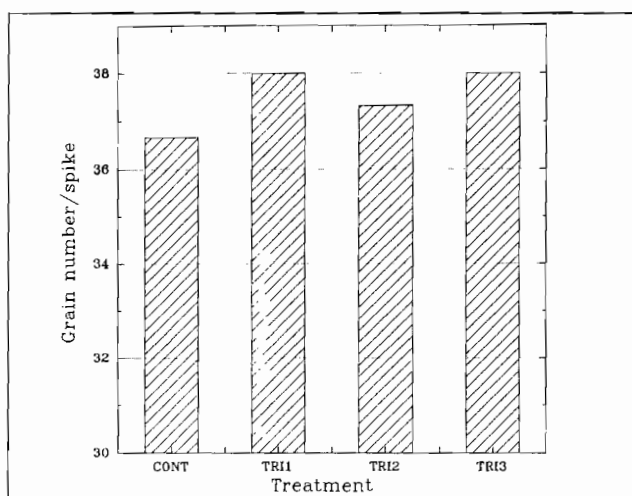


Figure 2. Grain number per spike obtained after all treatments (CONT: control, TRI1: one triadimenol treatment, TRI2: two triadimenol treatments, TRI3: three triadimenol treatments, l.s.d.: 2.28, α : 0.05).

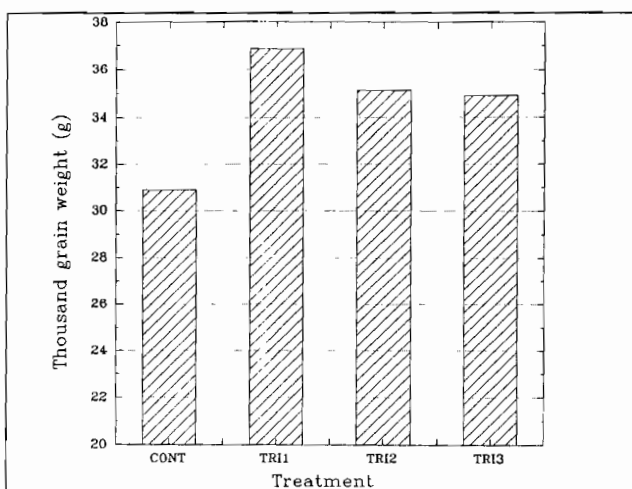


Figure 3. Thousand grain weight obtained after all treatments (CONT: control, TRI1: one triadimenol treatment, TRI2: two triadimenol treatments, TRI3: three triadimenol treatments, l.s.d.: 2.98, α : 0.05).

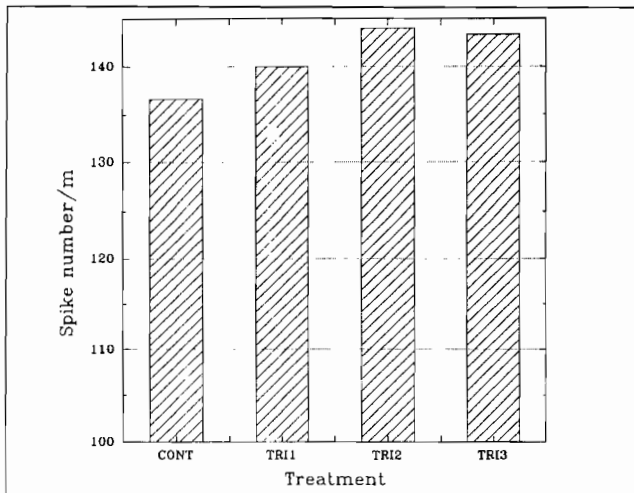


Figure 4. Spike number per meter square obtained after all treatments (CONT: control, TRI1: one triadimenol treatment, TRI2: two triadimenol treatments, TRI3: three triadimenol treatments, l.s.d.: 7.54, α : 0.05).

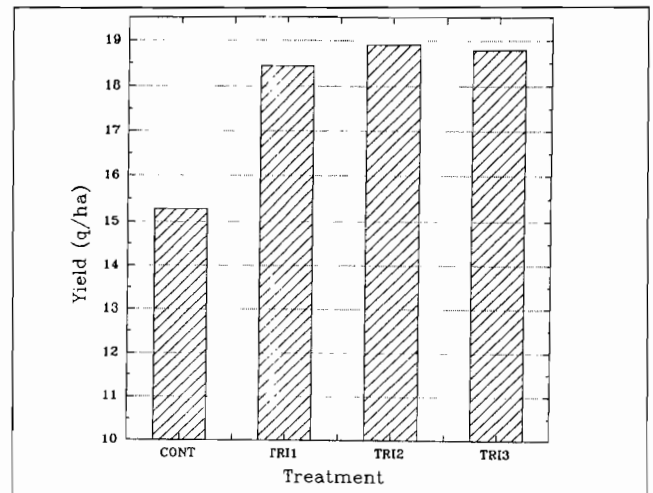


Figure 5: Yield obtained after all treatments (CONT: control, TRI1: one triadimenol treatment, TRI2: two triadimenol treatments, TRI3: three triadimenol treatments, l.s.d.: 1.45, α : 0.05).

Literature

- Jordan V.W.L., Hutcheon J.A. & Stinchcombe G.R., 1991. Biological properties and field performance of fungicides for control of winter barley foliar diseases. Abstract in Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz, **98**, 26-38.
- Khan T.N. & Young K.J., 1989. Effects of fungicide seed dressings and fungicide-treated fertiliser on the severity of leaf diseases and yield of barley in Western Australia. Aust. J. Exp. Agric., **29**, 565-568.
- Nasraoui B., 1993. Effet de trois antitranspirants de type film sur la croissance mycélienne *in vitro* de quelques espèces fongiques parasites de l'orge. Anna. Inst. Nat. Rech. Agro. Tunisie, **66**, 137-151.
- Nasraoui B. & Yahyaoui A., 1993. Effect of treatments with antitranspirants and fungicides on two barley diseases: powdery mildew and scald. Rev. Inst. Nat. Agro. Tunisie, **8**, 119-131.
- Sheridan J.E. & Nendick D.K., 1987. Control of *Rhynchosporium* scald of barley by seed and foliar fungicides. Proceedings (New Zealand Weed and Pest Control Conference, **41**, 30-33).
- Volk T. & Frahm J., 1989. Effective control of *Rhynchosporium* leaf blotch on barley with fungicides. Abstract in Gesunde Pflanzen, **41**, 338-343.

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