The Fertilizing Influence on *Pyrenophora tritici repentis* attack in Agricultural Research and Development Station Simnic area

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Abstract
Tan spot caused by *Pyrenophora tritici repentis* has gained predominance among foliar wheat diseases in the most of the wheat growing areas in the world. In the last years tan spot has become also an important wheat disease in ARDS Șimnic area. The present paper is focus on the fertilizing influence on *Pyrenophora tritici repentis* attack on a set of 25 winter wheat cultivars evaluated for their response to natural infection under field conditions. The pathogen attack degree was calculated in three times in vegetation T1 (Z44), T2 (Z51) and T3 (Z59). There was higher attack degree on unfertilized plots, while the attack degree was lower on fertilized plots (N100P40). The high attack degree show the cultivars sensitivity to pathogen attack, as Autan, while the low attack degree show a good cultivars behavior to pathogen attack, as Renesansa, Serina and Martina, which realized also good yields. These data suggest that nitrogen fertilizers appear to reduce disease by delaying natural leaf senescence but don’t have a direct effect on *Pyrenophora tritici repentis*.

Key words: wheat, cultivar, attack degree, fertilizing levels

Introduction
The fungus *Pyrenophora tritici repentis* (Died.) anamorph *Drechslera tritici repentis* (Died.) Shoemaker (synonym *Helminthosporium tritici repentis*) causes tan spot of wheat worldwide (Hosford, 1982). Since the 1970s the disease has become a serious problem and caused significantly losses (3 to 50%) in major wheat growing areas. The fungus produces lens-shaped necrotic lesions with chlorotic halo on susceptible cultivars. The pathogen can over-season on diseased seed, infected crop residue, and overwintering grass hosts (De Wolf et al., 1998). Two quantitative types of symptoms, tan necrosis (nec⁺) and extensive chlorosis (chl⁺) produced by *Pyrenophora tritici repentis* on susceptible wheat genotypes were indentified by Lamari and Bernier (1989). These types of symptoms are under independent genetic control of the host (Lamari and Bernier, 1991). The objective of this study was to evaluate the tan spot severity in two different fertilizing conditions in Simnic area as well as the response of the wheat cultivars to pathogen attack.

Material and methods
The experiment was conducted in the Breeding Laboratory field from ARDS Simnic on brown reddish soil (pH 5.6; 1.8% humus) which has been cropped to pea the previous season. The field was plowed and disked prior to planting and weeds control was realized using 1 l/ha recommended dose Dicopur Top herbicide. Twenty-five winter wheat cultivars with diverse origin were evaluated for their response to *Pyrenophora tritici repentis* natural
infection under field conditions in two different fertilizing conditions. Plots were fertilized at sowing with 40 kg/ha of N and 40 kg/ha of P₂O₅ basal applied and top-dressed with 60 kg/ha of N on early spring (March). The layout was a randomized complete block design in a strip-plot system with three replications. Plot size was 7 m². Seeding was on October 10th 2007 using a seed rate of 550 grains/ m². Throught the crop cycle the growth stages were recorded according to the Zadoks scale. Disease evaluation was started when initial necrotic symptoms were noticed in the canopy of the wheat cultivars. Visual scoring of percent diseased area was done in three times in vegetation (T1, T2 and T3), as follows: April 28th 2008 (Z44), May 10th 2008 (Z51) and May 20th 2008 (Z59) using a quantitative rating scale based on lesion size and necrotic leaf area. Individual leaf-disease rating were averaged to obtain a mean score for each replication. For each score, percent disease severity (S) and incidence (I) was estimated based on the following formulas:

\[ I\% = \frac{nx100}{N} \]

\[ S\% = \frac{ixf}{N} \]

where \( n \) is the number of diseased plants, \( N \) is plants total number/ m², \( S\% \) is percent disease severity, \( I\% \) is percent disease incidence, \( x \) refers to severity measured as diseased leaf area and \( f \) refers to number of affected leaves recording the same percent.

Then, the resulted values were used to calculate the attack degree following formula:

\[ AD\% = \frac{(S\% \times I\%)}{100} \]

where \( AD \) represents attack degree (Savescu et al., 1969).

Statistical analysis involved analysis of variance procedure.

Results and discussion

The wheat cultivars: Frini, Dunai, Carolina, Capo, Fridoline, Aztec, Bercy, Cezanne, Cordiale didn’t show any symptom of the pathogen attack for all three times of the evaluation.

Analyzing the data marked in table no. 1 could be observed the *Pyrenophora tritici repentis* pathogen attack evolution for three different times in vegetation. In T1 (Z44) (April 28th 2008) on unfertilized plots the highest attack degree was recorded by Autan with 15,13%, while on fertilized plots (N100P40) the value recorded by Autan was lower (8,55%). It was observed also that at rate of N100P40 Meunier and Mariska cultivars didn’t show any symptom of pathogen attack, while on unfertilized plots they have recorded attack values of 1,34%, respectively 10,6%. In T2 (Z5) (May 10th 2008) the highest attack degree on unfertilized plots was recorded by Autan with 26,66%, while at N100P40 level the same cultivar recorded 20% attack degree. In T3 (Z59) (May 20th 2008) from all twenty-five cultivars only sixteen were affected by pathogen attack recording 100% incidence (1%), excepting Briana cultivar which had 96,57% incidence value. On unfertilized plots the attack degree ranged from 7,0% (by Meunier), 7,66% (by Renesansa) to 25% (by Renan, Exotic, Isengrain) or even 30% (by Autan), while at N100P40 fertilizing level the highest attack degree was 25% (by Autan). The lowest attack value on unfertilized plots was recorded by Meunier with 7%, while Renesansa recorded 4, 04% at N100P40 fertilizing level.

The wheat cultivars Autan, Apache and Mariska recorded a very significant negative attack degree for all three times of the evaluation, while the cultivars Glosa, Josef, Enesco, Serina and Renesansa recorded high attack degree at a rate of N100P40 only to the last two times of the evaluation. A very significant decrease of the attack degree was recorded in T3 at a rate of N100P40 by cultivars Isengrain, Meunier, Orion, Martina, and Cubus, while Exotic recorded a negative distinct significant decrease of the attack degree. A possible explanation is that the older leaves are more susceptible to *Pyrenophora tritici repentis*. 
than are younger ones in field (Raymond et al., 1985; Cox and Hosford, 1987). Even if the cultivar Briana showed in the first time of the evaluation a very significant decrease of the attack degree at a rate of N100P40, in the last time of the evaluation this cultivar recorded a very significant positive attack degree. A possible explanation, as was suggested in the earlier work (Hubert et al., 1987), is that certain wheat genotypes may have a resistance mechanism that is sensitive to N fertility. This is a different aspect and needs further evaluation.

Table 1. The fertilizing influence to Pyrenophora tritici repentis attack on a set of winter wheat cultivars

<table>
<thead>
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Conclusions

The differences in the varietal response of wheat cultivars on tan spot severity in two different fertilizing treatments suggest the significance of cultivar selection when considering surface seeding. The pathogen attack evolution was different for each cultivar depending on infection moment, fertilizing treatment and cultivar resistance. The wheat cultivars: Frini, Dunai, Carolina, Capo, Fridoline, Aztec, Bercy, Cezanne, Cordiale didn’t show any symptom of the pathogen attack for all three times of the evaluation. It was observed that pathogen attack
started earlier on unfertilized plots recording higher values comparatively with fertilized plots (N100P40). The attack degree was double, 1/3 higher or more with few percent on unfertilised plots, comparatively with the values recorded on fertilized plots. The highest attack degree was recorded by Autan cultivar for both fertilizing treatments. As was suggested in the earlier work (Bockus and Davis, 1993), these data show that nitrogen fertilizers appear to reduce disease by delaying natural leaf senescence but do not have a direct effect on *Pyrenophora tritici repentis*. In Simnic area tan spot is still capable of causing high attack degrees, even when wheat is grown with or without adequate fertilizing treatment.

**References**


