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ASSESSMENT OF THE SEEDLING REACTIONS OF SOME BARLEY CULTIVARS TO *Drechslera teres f. maculata*[1]

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ABSTRACT

Seedling reactions of 20 barley cultivars grown in Turkey to an isolate of Drechslera teres f. maculata was determined under controlled conditions. The reactions of cultivars ranged between susceptible to resistant-moderately resistant. Cultivars Tokak 157/37 and Bülbül 89 was susceptible to the isolate used. The cultivars Özdemir, Çıldır 02 and Cumhuriyet 50 showed a moderately susceptible- susceptible reaction. The cultivars Fahrettinbey, Bilgi 91, Süleymenbey 98 and Bornova 92 were moderately susceptible to the isolate. The cultivars Yerçil 147, Şerifehanım 98, Sur 93, İnce 04, Konevi, Balkan 96, Beyşehir and Zeynelağa were moderately resistant - moderately susceptible to the pathogen. The cultivars Sladoran and Kıral 97 showed a moderately resistant and cultivar Erginel 90 showed a resistant-moderately resistant reaction the isolate.

Key Words: *Barley, disease resistance, Drechslera teres, Net blotch, Turkey*

BAZI ARPA ÇEŞİTLERİNİN *Drechslera teres f. maculata*' YA FİDE DÖNEMİ TEPKİLERİNİN DEĞERLENDİRİLMESİ

ÖZET

Türkiye'de yetiştirilen 20 arpa çeşidinin Drechslera teres f. maculata'nın bir izolatına karşı tepkileri kontrollü şartlarda değerlendirilmiştir. Çeşitlerin tepkileri hassas ile dayanıklı-orta derecede dayanıklı arasında değişmiştir. Tokak 157/37 ve Bülbül 89 çeşitleri kullanılan izolata hassas tepki vermişlerdir. Özdemir, Çıldır 02 ve Cumhuriyet 50 çeşitleri orta derecede hassas-hassas tepki göstermişlerdir. Fahrettinbey, Bilgi 91, Süleymenbey 98 ve Bornova 92 çeşitleri izolata karşı orta derecede hassas tepki vermişlerdir. Yerçil 147, Şerifehanım 98, Sur 93, İnce 04, Konevi, Balkan 96, Beyşehir ve Zeynelağa çeşitleri patojene karşı orta derecede dayanıklı-orta derecede hassas tepki göstermişlerdir. Sladoran ve Kıral 97 çeşitleriizolata karşı orta derecede dayanıklı tepki gösterirken Erginel 90 çeşidi dayanıklı-orta derecede dayanıklı tepki göstermiştir.

Anahtar Kelimeler: *Ağbenek, Arpa, Drechslera teres, hastalıklara dayanıklılık, Türkiye*

INTRODUCTION

Net blotch caused by the fungus *Drechslera teres* (teleomorph: *Pyrenophora teres*) is an important disease of barley both in the world and Turkey (Aktaş 1997, Shipton et al 1973, Mathre 1982). Aktaş (1997) found the disease in 70% of production fields in the Central Anatolia region with an average disease intensity of 13.4%. Losses due to this disease range between 10-40%. However, in susceptible cultivars yield losses could be very high (Mathre 1982). The disease has two forms. The spot form is caused by *Drechslera teres* f. *maculata* and the net form is caused by *Drechslera teres* f. *teres* (Smedegaard-Petersen 1971, Mathre 1982). Net form of the disease occurs on the barley leaves and leaf sheaths and on the hulls. The initial lesions appear as small streaks. Later, these streaks expand to form narrow, dark brown longitudinal and transverse streaks and characteristic net like pattern occcurs. The spot form also occurs on leaves and leaf sheaths. Spot form lesions are dark brown, elliptical or fusiform surrounded by a chlorotic zone. These lesions are 3x6 mm in diameter. The chlorosis eventually extends the entire leaf blade and withering occurs (Mathre 1982). In a study performed in the Central Anatolia region, Aktaş (1997) found that both forms were present in Turkey, however, spot form was more common (93,35%). Using resistant cultivars is the preferable approach to disease control because of environmental and economical constraints. In Turkey, there is limited information regarding the cultivar response to the pathogen. Aktaş (1995) studied the reactions of some barley cultivars to a virulent strain of *Drechslera teres*. He found that out of the 82 barley lines tested, 3 were resistant and 7 were moderately resistant to the isolate used. All 22 Turkish barley lines were susceptible to *P. teres*. Karakaya and Akyol (2006) studied seedling reactions of 15 Turkish barley cultivars to 4 *Drechslera teres* isolates. They found clear differences among the reactions of the cultivars to the isolates of the fungus ranging from very susceptible to the resistant. There were small differences among the cultivars in response to isolates. We report here the seedling resistance status of 20

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barley cultivars grown in Turkey to an isolate of spot form of *Drechslera teres*.

MATERIALS AND METHODS

Twenty barley cultivars were obtained from Central Research Institute for Field Crops, Ankara, Turkey and The Variety Registration and Seed Certification Center, Ankara, Turkey. Cultivars Tokak 157/37, Bülbül 89, Özdemir, Çıldır 02, Cumhuriyet 50, Fahrettinbey, Bilgi 91, Süleymanbey 98, Bornova 92, Yerçil 147, Şerifehanım 98, Sur 93, İnce 04, Konevi, Balkan 96, Zeynelağa and Sladoran are 2-rowed cultivars. Beyşehir, Kıral 97 and Erginel 90 are 6-rowed cultivars. In 2008, diseased leaves were collected from Haymana region of Ankara, Turkey. Diseased leaves showing spot form symptoms of the net blotch disease were surface sterilized one minute with 1% NaOCl and then transferred to Petri plates containing moistened filter paper. After sporulation, single conidium was taken and placed into Potato Dextrose Agar. Ten seeds of each cultivar were sown into 7 cm in diameter plastic pots containing top soil. Plants were maintained in a controlled growth room at 18-23^{o} C night/day and 14/10 h light and dark regimes. Plants were inoculated at growth stage 12-13 (Zadoks et al, 1974) with an inoculum concentration of 15-20 x 10^4 mycelium parts per ml (Douiyssi et al 1998, Karakaya and Akyol 2006). One drop of Tween 20 was added to per 100 ml of inoculum (Aktaş, 1997). After inoculation, plants were kept in moistened plastic bags for 72 h. Seven days after inoculation, disease evaluations were made using a 1-9 scale developed for spot form of the disease by Tekauz (1985). In this scale, 7 numerical classes were formed (1 R: resistant, 2 R: resistant-MR: moderately resistant, 3 MR: moderately resistant, 5 MR: moderately resistant-MS: moderately susceptible, 7 MS: moderately susceptible, 8 MS: moderately susceptible-S: susceptible, 9 S: susceptible). Experiments were repeated three times.

RESULTS AND DISCUSSION

Two days after inoculation, disease symptoms started to appear in susceptible cultivars. Disease symptoms started to appear three and four days after inoculation in all other cultivars.

With *Drechslera teres*, inoculum in the form of mycelial fragments give the same results as conidia in inoculation studies (Tekauz 1985, Douyissi et al 1998, Karakaya and Akyol, 2006). Also, in our study, inoculation using mycelial fragments were successful.

The response of 20 barley cultivars to an isolate of *Drechslera teres* f. *maculata* ranged from resistant-moderately resistant to susceptible (Table 1). Cultivars Tokak 157/37 and Bülbül 89 was susceptible to the isolate used. The cultivars Özdemir, Çıldır 02 and Cumhuriyet 50 showed a moderately susceptible-susceptible reaction. The cultivars Fahrettinbey, Bilgi 91, Süleymanbey 98 and Bornova 92 were moderately resistant - moderately susceptible to the pathogen. The cultivars Yerçil 147, Şerifehanım 98, Sur 93, İnce 04, Konevi,, Balkan 96, Beyşehir and Zeynelağa were moderately resistant-moderately susceptible to the pathogen. The cultivars Sladoran and Kıral 97 showed a moderately resistant reaction and cultivar Erginel 90 showed a resistant-moderately resistant reaction the isolate.

Aktaş (1995) studied the reactions of some barley cultivars to a virulent strain of *Drechslera teres*. He found the cultivars Bülbül 89, Tokak 157/37, Cumhuriyet 50 and Erginel 90 as susceptible and Yerçil 147 as moderately susceptible. In our study, cultivars Bülbül 89 and Tokak 157/37 were found susceptible and Cumhuriyet 50 was found moderately susceptible-susceptible to the isolate. Cultivar Yerçil 147 was found as moderately resistant-moderately susceptible and cultivar Erginel 90 was found as resistant – moderately resistant. Karakaya and Akyol (2006) determined the seedling reactions of 15 Turkish barley cultivars to 4 net blotch isolates. There were small differences among the cultivars in response to isolates. The response of the cultivars Bülbül 89 and Tokak 157/37 to pathogen isolates ranged between susceptible to moderately susceptible –susceptible. In our study, these cultivars showed a susceptible reaction the isolate used. These differences among the experiments might be related to isolate differences.

Table 1. Seedling response of 20 Turkish barley cultivars to a *Drechslera teres* f. *maculata* isolate under controlled conditions*.

Barley cultivar	Response of the cultivar
Tokak 157/37	8.67 (S)
Bülbül 89	8.67 (S)
Özdemir	8.00 (MS-S)
Çıldır 02	7.67 (MS-S)
Cumhuriyet 50	7.67 (MS-S)
Fahrettinbey	6.67 (MS)
Bilgi 91	6.33 (MS)
Süleymanbey 98	6.33 (MS)
Bornova 92	6.33 (MS)
Yerçil 147	5.67 (MR-MS)
Şerifehanım 98	5.67 (MR-MS)
Sur 93	5.67 (MR-MS)
İnce 04	5.00 (MR-MS)
Konevi	5.00 (MR-MS)
Balkan 96	5.00 (MR-MS)
Beyşehir	5.00 (MR-MS)
Zeynelağa	5.00 (MR-MS)
Sladoran	3.67 (MR)
Kıral 97	3.00 (MR)
Erginel 90	2.33 (R-MR)

**R: resistant, MR: moderately resistant; MS: moderately susceptible; S-susceptible. Numbers are mean of three replications.*

Karakaya and Akyol (2006) reported that pathogenic variability was low among the isolates tested. Pathogenic variability should be determined using a comprehensive number of isolates to assist breeding programs in developing effective screening protocols.

It appears that genotypic differences exist among Turkish barley cultivars to *Drechslera teres* f. *maculata*. Seventeen cultivars tested in this study were 2-rowed and 3 cultivars were 6-rowed. Six rowed cultivars appear to be more resistant than two rowed cultivars. Karakaya and Akyol (2006) also found six rowed cultivars as more resistant. Six rowed cultivars were more resistant to the another barley disease, scald, caused by *Rhynchosporium secalis* (Mert and Karakaya 2004, Zencirci and Hayes 1990). However, resistance to *Drechslera teres* was also found in two rowed cultivars in our study. Karakaya and Akyol (2006) also reported resistance in 2-rowed cultivars .

Turkey is among the gene centers of barley (Kün 1996). Metcalfe et al (1977) stated that Middle East was a good source of resistance to net blotch. It is also reported that Turkey and Ethiopia were important resistance centers to this diasease (Buchannon and McDonald 1965). Khan (1972) evaluated 875 Turkish barley lines against W. Australian isolates of *Drechslera teres* and found 6 lines as highly resistant. Legge et al (1996) evaluated the 176 Turkish barley accessions for disease reaction to barley pathogens present in Canada. Their results indicated that this germplasm was a good source of resistance *Septoria passerini*, *Rhynchosporium secalis* and the spot form of *Pyrenophora teres*. A small number of accessions with resistance to the net form of *P. teres* was also identified. Our study also showed that variation regarding resistance is present in cultivars grown in Turkey. Resistance studies should be carried out in the future regarding Turkish barley genotypes and farmers should be encouraged to use resistant cultivars.

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