

DISTRIBUTION OF OAT STEM RUST IN SOME PROVINCES OF T₁ RK₁YE*

Nilüfer Akci¹, Aziz Karakaya², Turhan Kahraman³, Orhan Büyük¹, Sümeyye
Erdoğ muk Bağ -eci¹, Melis Seidi Arslan¹, Semiha Yüceer⁴, Gülsüm Ünal⁴

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Abstract

Oat stem rust, caused by the fungus *Puccinia graminis* f. sp. *avenae*, is one of the most damaging diseases affecting oats. It is particularly problematic in regions with relatively low temperatures and high humidity, where oats are cultivated. This disease significantly reduces both the yield and quality of oat crops by diminishing the photosynthetic area of the plants. In 2023, surveys were conducted in various oat-growing areas across several provinces in Türkiye, including Bolu, Afyonkarahisar, Kastamonu, Ç ankārē Edirne, Osmaniye, Adana, Mersin, Kahramanmaraş, Gaziantep, and Hatay during May, June, and July. The findings indicated that the prevalence of oat stem rust was 25% in Bolu and Afyonkarahisar, 50% in Edirne, 48% in Kastamonu, and 17% in Ç ankārē. No cases of oat stem rust were found in the surveys conducted in Osmaniye, Adana, Mersin, Kahramanmaraş, Gaziantep, and Hatay provinces. To combat this pathogen, effective control measures should be implemented.

Keywords: *Oat, Oat stem rust, Puccinia graminis* f. sp. *avenae*, Türkiye

INTRODUCTION

Oat (*Avena sativa* L.) is a cereal plant that serves multiple purposes in human nutrition, animal feed, and industrial applications worldwide. Compared to wheat and barley, which were cultivated long ago, oats were brought into cultivation later and were long considered just a wild grass. Despite this, oats have a history spanning two thousand years and rank third among cool-season cereals globally in terms of planting and production, and fourth in Türkiye after wheat, barley, and rye. Recently, the rising significance of oats in human nutrition and their industrial uses has led to an expansion in production areas. Oats are typically grown in marginal environments, such as cool,

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¹Plant Protection Central Research Institute, Ankara, Türkiye;

²Ankara University Faculty of Agriculture, Ankara, Türkiye;

³Trakya Agricultural Research Institute, Edirne, Türkiye;

⁴Biological Control Research Institute, Adana, Türkiye;

Correspondence: niluferakci@hotmail.com

rainy climates and low-fertility soils, compared to other cereals (Hoffmann, 1995; Ge it, 2016). The most common use of oats is for animal feed. Oat stalks are softer, and oat leaves are more abundant, which makes them richer in organic and mineral substances compared to wheat and barley straw. Animals enjoy eating oats, which are provided in various forms such as green grass, hay, grain, and straw. Oats are also included as a support plant in mixtures with legume forage plants (e.g., forage pea, vetch). Animals tend to prefer oats over other cereals due to their soft stalks and lush leaves. In recent years, oats have gained popularity in human nutrition, particularly in the form of oat flour and oatmeal, especially for breakfast. In addition to being rich in protein, oats contain significant amounts of oil, vitamin B1, phosphorus, iron, and various minerals, enhancing their nutritional value (Anderson, 2000; Ge it, 2016). In T rkiye, oat farming occurs in both dry and irrigated regions, with significantly more activity in dry areas compared to irrigated ones. While growing oats is generally more suitable in rainy or irrigated conditions, the actual cultivation of oats in irrigated areas remains relatively low. Oat farming takes place to varying degrees in eight of the T rkiye's agricultural regions, excluding the Southeastern agricultural region. The regions where oat farming is practiced include Mid-south, Mid-north, Marmara, Aegean, Black Sea, Mediterranean, Mid-east, and Northeast (Ge it, 2016). The significance of oats has increased in T rkiye due to enhanced producer support, resulting in a rise in cultivation areas over the years. In 1991, the area allocated for oat cultivation was 132,000 hectares. This figure rose to 158,500 hectares by 2008. However, after 2008, the cultivation area dropped to 85,863 hectares in 2011, before increasing again to 109,820 hectares in 2019. Additionally, the area in T rkiye planted with oats for green grass expanded from 825,512 hectares in 2012 to 2,560,078 hectares in 2019 (Anonymous, 2020). Oats thrive in relatively cool temperatures and high humidity, which makes them more susceptible to fungal diseases due to their significant water requirements compared to other cool-climate cereals. One major concern for oat cultivation is rust diseases, particularly oat stem rust, which is caused by the basidiomycetous pathogen *Puccinia graminis* Pers. f. sp. *avenae* Erick. & Henn. This disease is especially problematic in regions with the cool and humid conditions that favor oat growth. Oat stem rust can affect the leaves, stems, and ears of the plant. The pustules produced by the pathogen break through the plant's epidermis, reducing the available photosynthetic area and resulting in significant decreases in both yield and quality. In severe cases, the stems and leaf sheaths may become heavily covered with rust pustules, potentially causing the stems to break. Furthermore, when oats are used as green grass, silage, grain, or hay for animal nutrition, the presence of stem rust can diminish forage quality. The fungus responsible for oat stem rust can produce new races during its sexual reproduction phase and through mutations (Martens, 1985; Rodriguez-Algaba *et al.*, 2022). This adaptability allows the fungus to infect previously resistant oat varieties, potentially leading to new epidemics. Therefore, it is crucial to evaluate the impact of this disease on oat production in T rkiye and implement appropriate control measures. This study aimed to examine the distribution of oat stem rust disease across different regions of T rkiye.

MATERIALS AND METHODS

In May, June, and July 2023, surveys were conducted in the oat cultivation areas of the provinces of Kastamonu, Çankır, Bolu, Afyonkarahisar, Edirne, Kahramanmaraş, Adana, Mersin, Hatay, Osmaniye, and Gaziantep in Türkiye (Figure 1).

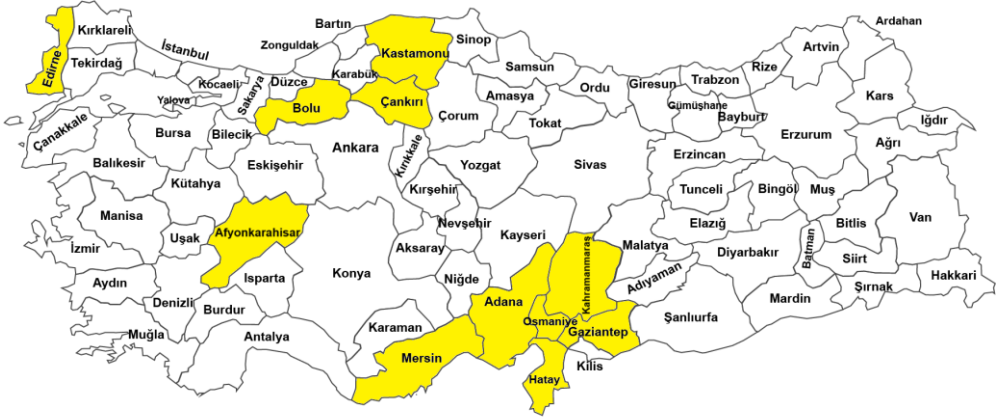


Figure 1. Turkish provinces surveyed for oat stem rust in 2023

Systematic sampling method was used in the surveys (Aktak, 2021). Samples were taken from the fields by stopping approximately every 5-30 km. In these fields, sampling points were made randomly within the field according to the size of the field. The surveys took into account the grain production and grass production periods of oat plants. While the grain production periods vary by region, they generally occur in June and July, and the grass production periods typically occur in May and June. The surveys were conducted with these time frames in mind. In the surveys, prevalence of the stem rust disease in oat cultivation areas was determined. In the surveys, the presence/absence of the disease in each field was recorded. One hundred forty oat fields were surveyed in the Turkish provinces of Bolu (24 fields), Afyonkarahisar (8 fields), Kastamonu (35 fields), Çankır (45 fields), Edirne (4 fields), Osmaniye (4 fields), Adana (10 fields), Mersin (3 fields), Kahramanmaraş (4 fields), Gaziantep (2 fields), and Hatay (1 field). As the field size increased, more samples were taken (Table 1). At each location, at least 100 plants were inspected.

Table 1. Field size and number of sampling locations (Aktak, 2001).

Field size	Number of sampling locations
Up to 10 decares	At least 5 different locations
11-100 decares	At least 10 different locations
101-500 decares	At least 15 different locations
Over 501 decares	At least 20 different locations

RESULTS AND DISCUSSION

Oat stem rust was detected in 6, 2, 2, 17, and 8 oat fields in Bolu, Afyonkarahisar, Edirne, Kastamonu, and   ank  provinces, respectively (Figure 2). The percentages of oat stem rust disease was found to be 25% in Bolu and Afyonkarahisar provinces, 50% in Edirne province, 48% in Kastamonu province, and 17% in   ank  province during field inspections (Table 2). Oat stem rust disease was not encountered in the surveys conducted in Osmaniye, Adana, Mersin, Kahramanmara , Gaziantep, and Hatay provinces. However, the number of investigated fields were limited in some provinces including Hatay and Gaziantep. The lack of oat rust disease in these regions may be attributed to the climatic conditions and the specific oat cultivars grown. It is possible that the disease was not detected in surveys in these regions due to insufficient spring rainfall and high temperatures.



Figure 2. Oat stem rust symptoms observed in Kastamonu province of T rkiye

Table 2. In 2023, surveys were conducted in oat cultivation regions across the provinces of Bolu, Afyonkarahisar, Kastamonu, Çankırı, Edirne, Osmaniye, Adana, Mersin, Kahramanmaraş, Gaziantep, and Hatay to assess the status of oat stem rust disease

Province	District	Village	GPS Coordinates	Altitude	Disease situation
Bolu	Merkez	Karamanlar	40.792432 31.806046	724 m	Absent
	Merkez	Kandamāk	40.782618 31.838197	776 m	Absent
	Merkez	Yayladānlar	40.789156 31.846775	769 m	Absent
	Merkez	Ulumescit	40.791873 31.868373	892 m	Absent
	Merkez	Sazakkānĭk	40.768776 31.824105	810 m	Absent
	Merkez	Yuva	40.763587 31.788537	747 m	Absent
	Merkez	Çaygökpınar	40.719842 31.737113	859 m	Absent
	Merkez	Vakıfgeçitveren	40.724709 31.693848	757 m	Absent
	Gerede	Sofular	40.762166 32.199602	1213 m	Absent
	Gerede	Sofular-Akurlu mevkii	40.770856 32.189385	1245 m	Absent
	Gerede	Sofular-Rumelihkārē mevkii	40.764579 32.199440	1240 m	Absent
	Gerede	Yazıkara	40.754919 32.210221	1206 m	Absent
	Gerede	Yazıkara-Mezarlık mevkii	40.757737 32.200750	1206 m	Absent
	Gerede	Çoğlu	40.726320 32.200560	1162 m	Present
	Gerede	Çoğlu- Gübüzler mevkii	40.736601 32.184480	1171 m	Absent
	Gerede	Nuhören	40.771136 32.166371	1265 m	Absent
	Gerede	Nuhören-Kadıkārē mevkii	40.762729 32.169082	1261 m	Present
	Yeni-ağaç	Hamzabey	40.783159 31.998186	998 m	Present

Table 2. In 2023, surveys were conducted in oat cultivation regions across the provinces of Bolu, Afyonkarahisar, Kastamonu, Çankırı, Edirne, Osmaniye, Adana, Mersin, Kahramanmaraş, Gaziantep, and Hatay to assess the status of oat stem rust disease (continued)

Province	District	Village	GPS Coordinates	Altitude	Disease situation
Bolu	Yeni-ağa	Dereköy	40.814708 31.961013	1121 m	Present
	Yeni-ağa	Kemaller	40.779020 31.958742	1185 m	Present
	Yeni-ağa	Örenköy	40.766063 32.001083	1022 m	Absent
	Yeni-ağa	Kandıra	40.822883 31.981536	1168 m	Absent
	Yeni-ağa	Kandıra-Büyükçam mevkii	40.812813 31.981651	1121 m	Present
	Yeni-ağa	Eski-ağa	40.818581 32.034908	1008 m	Absent
Afyonkarahisar	Bolvadin	Dikdi Kasabası	38.780853 31.053032	1075 m	Present
	Bolvadin	Derekarabaşı	38.712369 31.162270	969 m	Absent
	Bolvadin	Bıyıklıkarabaşı	38.766096 31.251273	1101 m	Absent
	Bolvadin	Yörük Karacaören	38.826965 31.079002	1206 m	Present
	Emirdağ	Güneysaray	38.990078 31.070070	1132 m	Absent
	Emirdağ	Güneysaray- Belen mevkii	39.004113 31.037627	1127 m	Absent
	Emirdağ	Tabaklar	39.031513 31.090677	1021 m	Absent
	Emirdağ	Tabaklar-Köyünü mevkii	39.048908 31.087348	960 m	Absent
Kastamonu	Merkez	Gömeç	41.438023 33.827262	713 m	Absent
	Merkez	Gölköy	41.456969 33.746371	732 m	Absent
	Merkez	Ömerli	41.437114 33.866896	797 m	Absent

Table 2. In 2023, surveys were conducted in oat cultivation regions across the provinces of Bolu, Afyonkarahisar, Kastamonu, Çankırı, Edirne, Osmaniye, Adana, Mersin, Kahramanmaraş, Gaziantep, and Hatay to assess the status of oat stem rust disease (continued)

Province	District	Village	GPS Coordinates	Altitude	Disease situation
Kastamonu	Merkez	Bozoğlak	41.461317 33.895264	736 m	Present
	Merkez	Oğulköyü	41.461279 33.909330	747 m	Present
	Merkez	Emirler	41.463075 33.765818	741 m	Present
	Merkez	Akajbatakları	41.478971 33.951202	688 m	Absent
	Merkez	Alatarla	41.495506 34.028122	643 m	Present
	Merkez	Hala-lı	41.461743 33.960728	685 m	Absent
	Merkez	Duruçay	41.489096 33.769956	813 m	Absent
	Merkez	Emirli	41.453496 33.875009	743 m	Absent
	Merkez	Taklı	41.421244 33.712529	857 m	Present
	Merkez	Çavundur	41.472517 33.984066	645 m	Present
	Merkez	Teke	41.316831 34.067255	907 m	Present
	Merkez	Kasaba	41.479390 33.681155	832 m	Present
	Merkez	Küçüksu	41.515614 33.717935	967 m	Present
	Merkez	Hacıbaşı	41.504560 33.694899	946 m	Present
	Devrekani	Asarcık	41.706252 34.046871	1214 m	Present
	Takırcı	Merkez	41.494221 34.210672	582 m	Present
	Takırcı	Karha	41.484328 34.192886	621 m	Present
	Takırcı	Akdeğirmen	41.469180 34.008389	648 m	Absent

Table 2. In 2023, surveys were conducted in oat cultivation regions across the provinces of Bolu, Afyonkarahisar, Kastamonu, Çankırı, Edirne, Osmaniye, Adana, Mersin, Kahramanmaraş, Gaziantep, and Hatay to assess the status of oat stem rust disease (continued)

Province	District	Village	GPS Coordinates	Altitude	Disease situation
Kastamonu	Kışangazi	Çay	41.220979 33.549267	864 m	Present
	Kışangazi	Sevindik	41.220043 33.575209	882 m	Present
	Kışangazi	Kuk-ular	41.222985 33.535342	834 m	Present
	Kışangazi	Kıcığ ez	41.254972 33.494885	1099 m	Absent
	Kışangazi	Enbiya	41.216431 33.513004	824 m	Present
	Seydiler	Merkez	41.617861 33.707887	1039 m	Absent
	Seydiler	Yukarē Aslanlē	41.636943 33.708615	1030 m	Absent
	Seydiler	Akağ ē Aslanlē	41.638740 33.682305	1015 m	Absent
	Seydiler	Yağ lar	41.611671 33.743468	1054 m	Absent
	Seydiler	kalgam	41.653166 33.668125	1018 m	Absent
	Seydiler	Demirciözü	41.611946 33.645084	1080 m	Absent
	Seydiler	Odabakē	41.638487 33.655707	1014 m	Absent
	Seydiler	Sahbat	41.628096 33.711774	1027 m	Absent
	Seydiler	Mancēk	41.646982 33.627923	1021 m	Absent
Çankırı	Yapraklē	Merkez	40.758731 33.782780	1173 m	Present
	Yapraklē	Yukarēmahalle	40.753591 33.771949	1184 m	Absent
	Yapraklē	Akyazē	40.743919 33.832042	1024 m	Present
	Yapraklē	Kıdır	40.770089 33.814044	1176 m	Present

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Province	District	Village	GPS Coordinates	Altitude	Disease situation
Çankırı	Yapraklı	Yüklü	40.681434 33.792520	867 m	Present
	Yapraklı	Bugay	40.720040 33.76322	1028 m	Absent
	Yapraklı	Buluca	40.739735 33.794060	1116 m	Absent
	Yapraklı	Sazcağaz	40.706255 33.801085	937 m	Absent
	Yapraklı	Kızören	40.682676 33.87468	1176 m	Absent
	Merkez	Kısa-	40.627833 33.700085	827 m	Absent
	Merkez	Tuzlu	40.597248 33.678758	904 m	Absent
	Merkez	Bayındır	40.621879 33.819211	1107 m	Absent
	Merkez	Küçüklü	40.589638 33.807994	1126 m	Absent
	Kabanozü	Gölpınar	40.503781 33.307665	1136 m	Absent
	Kabanozü	Mart	40.424840 33.393881	995 m	Absent
	Kabanozü	Gömerdişin	40.457119 33.250321	1077 m	Absent
	Korgun	Büyük mahalle- Ova mevkii	40.715897 33.523893	848 m	Absent
	Korgun	Uludağ	40.747414 33.498544	1011 m	Absent
	Eldivan	Merkez-Höyük	40.516843 33.522116	1202 m	Absent
	Eldivan	Sarayköy	40.535606 33.480773	946 m	Absent
	Eldivan	Merkez-Çelebi	40.511324 33.518367	1182 m	Absent

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Province	District	Village	GPS Coordinates	Altitude	Disease situation
Çankırı	Eldivan	Seyidi	40.570706 33.473780	912 m	Absent
	Eldivan	Çiftlik	40.581513 33.493342	887 m	Absent
	Eldivan	Gölezkayē	40.515514 33.545795	1000 m	Absent
	Kızılirmak	Saraycık	40.290132 33.928717	648 m	Absent
	Kızılirmak	Karallē	40.289432 33.863436	678 m	Absent
	Kızılirmak	Karallē-Yaydagan mevkii	40.289764 33.871309	674 m	Absent
	Kızılirmak	Merkez-Hüseyinli	40.348376 34.02119	569 m	Absent
	Kızılirmak	Yukarı Alagöz	40.393057 33.891104	636 m	Absent
	Kızılirmak	Tepe Alagöz	40.381526 33.966605	600 m	Absent
	Kızılirmak	Halla-lē	40.286649 33.943914	635 m	Absent
	Orta	Kesā-	40.648418 33.034105	1346 m	Present
	Orta	Kanlıca	40.640342 33.088706	1287 m	Present
	Orta	Kalfat	40.687073 33.082792	1292 m	Absent
	Orta	Buğurten	40.639973 33.005142	1367 m	Absent
	Orta	Dodurga	40.603362 32.99397	1370 m	Absent
	Orta	Bıyıköz	40.595664 33.067013	1284 m	Absent
	Orta	Hasan Hacı	40.593198 33.060053	1285 m	Absent

Table 2. In 2023, surveys were conducted in oat cultivation regions across the provinces of Bolu, Afyonkarahisar, Kastamonu, Çankırı, Edirne, Osmaniye, Adana, Mersin, Kahramanmaraş, Gaziantep, and Hatay to assess the status of oat stem rust disease (continued)

Province	District	Village	GPS Coordinates	Altitude	Disease situation
Çankırı	Orta	Yaylakent	40.599518 33.076971	1276 m	Present
	Çerkeş	Bayındır	40.826971 32.780433	1098 m	Absent
	Çerkeş	Kuzdere	40.819080 32.708355	1202 m	Absent
	Çerkeş	Göynükçukuru	40.828919 32.659420	1144 m	Present
	Çerkeş	Çördük	40.849609 32.718056	1308 m	Absent
	Bayramören	Dalkoz	40.947670 33.225827	904 m	Absent
	Bayramören	Erenler	40.940311 33.134386	1000 m	Absent
	Enez	Karpuzlu	40.804066 26.280752	5 m	Absent
Edirne	Enez	Yeniceköy	40.686800 26.138559	38 m	Present
	Enez	Sultanice	40.612551 26.145290	9 m	Absent
	Enez	Küçükevren	40.640566 26.171860	25 m	Present
	Toprakkale		37,076015 36,121265	55 m	Absent
Osmaniye	Toprakkale	Sayhüyük	37,077370 36,121281	46 m	Absent
	Toprakkale	Atatürk cad.	37,072376 36,113327	47 m	Absent
	Merkez		37,346863 36,078526	76 m	Absent
	Ceyhan		37,0088987 35,706173	24 m	Absent
Adana	Ceyhan		37,008377 35,701595	28 m	Absent

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Province	District	Village	GPS Coordinates	Altitude	Disease situation
Adana	Ceyhan		36,997749 35,679161	48 m	Absent
	Yüreğir	Akpınar	36,820152 35,595577	128 m	Absent
	Yumurtalık		36,785324 35,642174	24 m	Absent
	Karaisalâ		37,065678 35,171108	274 m	Absent
	Kozan		37,427738 36,707478	107 m	Absent
	Kozan		37,465374 35,669548	156 m	Absent
	Kozan	Yahyalı	37,457054 35,682716	135 m	Absent
	Kozan	Yahyalı	37,447369 35,693237	121 m	Absent
Mersin	Silifke	Sömek	36,591892 34,062874	855 m	Absent
	Silifke		36,591831 34,058262	5 m	Absent
	Silifke		36,628815 33,999493	6 m	Absent
Kahramanmaraş	Pazarcık		37,447224 37,211380	901 m	Absent
	Pazarcık		37,355000 37,018230	749 m	Absent
	Pazarcık		37,310482 36,793736	763 m	Absent
	Türkmen		37,244095 36,776432	485 m	Absent
Gaziantep	Araban		37,205166 37,474949	540 m	Absent
	Oğuzeli		37,183266 37,450790	746 m	Absent
Hatay	Kırkhan		36,249306 36,4176933	84 m	Absent

Oat stem rust has been detected in several provinces of Türkiye. The significant presence and prevalence of this disease in some areas highlight the urgent need for prompt and effective action. The oat stem rust fungus is capable of producing new races, and currently cultivated varieties may be vulnerable to these emerging races (Boshoff *et al.*, 2019; Fetch *et al.*, 2021; Sowa *et al.*, 2021; Li *et al.*, 2022). Comprehensive studies need to be conducted to assess the prevalence of oat stem rust and to identify the different races of the fungus. Additionally, it is essential to develop resistant oat varieties to combat these races. In a study conducted by Kahraman & Akan (2017a) in Türkiye, the responses of 48 oat genotypes to oat stem rust were evaluated at both the seedling and adult plant stages. Among these genotypes, 38 (79%) exhibited resistance during both the seedling and adult plant tests. Furthermore, the genotypes that demonstrated resistance in field trials also showed resistance in the seedling tests. In another study by Kahraman & Akan (2017b) conducted in Türkiye, the reactions of 40 oat genotypes to oat stem rust were evaluated. The results showed that 83% of the lines tested were resistant to oat stem rust at both the seedling and adult stages. Akan *et al.* (2016) examined the reactions of seven oat varieties: Checota, Faikbey, Fetih, Kahraman, Sarē Seydiköhir, and Yeni-eri at two locations: Kızca (Ankara) and Seydiler (Kastamonu) using isolates collected from those regions. Greenhouse tests indicated that the Checota, Faikbey, Fetih, Kahraman, Sarē and Yeni-eri varieties displayed resistance ratings (0-2) against the Kızca isolate. Additionally, the Sarē and Yeniçeri varieties also demonstrated resistance (0-2) to the Seydiler isolate. Field tests revealed that in the Kızca location, the Checota, Faikbey, Fetih, Kahraman, Sarē and Yeniçeri varieties were classified as resistant (200). In the Seydiler location, the Sarē and Yeniçeri varieties were found to be resistant (200) as well. In South Africa, oat stem rust races RSJ, RJS and RJJ were identified (Boshoff *et al.*, 2019) and moderate levels of adult plant resistance of seven cultivars against oat stem rust races RSJ, and RJS in 2017 and 2018 were reported. In Poland, 57 pathotypes of oat stem rust were detected, and the most dominant race was SSK (Sowa *et al.*, 2021). Eight oat stem races were identified in China and using oat stem rust races TJD, TJN, and TKN, the resistance of 30 Chinese oat cultivars was evaluated at the seedling and adult plant stages. Oat cultivars Bayan 1, Baiyan 2, Baiyan 3, Baiyan 5, and Baiyan 9 were found resistant to three races in seedling and adult plant tests (Li *et al.*, 2022). In a study by Huerta-Espino *et al.* (2022), the resistance of 13 oat varieties and 37 lines to stem rust caused by *Puccinia graminis* f. sp. *avenae* was evaluated in both seedling and adult plant stages in Mexico. The study used TNQ and TFQ races, as well as isolates AMEX18.21.1.1 and AMEX18.18.1.1 for seedling evaluation, and AMEX18.18.1.1 isolate for adult plants. The Diamante, Menonita, Karma, and Turquesa varieties were found to be resistant to the TFQ race in the seedling stage but susceptible to the TNQ race and isolates AMEX18.21.1.1 and AMEX18.18.1.1. The other varieties were susceptible to both races and isolates. All varieties were susceptible to isolate AMEX18.18.1.1 in seedlings, but in adult plants, they were classified as susceptible, and intermediate, and only Teporaca was resistant. The 37 lines were categorized into 17 groups based on final severity and sister lines. Genotypes 25, 28, 34, 39, and 48 were seedling-resistant to AMEX18.18.1.1, while the rest were susceptible. In the field, all the lines were resistant,

and only genotype 19 of group 14 reached a 20% infection. Based on the response in seedlings and adult plants of the advanced lines, it is inferred that resistance is conditioned by adult plant genes. In Canada, the most common race of *Puccinia graminis* f. sp. *avenae* found in Manitoba and Saskatchewan was TGN, followed by SGB and TJS. The most frequent races identified in Ontario were TDJ, TDD, and TGN (Menzies *et al.*, 2024).

CONCLUSIONS

Oat stem rust, caused by *Puccinia graminis* f. sp. *avenae*, has been found in the Turkish provinces of Bolu, Afyonkarahisar, Edirne, Kastamonu, and  ank r . The disease has not been detected in Osmaniye, Adana, Mersin, Kahramanmara , Gaziantep, and Hatay provinces. However, in some provinces disease was found in half of the fields inspected. Control measures should be implemented for this pathogen. Races of the pathogen should be determined and resistant oat varieties to the disease should be developed.

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