

<https://doi.org/10.15407/frg2020.03.258>

UDK 632.938:633.11+632.4

## UNIQUE SOURCES OF RESISTANCE TO *FUSARIUM* HEAD BLIGHT FOR DURUM WHEAT

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Fifteen accessions of *Triticum dicoccum* tetraploid wild relatives of durum wheat were screened for Type II *Fusarium* head blight (FHB) resistance. Single florets on spike at 50 % anthesis were inoculated with spores of *Fusarium graminearum* and symptoms were scored at 21 days after inoculation. The range of infected florets varied from 6 % to 100 % compared to Langdon atypical sensitive durum wheat cultivar at 75 %. Six selected the most resistant accessions were used in the trial, which range of infection varied from 6 % to 8 %.

**Key words:** *Triticum dicoccum*, *Fusarium graminearum*, resistance, durum wheat, symptoms.

The level of variability for FHB resistance in the primary and secondary gene pools of tetraploid wheat is very low compared to the situation in hexaploid wheat. The search for variability has been extensive, with meager results.

In a search of the literature, reporting 6 studies covering over 1300 accessions, mainly *T. dicoccoides* strains from gene banks, negligible resistance was found [1]. Resistance has also been reported in *T. dicoccum* [2–4] and in *T. dicoccoides* [5]. In our own previous studies, a strain of *T. carthlicum*, named Blackbrid carried a QTL on chromosome 6BS [6]. Resistance was also found in a partial amphiploid derived from hybrids between durum wheat and *Thinopyrum elongatum* [7].

The need for variability for FHB resistance in durum wheat has become more urgent following an FHB epidemic in Canada in 2016.

### Materials and Methods

A total of fifteen *T. dicoccum* accessions which were obtained from the USDA genebank at Aberdeen Idaho were inoculated by point inoculation following standard procedures. This involved the injection of 10 µl of inoculum at a concentration of 50,000 spores per ml into a central floret at 50 % anthesis following a 48 hour misting exposure. The percent of

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TABLE 1. Average percent of infected florets of selected *T. dicoccum* strains at 21 day

Line ID	Trial 1 FHB infection (%)	Trial 2 FHB infection (%)
C2	6	8
C3	20	–
C4	6	6
C5	39	–
C6	7	7
C7	6	6
C8	30	–
C9	13	–
C12	12	7
C13	9	6
C14	20	–
C15	6	–
C16	15	–
C17	100	–
C18	95	–
Langdon	73	75

infected florets was estimated at 21 days after inoculation. A minimum of five spikes were inoculated for each accession at each trial.

### Results and discussion

The floret infection percentages of the fifteen *dicoccum* accessions tested ranged from approximately 5 % to 100 % compared to the Langdon check at 73 % infection (Table 1). The test was repeated on six of the best lines from trial 1 (trial 2). Similar results were obtained.

This should be valuable germplasm for durum wheat improvement. Some of the accessions are tall and late as expected from wild species. Such negative traits should be easily removed in segregating populations. Positive attributes of other accessions of *T. dicoccum* include a large seed size and large spikes.

The *T. dicoccum* accessions studied have varied and diverse backgrounds. Some date back to collection made by N.I. Vavilov and deposited in gene banks in the 1930s (Table 2).

The results shown in Table 1 are frequencies of infected florets observed following point inoculation in Type II resistance or resistance to spread of the infection. Those same accessions need to be grown in full nurseries and evaluated for resistance to initial infection (Type I resistance). This was the situation we encountered with Blackbird. In an initial study we detected a QTL on chromosomes 6B that provided Type II resistance [8]. In a subsequent study [9] Type I resistance was detected.

Langdon is a typical modern durum wheat cultivar. Its FHB rating is typical of modern durum wheat cultivars. The resistance observed in the

TABLE 2. Geographic origin of *T. dicoccum* lines

C#	PI#	Geographical Origin
C2	PI 94614	Kharkiv, 1931 (V*)
C4	PI 94650	Czechoslovakia, 1931 (V)
C6	PI 94666	Dagestan, 1930
C7	PI 94675	Georgia, 1930 (V)
C12	PI 352335	Minnesota, 1919 (USA)
C13	PI 355465	Gembloux, Belgium

\*Original collection by N.I. Vavilov.

present experiment among the *T. dicoccum* accessions should be useful geneplasm to use to improve FHB ratings of durum cultivar.

Recently it has been found that numerous alien introductions carry resistance to a multitude of diseases. Table 1 lists the FHB ratings of the *T. dicoccum* accessions evaluated. In future these accessions will be evaluated for resistance to other diseases such as stem rust. The *T. carthlicum* strain Blackbird was also found to carry resistance to leaf rust and loose smut in addition to FHB.

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Received 20.01.2020

## УНІКАЛЬНІ ДЖЕРЕЛА СТІЙКОСТІ ДО ФУЗАРІОЗУ КОЛОСА ДЛЯ ТВЕРДОЇ ПШЕНИЦІ

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Проведено скринінг п'ятнадцяти зразків *Triticum dicoccum*, тетраплоїдних диких родичів твердої пшениці на стійкість до фузаріозу колоса II типу (FHB). Поодинокі квіточки на колосі при 50 %-му цвітінні інокулювали спорами *Fusarium graminearum* і оцінювали симптоми через 21 день після інокуляції. Діапазон заражених квіток варіював від 6 до 100 % порівняно з нетипово чутливим сортом твердої пшениці Langdon (75 %). У випробуванні використовували виділені шість найстійкіших зразків, спектр зараження яких варіював від 6 до 8 %.

*Ключові слова:* *Triticum dicoccum*, *Fusarium graminearum*, резистентність, тверда пшениця.