ISSN 2224-526X

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ

ҚАЗАҚ ҰЛТТЫҚ АГРАРЛЫҚ УНИВЕРСИТЕТІ

# Х А Б А Р Л А Р Ы

# ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН

КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ
АГРАРНЫЙ УНИВЕРСИТЕТ

# N E W S

OF THE NATIONAL ACADEMY OF SCIENCES
OF THE REPUBLIC OF KAZAKHSTAN

KAZAKH NATIONAL
AGRARIAN UNIVERSITY

## АГРАРЛЫҚ ҒЫЛЫМДАР СЕРИЯСЫ

♦

## СЕРИЯ АГРАРНЫХ НАУК

♦

## SERIES OF AGRICULTURAL SCIENCES

**5 (47)**

**ҚЫРКҮЙЕК – ҚАЗАН 2018 ж.**
**СЕНТЯБРЬ – ОКТЯБРЬ 2018 г.**
**SEPTEMBER – OCTOBER 2018**

2011 ЖЫЛДЫҢ ҚАҢТАР АЙЫНАН ШЫҒА БАСТАҒАН
ИЗДАЕТСЯ С ЯНВАРЯ 2011 ГОДА
PUBLISHED SINCE JANUARY 2011

ЖЫЛЫНА 6 РЕТ ШЫҒАДЫ
ВЫХОДИТ 6 РАЗ В ГОД
PUBLISHED 6 TIMES A YEAR

АЛМАТЫ, НАН РК АЛМАТЫ, ҚР ҰҒА ALMATY, NAS RK

**Известия Национальной академии наук Республики Казахстан. Серия аграрных наук.**
**ISSN 2224-526X**
Собственник: РОО «Национальная академия наук Республики Казахстан» (г. Алматы)
Свидетельство о постановке на учет периодического печатного издания в Комитете информации и архивов Министерства культуры и информации Республики Казахстан **№ 10895-Ж**, выданное 30.04.2010 г.

Периодичность 6 раз в год
Тираж: 300 экземпляров

Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28, ком. 219-220, тел. 272-13-19, 272-13-18
http://nauka-nanrk.kz/agricultural.kz

---



Адрес типографии: ИП «Аруна», г. Алматы, ул. Муратбаева, 75

**News of the National Academy of Sciences of the Republic of Kazakhstan. Series of Agrarian Sciences.**
**ISSN 2224-526X**
Owner: RPA "National Academy of Sciences of the Republic of Kazakhstan" (Almaty)
The certificate of registration of a periodic printed publication in the Committee of Information and Archives of the Ministry of Culture and Information of the Republic of Kazakhstan N 10895-Ж, issued 30.04.2010

Periodicity: 6 times a year
Circulation: 300 copies

Editorial address: 28, Shevchenko str., of.219-220, Almaty, 050010, tel. 272-13-19, 272-13-18,
http://nauka-nanrk.kz / agricultural.kz

---



Address of printing house: ST "Aruna", 75, Muratbayev str, Almaty

**N E W S**
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
**SERIES OF AGRICULTURAL SCIENCES**
ISSN 2224-526X **https://doi.org/10.32014/2018. 2224-526X.4**
Volume 5, Number 47 (2018), 27 – 34

UDK 633.11:631.524.85:632.485/9(574.51)

**Z. Amangeldikyzy[1], A. S.Kochorov[2], Aziz Karakaya[3]**

[1]Kazakh National Agrarian University, Almaty, Kazakhstan,
[2]Institute of Agriculture named after A.I. Baraev, LLP, Depute general director, Almaty, Kazakhstan,
[3]Ankara University, Faculty of Agriculture, Department of Plant Protection, Dışkapı, Ankara, Turkey.
E-mail: zako_89@mail.ru

# IMMUNE-PHYTOPATHOLOGICAL ASSESSMENT OF RESISTANCE OF SPRING WHEAT VARIETIES TO STEM RUST IN THE NORTHERN, WESTERN AND SOUTH-EASTERN REGIONS OF QAZAQSTAN

**Abstract.** Stem rust is the most common and dangerous disease of wheat. Despite comprehensive studies of stem rust, protection of wheat from this disease is still relevant. In order to determine resistance to stem rust under field and laboratory conditions, phenologic, phytopathological were conducted on 90 varieties of spring wheat varieties. The paper also presents biological features and harmfulness of stem rust (*Puccinia qraminis Pers*). In addition, farmers and agricultural organizations are informed that the new virulent Ug99 stem rust race found in Uganda is now rapidly spreading, creating devastating epiphytoties on wheat, which is dangerous for the Central Asian region, including Kazakhstan. A long time ago, stem rust has been of particular concern to scientists. The rapid spread of new strain of the pathogenic agent may endanger the world's grain reserves. For many years, linear stem rust has been of particular concern to scientists. Kazakhstan farmers should also remember about stem rust.

**Keywords:** phytopathogen, wheat, monitoring, stem rust, inoculum, resistance.

**Introduction.** We know that not so long ago stem rust was an example of how the selection science has “killed” an extremely dangerous disease of cereals. It would seem that by the 1970s, the pathogen, which in the first half of the twentieth century had resulted in serious crop losses, was killed by spreading new resistant varieties around the globe.

However, in fact, in 30 years of silence, the fungus mutated into a new extremely aggressive race and in 1999 struck the crops of the North African state of Uganda. Thus, its name and that of the strain justifies itself: stem rust of wheat (*Puccinia qraminis f., tritici*) has the ability to transform crops that look quite healthy a few weeks before harvest, into tangled black stems with wrinkled grains by the time of harvest. Under certain conditions, a loss of 70% or more of the crop is possible. In recent years, the close attention of breeders to stem rust of wheat has been caused by concern about the high aggressiveness of this pathogen. A characteristic feature of this type of rust, in contrast to brown and yellow rust, is that it affects stems, leaves and ears of wheat, and can almost completely destroy wheat crops. It is no accident that during the Cold War this pathogen was considered a biological weapon. Before 2004-2005, the struggle against stem rust was cited as a classic example of effective and long-term genetic protection of plants. For the last 30 years, the presence of the Sr31 gene in many cultivated wheat varieties provided protection of wheat against diseases (Shamanin et al., 2012). In 1999, in Uganda, the affection of genotypes with the Sr31 gene with stem rustwas first noted, which up to that time had been practically unaffected with stem rust. This single incident alerted the world about the appearance of new stem rust race called Ug 99. It took only a few years for the new race to spread in the wheat sowing regions of Kenya and Ethiopia. Already in 2005-2006, the cultivation of wheat in these countries without chemical treatment was almost impossible (Singeetal., 2008).

Sh. S. Rsaliev, M. Koishibaev noted the foci with the moderate and strong development of stem rust on spring wheat crops in the Kostanay and North Kazakhstan regions. The spread of the disease varied in the range of 20-40%, while in some fields this indicator reached 90-100%. However, the degree of damage to plants did not exceed 10%, and only in rare cases it was 25%.

**Materials and methods.** The studies were conducted in 2014-2017 based on stationary experiments of the Kazakh Research Institute of Agriculture and Plant Growing, in the Kazakh Research Institute for Plant Protection and Quarantine named after Jh. Zhiembaev and in the CIMMYT-Turkey greenhouse.

The resistance of wheat varieties and samples was evaluated by the dominant types of rust. The resistance of wheat lines to stem rust was evaluated in points at the stages of earing and milky ripeness of grain.

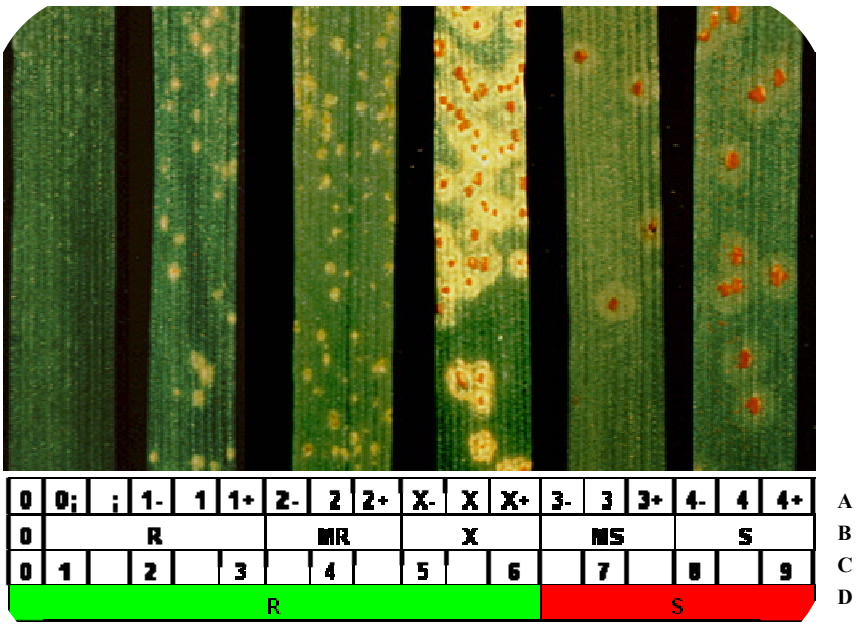


Figure 6 – Scales of resistance of wheat to stem rust:
A - photographs of types of damage; B - scoring scale from 0 to 4 points, where X is a heterogeneous reaction;
C - unified scoring scale, D - scalefrom 0 to 9 points, E - qualitative damage reactions: resistance (R) and susceptibility (S)

In Turkey, 90 samples of the seeds of the 17F1SYNT-OMSK-LIST farm were sown in a greenhouse in one row of 1 meter long. There was one replication. On an artificial infection background of stem rust (*P. graminis*Pers.f. sp.*Triticieeriks* and *E. hernn*), the collection of synthetic wheat for resistance to diseases was evaluated. Inoculation was conducted to assess stem rust in greenhouse conditions. Samples of rust uredopustule were collected during the milky-wax stage in the greenhouse by artificial means using a special apparatus. Reproduction of the inoculum was carried out under the greenhouse conditions on the Demir universally susceptible wheat variety. Shoots were inoculated into a 2-3-leaf stage. The incubation period of the disease depends on the room temperature. For brown rust at a temperature of 26-28 °C the incubation period was 7-8 days, for the yellow rust pathogen, the optimum temperature for infection of plants and the development of the disease was in the range of 15-20 °C.

The manifestation of the disease was taken into account after 14 days on the Mackintosh scale (figure 1, 2).

The study of cereals in the greenhouse conditions is shown in figures 1, 2, 4.

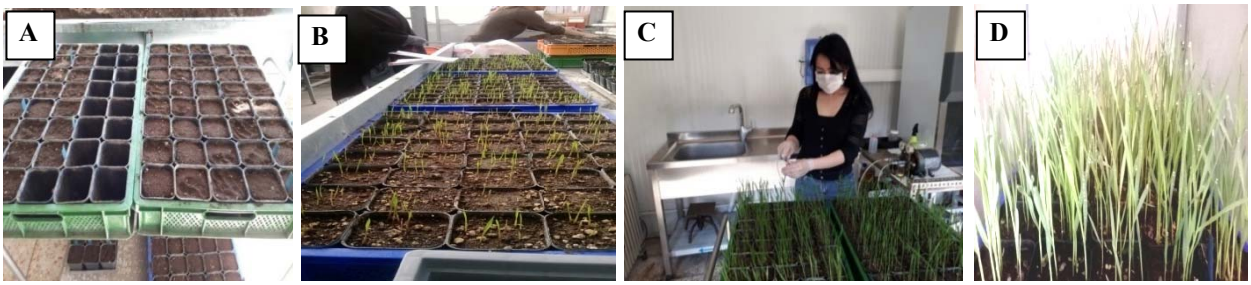


Figure 1 – A - Sowing of wheat material, B - care, C - Day of inoculation, D - A day after inoculation

Figure 2 – Collection of stem rust spores for artificial inoculation

In the spring, in the tillering stage, the crops of spring wheat were infected with uredospores of stem rust. For infection, only the local fungus population, or the races (pathotypes) with a certain virulence were used. The inoculum taken for infection was activated at a temperature of 37-40 °C for 30 minutes, followed by watering in a moist chamber at a temperature of 18-22 °C for 2-4 hours. The infectious material was applied to the plants by spraying with an aqueous spore suspension from 0.001% Tween 80 according to E.E. Geshele, or by powdering a mixture of spores with talc (at a ratio of 1: 300) according to G.S. Turov et al.. The plants were infected in the evening in windless weather after preliminary watering and moistening of leaves of plants of experimental crops. The spore infectious load was 20 mg/m$^2$. After the infection, the plots were covered with a polyethylene film for 16-18 hours to create high humidity (figure 3).

Figure 3 – Establishment of the field experiment on creating an infection background of stem rust of wheat

**Results.** After the manifestation of diseases on susceptible control varieties, the resistance of plants to rust types according to the established scales was assessed 2 to 3 times (figures 4).


Figure 4 – A - Assessment of resistance of wheat varieties to stem rust in the greenhouse
B - Assessment of resistance of wheat varieties to stem rust in the field

According to the results of the research from the 17F1SYNT-OMSK-LIST farm, 90 lines were identified. 8 of them were resistant varieties, entry no 69, 71,72, 74,75,77,78,89. 16 varieties were moderately resistant to stem rust, 26 varieties were moderately susceptible, 19 varieties were susceptible, and 1 varieties possessed the R-S reaction type - SY ROWYN, 20 varieties possessed the MR-MS reaction type (table 1, figure 6).

Table 1 – Damage to nursery 17F1SYNT-OMSK-LIST to stem rust
in the northern, western and south-eastern regions of Qazaqstan

| Entry no. | Variety or breeding line | Origin | Defeat, score | | | |
|---|---|---|---|---|---|---|
| | | | Almaty | WKO | | Shortandy |
| | | | 17.08.17 | 08.08.17 | 19.08.17 | 28.08.17 |
| | | | SR | SR | SR | SR |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | SERI | KAZ | 1 MR | 1 MR | 5 MR | 50S |
| 2 | STEPNAYA75 | KAZ | 10 MR | 5 MR | 20 MS | 60S |
| 3 | STEPNAYA1414 | KAZ | 10 MR | 5 MR | 20 MS | 80S |
| 4 | GVK2055-1 | KAZ | 30 MS | 5 MS | 20 MS | 80S |
| 5 | LUTESTSENS2 | KAZ | 30 MS | 5 MS | 20 MS | 80S |
| 6 | LINE-C-19SB | KAZ | 1 MR | 1 MR | 1 MR | 10MRMS |
| 7 | KARABALYKSKAYA 20 | KAZ | 30 MR | 10 MS | 40 MS | 100S |
| 8 | FANTAZIYA | KAZ | 30 MR | 5 MR | 30 MS | 100S |
| 9 | BOSTANDYK | KAZ | 10 MR | 5 MS | 20 MS | 80S |
| 10 | LUTESCENS 30 69/97 | KAZ | 30 MS | 5 MS | 20 MS | 80S |
| 11 | KARAGANDINSKAYA 30 | KAZ | 10 MR | 5 MS | 30 MS | 80S |
| 12 | KARAGANDINSKAYA 31 | KAZ | 30 MR | 20 MS | 80 S | 80S |
| 13 | PAVLODARSKAYA YUBILEYNAYA | KAZ | 30 MS | 5 MS | 80 S | 100S |
| 14 | KONDITERSKAYA YAROVAYA | KAZ | 5 MR | 5 MR | 5 MS | 15MRMS |
| 15 | FITONC-50SB | KAZ | 10 MR | 5 MR | 5 MS | 10MRMS |
| 16 | FITON82 | KAZ | 30 MR | 10 MR | 15 MS | 30MRMS |
| 17 | FITON-C-54SB | KAZ | 30 MS | 5 MS | 10 MS | 40MS |
| 18 | EKADA148 | KAZ | 30 MS | 5 MS | 30 MS | 40MS |

*Continuation of table 1*

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| 19 | EKADA 113 | KAZ | 10 MR | 5 MR | 15 MS | 30MRMS |
| 20 | LYUBAVA | KAZ | 5 MR | 5 MR | 15 MS | 40MS |
| 21 | FITON 41 | KAZ | 30 MS | 10 MS | 60 S | 80S |
| 22 | FITON 204 | KAZ | 40 S | 5 MR | 60 S | 80S |
| 23 | VLADIMIR | KAZ | 30 MS | 10 MS | 40 S | 80S |
| 24 | TSELINA50 | KAZ | 40 S | 5 MR | 50 S | 80S |
| 25 | TSELINNAYA NIVA | KAZ | 10 MS | 5 MR | 50 S | 80S |
| 26 | ASYLSAPA | KAZ | 30 MS | 10 MS | 40 S | 80S |
| 27 | AKMOLA 2 | KAZ | 40 S | 5 MR | 40 S | 100S |
| 28 | AK ORDA | KAZ | 30 MS | 10 MS | 40 S | 80S |
| 29 | SHORTANDINSKAYA 2012 | KAZ | 40 S | 5 MS | 60 S | 100S |
| 30 | TSELINNAYA 3S | KAZ | 30 MS | 10 MS | 50 S | 80S |
| 31 | ASTANA | KAZ | 40 S | 5 MS | 40 S | 80S |
| 32 | ALTAISKAYA70 | RUS | 30 MS | 5 MR | 40 S | 80S |
| 33 | ALTAISKAYA110 | RUS | 30 MS | 5 MS | 40 S | 80S |
| 34 | TOBOLSKAYA | RUS | 10 MS | 20 MS | 40 S | 100S |
| 35 | ALTAYSKAYA ZHNITSA | RUS | 10 MS | 20 MS | 50 S | 80S |
| 36 | STEPNAYA VOLNA | RUS | 40 S | 20 MS | 30 MS | 80S |
| 37 | APASOVKA | RUS | 30 MS | 10 MR | 30 MS | 80S |
| 38 | LUTENSCENS89-06 | RUS | 30 MS | 20 MS | 40 S | 80S |
| 39 | DUET | RUS | 30 MS | 10 MR | 40 S | 80S |
| 40 | PAVLOGRADKA | RUS | 10 MS | 5 MS | 60 S | 80S |
| 41 | LUTESCENS29-12 | RUS | 1 MR | 5 MR | 1 MR | 10MRMS |
| 42 | LUTESCENS106-11 | RUS | 5 MR | 1 MR | 1 MR | 10MRMS |
| 43 | TULAIKOVSKAYA110 | RUS | 10 MR | 5 MR | 10 MS | 20MRMS |
| 44 | LUTESCENS916 | RUS | 10 MR | 1 MR | 5 MR | 20MRMS |
| 45 | GRECUM1003 | RUS | 10 MR | 1 MR | 5 MR | 30MS |
| 46 | LUTESCENS1062 | RUS | 10 MR | 5 MR | 5 MR | 20MRMS |
| 47 | LUTESCENS89-06 | RUS | 10 MR | 1 MR | 1 MR | 20MRMS |
| 48 | ERITROSPERMUM85-08 | RUS | 10 MR | 1 MR | 1 MR | 20MRMS |
| 49 | SEREBRISTAYA | RUS | 20 MS | 20 MS | 50 S | 60S |
| 50 | SERI | RUS | 1 MR | 1 MR | 5 MR | 5MR |
| 51 | BOEVCHANKA | RUS | 10 MR | 5 MS | 20 MS | 50MS |
| 52 | OMSKAYA 37 | RUS | 5 MR | 5 MR | 5 MR | 20MRMS |
| 53 | LUTESTSENS7-04-4 | RUS | 5 MR | 5 MR | 10 MR | 20MRMS |
| 54 | LUTESTSENS197-04-7 | RUS | 5 MR | 5 MR | 20 MS | 30MRMS |
| 55 | LUTESTSENS220-03-45 | RUS | 5 MS | 5 MS | 30 MS | 40MS |
| 56 | TULAIKOVSKAYA 10 | RUS | 10 MR | 5 MR | 30 MS | 40MS |
| 57 | TULAIKOVSKAYA ZOLOTISTAYA | RUS | 10 MR | 10 MR | 40S | 60S |
| 58 | TULAIKOVSK 100 | RUS | 5 MS | 5 MS | 15 MS | 40MS |
| 59 | GREKUM 650 | RUS | 5 MS | 5 MR | 15 MS | 40MS |
| 60 | LUTESCENS 920 | RUS | 5 MR | 5 MR | 10 MR | 40MS |
| 61 | EKADA 121 | RUS | 40 S | 10 MS | 30 MS | 80S |

*Continuation of table 1*

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| 62 | CIMMYT | RUS | 30 MR | 10 MS | 10 MS | 40MS |
| 63 | P-23-17 | RUS | 30 MR | 10 MR | 60 S | 80S |
| 64 | PAMYATI RUBA | RUS | 10 MS | 20 MS | 60 S | 80S |
| 65 | CHELYABA 75 | RUS | 5 MR | 5 MR | 10 MR | 15MRMS |
| 66 | ERITROSPERMUM 23707 | RUS | 30 MS | 10 MS | 40 S | 60S |
| 67 | SY TYRA | US-SYN | 10 MR | 1 MR | 1 MR | 5MRMS |
| 68 | SY GOLIAD | US-SYN | 5 MR | 5 MR | 5 MR | 15MRMS |
| 69 | SY SOREN | US-SYN | 5 MR | 5 MR | 1 R | 5MR |
| 70 | SY ROWYN | US-SYN | 5 MR | 10 MR | 60 S | 1MR-80S |
| 71 | SY INGMAR | US-SYN | R | 1 MR | R | 1R |
| 72 | SELECT | US-SDSU | 1 MR | 1 R | 1 MR | 1R |
| 73 | FORE FRONT | US-SDSU | 1 MR | 1 MR | 1 MR | 5MR |
| 74 | PREVAIL | US-SDSU | 1 MR | 1 R | 1 MR | 5MR |
| 75 | ADVANCE | US-SDSU | 1 MR | 1 R | R | 5MR |
| 76 | BRICK | US-SDSU | 10 MR | 5 MR | | |
| 77 | CARBERRY | CAN | 1 MR | 1 R | 1 MR | 1R |
| 78 | MUCHMORE | CAN | 1 MR | 1 MR | 1 MR | 5MR |
| 79 | URALOSYBIRSKAYA | RUS | 5 MR | 5 MR | 1 MR | 20MRMS |
| 80 | TORNADO 22 | KAZ | 20 MS | 10 MS | 50 S | 50S |
| 81 | LYUTESTSENS 1012 | RUS | 30 MS | 20 MS | 50 S | 80S |
| 82 | LYUTESTSENS 7-04-10 | RUS | 10 MR | 5 MR | 10 MR | 20MRMS |
| 83 | LYUTESTSENS 208-08-4 | RUS | 5 MR | 5 MR | 15 MS | 30MRMS |
| 84 | LYUTESTSENS 27-12 | RUS | 10 MS | 5 MR | 20 S | 40MS |
| 85 | ERITROSPERMUM 85-08 | RUS | 10 MR | 5 MR | 15 MS | 20MRMS |
| 86 | LYUTESTSENS 6-04-4 | RUS | 5 MR | 5 MR | 15 MR | 20MRMS |
| 87 | LYUTESTSENS 186-04-61 | RUS | 10 MS | 20 MS | 20 MS | 60S |
| 88 | CHEBARKULSKAYA 3 | RUS | 20 MS | 5 MS | 40 MS | 80S |
| 89 | LINE D 25 | RUS | 1 MR | 5 MR | 1 MR | 5MR |
| 90 | LINE 654 | RUS | 10 MR | 5 MR | 10 MS | 30MS |

Based on the results of the statistical processing of the data obtained on the productivity of the ear, the best samples were identified, which showed the maximum grain mass index from the ear in comparison with the standards, the length and density of the ear, and also the mass of 1,000 grains, by which they exceeded the standard Kazakhstanskaya 10.Samples No. 87, 41, 56, 20, 81, 30 and 53, 80, 65, 37, 62, 19, 22, 54, 21, 64, 40, 32 exceeded the standard by weight of grain from the ear, all samples except for CYMMIT (7 cm) were by 2 cm less in length of the ear, and many synthetics were not inferior to the standard by weight of 1,000 grains (table 2).

In samples No. 87, 41, 20, 30, 37, 62, 19, 54, 40, 32, the weight of 1,000 grains was higher than that of the standard variety. From 97 varieties and lines, one variety - Altaiskaya 70 -had the same yield-compared with the standard, 18 varieties exceeded the standard, and the remaining varieties showed lower yields than Kazakhstanskaya 10. This, apparently, was due to higher productive bushiness in the local variety, while the samples of synthetic wheat studied were less bushy. The obtained data are preliminary; the splitting of hereditary traits must be studied in subsequent generations (see table2).

Table 2 – Yields of varieties and wheat lines in comparison with the standard variety

| Item No. | Variety, line | Bushiness, pcs | | Ear length, cm | Number of ears, pcs. | Number of grains from 1 ear, pcs. | Mass of grains from 1 ear, g. | Mass, 1,000 grains, g | Yield, c/hectare |
|---|---|---|---|---|---|---|---|---|---|
| | | total | productive | | | | | | |
| 87 | Lyutestsens 186-04-61 | 2.8 | 1.5 | 11 | 19 | 34.2 | 3.063 | 36.98 | 61.26 |
| 41 | Lutescens29-12 | 2.5 | 1.2 | 12.5 | 20 | 36 | 2.854 | 35.59 | 57.08 |
| 56 | Tulaikovskaya 10 | 2.5 | 1.2 | 12 | 20 | 36 | 2.613 | 34.24 | 52.26 |
| 20 | Lyubava | 2.5 | 1.2 | 12 | 21 | 35.8 | 2.563 | 34.12 | 51.26 |
| 81 | Lyutestsens 1012 | 2.7 | 1.4 | 11 | 20 | 36 | 2.523 | 34.58 | 50.46 |
| 30 | Tselinnaya 3s | 2.7 | 1.4 | 11.6 | 17 | 30.6 | 2.296 | 32.1 | 45.92 |
| 53 | Lutestsens7-04-4 | 2.8 | 1.5 | 11 | 19 | 34.2 | 2.292 | 32.54 | 45.84 |
| 80 | Tornado 22 | 2.7 | 1.4 | 12.8 | 20 | 36 | 2.271 | 31.3 | 45.42 |
| 65 | Chelyaba 75 | 2.6 | 1.3 | 11.5 | 18 | 32.4 | 2.251 | 31.06 | 45.02 |
| 37 | Apasovka | 2.5 | 1.2 | 11.5 | 19 | 34.2 | 2.242 | 33.23 | 44.84 |
| 62 | Cimmyt | 2.6 | 1.3 | 7 | 17 | 30.6 | 2.21 | 33.02 | 44.20 |
| 19 | Ekada 113 | 2.6 | 1.3 | 11.5 | 18 | 32.4 | 2.153 | 32.45 | 43.06 |
| 22 | Fiton 204 | 2.8 | 1.5 | 12 | 20 | 36 | 2.106 | 31.12 | 42.12 |
| 54 | Lutestsens197-04-7 | 2.5 | 1.2 | 11 | 19 | 34.2 | 2.071 | 32.56 | 41.42 |
| 21 | Fiton 41 | 2.6 | 1.3 | 12 | 21 | 33.8 | 2.024 | 31.84 | 40.48 |
| 64 | Pamyati ruba | 2.6 | 1.3 | 12 | 18 | 32.4 | 1.978 | 31.0 | 39.56 |
| 40 | Pavlogradka | 2.7 | 1.4 | 10 | 18 | 32.4 | 1.939 | 33.09 | 38.78 |
| 32 | Altaiskaya70 | 2.5 | 1.2 | 11.5 | 18 | 32.4 | 1.896 | 31.37 | 37.92 |
| | Kazakhstanskaya 10 | 2.8 | 1.2 | 9 | 18 | 32.4 | 1.896 | 30.1 | 37.92 |

**Conclusion.** In the field, as a result of phenological observation, 11 varieties of Seri, Pamyatiruba, Sytyra, Sygoliad, Sysoren, Syrowyn, SyIngmar, Select, Carberry, Muchmore proved to be the fastest-growing ones.

Of the tested varieties and lines there are no the varieties absolutely resistant to stem rust, but at the same time they differ in stability and susceptibility.

According to V.N. Tishenko and N. M. Chekalin (Tishenko, Chekalin, 2005) [18], the size of the crop depends on the mass of the grain from one ear and productive bushiness. Reduction of these indicators occurs due to losses of plants and their vegetation stems. The elements of the crop pattern of wheat selection lines are unstable in terms of sowing years and times due to the extreme variability of the trait - the number of ears per 1 $m^2$.

**REFERENCES**

[1] Shamanin V.P., Morgunov A.I., Manes YA. Zelenskiy YU.I., Chursin A.S., Levshunov M.A., Pototskaya I.V., LikhenkoI.Ye., Man'ko T.A., Karakoz I.I., Tabachenko A.V., Petukhovskiy S.L. Selection and genetic estimation of populations of spring soft wheat of the Symmit Siberian farm // Vavilov Journal of Genetics and Selection. 2012. Vol. 16, N 1. P. 21-32.

[2] Rsaliyev Sh.S., Koyshibayev M. Study of natural populations of pathogens of rust diseases of wheat in the territory of Kazakhstan and evaluation of resistance to them of wheat samples with the use of virulent and rare races // The final report of the NIIPBB for the MNTC project K-374p. Gvardeiskiy, 2008. Inv. No MNTC K-374. 141 p.

[3] Gechele E.E. Fundamentals of phytopathological evaluation in plant breeding. M.: Kolos, 1978. 208 p.

[4] Turov G.S., Turova N.A., Rsaliev Sh.S., Davletbekova T.T. The role of artificial infectious backgrounds in identifying the potential and stable resistance of wheat samples // Proceedings of the NISHI scientific conference. Part II. Gvardeiskiy, 1994. 144 p.

[5] Tishchenko V.N. Genetic basis of adaptive selection of winter wheat. Text / V.N. Tishchenko, N.M. Chekalin // Monograph. Poltava, 2005. 243 p.

[6] Koyshibayev M., Morgunov A.I., Kochorov A.S., Masalimov A. Effective Lr genes for spring wheat selection for resistance to brown rust in Kazakhstan // 2nd International Central Asian Conference on Cereals. Cholpon-Ata, Issyk-Kul. Kyrgyzstan. SIMMIT, Agromeridian. Bishkek, 2006. N 2(3). P. 125-127.

[7] McIntosh R.A., Wellings C.R. Park R.F. Wheat Rustsan atlas of resistance genes // CSIRO Australia. 1995. P. 9 p.

[8] McIntosh R.A., Wellings C.R., Park R.F. Wheat Rusts: An atlas of Resistance Genes. Australia: CSIRO, 1995. 200 p.

**З. Амангелдіқызы[1], А. С. Кочоров[2], Азиз Каракай[3]**

[1]Қазақ ұлттық аграрлық университеті, Алматы, Қазақстан,
[2]"А. И. Бараев атындағы астық шаруашылығының ҒӨО" ЖШС, Астана, Қазақстан,
[3]Анкара университеті, ауыл шаруашылығы факультеті, өсімдік қорғау бөлімі, Дышкапі, Анкара, Түркия

## ҚАЗАҚСТАННЫҢ СОЛТҮСТІК, БАТЫС ЖӘНЕ ОҢТҮСТІК-ШЫҒЫС АЙМАҚТАРЫНДАҒЫ ЖАЗДЫҚ БИДАЙ СОРТТАРЫНЫҢ САБАҚ ТАТЫНА ТӨЗІМДІЛІГІН ИММУНДЫ-ФИТОПАТОЛОГИЯЛЫҚ ТҰРҒЫДА БАҒАЛАУ

**Аннотация.** Сабақ тат ауруы бидайдың кең тараған және қауіпті ауруы болып табылады. Бидайд сабақ таттан қорғау, осы ауруды барлық қырынан зерттеуіне қарамастан, өзекті мәселе болып отыр. Далалық және зертханалық жағдайда сабақ татқа төзімділікті анықтау мақсатында 90 жаздық бидай сорттарына фенологиялық, фитопатологиялық зерттеулер жүргізілді. Сонымен қатар, жұмыста сабақ татының (*Puccinia qraminis Pers)* зияндылығы мен биологиялық ерекшеліктері қарастырылған. Содан басқа, ауыл шаруашылық органдары мен фермерлер айтуынша, Угандада сабақ татының жаңа верулентік раса Ug99 табылған, бидайда эпифитотия кезеңін тудырған, Орталық Азияға аймақтарына қауіп төндіруде, сонымен қатар Қазақстанға. Ғалымдаға көптен бері сабақ таты ерекше алаңдаушылық тудыруда. Жаңа штамм ауру қоздырғышының тез таралуы әлемдік астық резервтеріне қауіп төндіруі мүмкін. Көпетеген жылдар бойы ғалымдар сабақ таты ауруына ерекше назар аударуда. Қазақстандық фермерлердің сабақ татын естен шығармағаны дұрыс.

**Түйін сөздер:** фитопатоген, бидай, мониторинг, сабақ тат, инокулум, төзімді.

**З. Амангелдикызы[1], А. С. Кочоров[2], Азиз Каракай[3]**

[1]Казахский национальный аграрный университет, Алматы, Казахстан,
[2]«НИИ сельского хозяйства им. А. И. Бараева», Астана, Казахстан,
[3]Университет Анкары, факультет сельского хозяйства, отдел защиты растений, Дышкапы, Анкара, Турция

## ИММУННО-ФИТОПАТОЛОГИЧЕСКАЯ ОЦЕНКА УСТОЙЧИВОСТИ СОРТОВ ЯРОВОЙ ПШЕНИЦЫ К СТЕБЛЕВОЙ РЖАВЧИНЕ В СЕВЕРНОМ, ЗАПАДНОМ И ЮГО-ВОСТОЧНОМ РЕГИОНАХ КАЗАХСТАНА

**Аннотация.** Стеблевая ржавчина особо опасный и распространенный болезь пшеницы. Зачита пшеницы от стеблевой ржавчине, не смотря на то, что он изучал болезнь во всех отношениях, проблева остается. В работе представлены результаты фитопатологические и фенологические оценки сортов яровой пшеницы в количестве 90 образцов яровой пшеницы. А также, в работе приводятся данные биологические особенности и вредоносности стеблевой ржавчины (*Puccinia qraminis Pers)*. Кроме того, информируются фермеры и с/х организации, что обнаруженная в Уганде новая вирулентная раса стеблевой ржавчины Ug99, в настоящее время быстро распространяется, создавая разрушительные эпифитотии на пшенице, что представляет опасность для Центрально-Азиатского региона, в том числе и для Казахстана. Уже давно стеблевая ржавчина вызывает особое беспокойство ученых. Быстрое распространение нового штамма возбудителя заболевания может поставить под угрозу мировые запасы зерна. Уже более много лет стеблевая ржавчина вызывает особое беспокойство ученых. Помнить о стеблевой ржавчине следует и казахстанским фермерам.

**Ключевые слова:** фитопатоген, пшеница, мониторинг, стеблевая ржавчина, инокулум, устойчивость.

**Information about authors:**

Amangeldikyzy Zamzagul – PhD student plant protection, Kazakh national agrarian university, Almaty, Kazakhstan; zako_89@mail.ru; https://orcid.org/0000-0002-8701-6819

Kochorov Abdumamat Suleymanovih – candidate of agricultural sciences, doctor PhD, Institute of Agriculture named after A. I. Baraev, LLP, Depute general director, Astana, Kazakhstan; kochorov@mail.ru; https://orcid.org/0000-0002-6080-683X

Aziz Karakaya – professor, Ankara University, Faculty of Agriculture, Department of Plant Protection, Dışkapı, Ankara, Turkey; azizkarakaya@hotmail.com; https://orcid.org/0000-0002-0902-0310

## Publication Ethics and Publication Malpractice
## in the journals of the National Academy of Sciences of the Republic of Kazakhstan

For information on Ethics in publishing and Ethical guidelines for journal publication see http://www.elsevier.com/publishingethics and http://www.elsevier.com/journal-authors/ethics.

Submission of an article to the National Academy of Sciences of the Republic of Kazakhstan implies that the described work has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see http://www.elsevier.com/postingpolicy), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. In particular, translations into English of papers already published in another language are not accepted.

No other forms of scientific misconduct are allowed, such as plagiarism, falsification, fraudulent data, incorrect interpretation of other works, incorrect citations, etc. The National Academy of Sciences of the Republic of Kazakhstan follows the Code of Conduct of the Committee on Publication Ethics (COPE), and follows the COPE Flowcharts for Resolving Cases of Suspected Misconduct (http://publicationethics.org/files/u2/New_Code.pdf). To verify originality, your article may be checked by the Cross Check originality detection service http://www.elsevier.com/editors/plagdetect.

The authors are obliged to participate in peer review process and be ready to provide corrections, clarifications, retractions and apologies when needed. All authors of a paper should have significantly contributed to the research.

The reviewers should provide objective judgments and should point out relevant published works which are not yet cited. Reviewed articles should be treated confidentially. The reviewers will be chosen in such a way that there is no conflict of interests with respect to the research, the authors and/or the research funders.

The editors have complete responsibility and authority to reject or accept a paper, and they will only accept a paper when reasonably certain. They will preserve anonymity of reviewers and promote publication of corrections, clarifications, retractions and apologies when needed. The acceptance of a paper automatically implies the copyright transfer to the National Academy of Sciences of the Republic of Kazakhstan.

The Editorial Board of the National Academy of Sciences of the Republic of Kazakhstan will monitor and safeguard publishing ethics.

Правила оформления статьи для публикации в журнале смотреть на сайте:

www:nauka-nanrk.kz

http://agricultural.kz/

Редактор *М. С. Ахметова, Т. М. Апендиев, Д. С. Аленов*
Верстка на компьютере *Д. Н. Калкабековой*

Подписано в печать 10.10.2018.
Формат 60x881/8. Бумага офсетная. Печать – ризограф.
5,9 п.л. Тираж 300. Заказ 5.

*Национальная академия наук РК*
*050010, Алматы, ул. Шевченко, 28, т. 272-13-18, 272-13-19*