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Early-Ripeness and Resistance of Summer Soft Wheat to Sicknesses

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Abstract: Most of early-ripening patterns are being characterized by high and very high resistance to powdery mildew-51% and brown rust-68%. The selection of early-ripening sorts has to be carried out depending on the vegetation period from growth till earing. Differentiation of summer wheat by vegetation period has to be conducted on the base of 3-years studying with difference of 2 days between groups of ripeness. The selective sources of early-ripeness and resistance are being suggested: resistant to powdery mildew CNO79/PRL, Dob.SG; to brown rust-TAM200/Turaco, CNO79/PRL, Dob.SG.

Key words: Soft wheat, early-ripeness, resistance, powdery mildew, brown rust

INTRODUCTION

The summer soft wheat is an important food crop in the world. The sort is one of the determining factors of the scientific and production progress. Just by new sort and the other identical conditions the crop yield is being increased to 20-59% (Golik, 2004). The modern assortment of summer wheat does not ensure all requirements of production; therefore the selection process must be constantly developing. One of its directions is the selection for early-ripeness (Musynov, 2005). The sorts with these features are the most do for re-seeding. The topical task is expansion of genetic potential of sorts through increasing of quantity of new early-ripening sorts (Vitvitskiy, 2003).

The aim of research was a study of genetic variety of summer soft wheat by selection indexes, definition of early-ripening and resistant to main sicknesses different forms and possible forming of working collection for selection of new early-ripening sorts.

The great scientist of last century Vavilov (1935) with vegetation period linked characteristics which determine the yield and the quality of grain, morbid and vermin affection, escape of plants from drought on the south and light frosts on the north. Duration of vegetation period is submitted to rules of geographical changeableness. It depends also on terms of sowing, norms of sowing, physical and mechanical characteristics of soil, forerunners, system of nourishment. The period of growth-earring is determinant in the forming of yield, because in this time plants pass eight in eleven stages of organogenesis. Its duration mainly depends on genotype and less depends on influence of external conditions comparing with period of growth-earring. Therefore time of earing reflects more precisely the difference between sorts by early-ripeness than time of their ripeness, especially in drought conditions when heat of grain and burning of

late-ripening forms happen quite often. The duration of the second stage of organogenesis allows predicting of the duration of vegetation period.

The analysis of scientific literature shows that duration of vegetation period is linked with many valuable characteristics of summer soft wheat, particularly the resistance to phytopathogen morbid (Aleksseva *et al.*, 2003).

MATERIALS AND METHODS

This work was done in 2003-2005. The terms of sowing were early and conducted in the beginning of field works. Norms of sowing were counted for station sort research-600 pieces, for selection breeding-ground-200 pieces of similar seeds on 1 m². The registration square of plot for sort researching was 10 m², selection ones-1 m², Study of starting material in selection breeding and sort researching was conducted due to general methodic. Biometric registrations and statistic analysis was conducted due to requirements of international classificatory (Dosphehov, 1979).

Agro meteorological and phytosanitarian conditions were different during the years of research. The specific combination of their elements became a limited factor of environment during the formation of summer wheat productivity.

RESULTS AND DISCUSSION

In collection and selection breeding grounds and selection sort researching during 2003-2005, 600 patterns of different ecological and geographical origin have been studied. Among them 79 early-ripening forms were distinguished, however only 10 of them showed themselves like candidates in new selection sources.

Table 1: The characteristic of summer soft wheat samples, resistant to sicknesses (average of 2003-2005)

| Name (origin) | Period of growth-earning | Resistance to (marks) | | | Height of plants | Crop capacity (g m ⁻²) |
|---------------------------|--------------------------|-----------------------|------------|---------|------------------|---------------------------------------|
| | | Powdery mildew | Brown rust | Lodging | | |
| TAM200/Turaco, Mexico | 40.00 | 7.00 | 9.00 | 8.70 | 65.00 | 485.00 |
| Dob.SG 97-16, Mexico | 40.30 | 7.00 | 7.00 | 8.60 | 72.00 | 358.00 |
| Dob.SG 99-16, Mexico | 41.30 | 7.00 | 9.00 | 8.30 | 95.00 | 460.00 |
| No16, France- | | | | | | |
| Dob.SG 99-496, Mexico | 41.30 | 7.00 | 7.00 | 9.00 | 80.00 | 332.00 |
| Bastion/M-s Hastler | 41.70 | 7.00 | 7.00 | 9.00 | 94.00 | 384.00 |
| Dob.Besso, Switzerland | 41.70 | 7.00 | 7.00 | 8.30 | 94.00 | 438.00 |
| Dob.Bastion, Netherlands | 42.30 | 7.00 | 7.00 | 8.10 | 93.00 | 452.00 |
| Dob.SG 99-47, Mexico | 42.30 | 7.00 | 9.00 | 8.70 | 87.00 | 475.00 |
| CNO79/PRL, Mexico | 42.30 | 7.00 | 9.00 | 9.00 | 69.00 | 339.00 |
| UM714 A, Mexico | 42.70 | 7.00 | 7.00 | 5.40 | 91.00 | 422.00 |
| Standard deviation, (S) | 1.30 | 1.10 | 1.10 | 1.00 | 10.90 | 58.10 |
| Standard mean error, (Sx) | 0.27 | 0.20 | 0.20 | 0.21 | 2.40 | 12.70 |

Taking into account the biggest differentiation between sorts and duration of period growth-earning (8 days) and highest technical exactness of date determination for full eating and according to probability of these data; we consider that early-ripeness must be determined by these indications. We differentiated sorts by groups of ripeness (according to average indexes of period growth-earning duration in conditions of 2003-2005): ultra early sorts-39.5 days and less; early sorts- 39.1-41.0; medium early sorts-41.1-43.0; medium ripe-43.1-45.0; medium late-45.1-47.0; late-47.1 days and more. According to this classificatory determined sources by early-ripeness were separated to ultra early (1 sort), early (4), medium early (11) and not stable medium early-medium ripe (1).

Our analysis of data of study of wheat samples of different geographic origin in collection breeding ground shows their good provision (39%) with early-ripening forms. Big amount of samples of Mexican origin is being studied. The earliest (39-41 days) earing showed individual sorts from Switzerland (Barkayi, Barnaul), from Netherlands (Adonis), from Germany (Amor), from India (ND-2281), from Kenya (Romany), from Ethiopia (Complex hybrid), from Peru (Majes I), from Canada (953 «А»), from USA (Chaparoll, Amidon-ND 606, Amidon-ND 604), From Mexico (Trapateko, CHA No. 3 /TPT S and the whole row of complex hybrids), from Brasilia (Frontana) and some others.

In ecological research, where the best sorts from different ecologo-geographical zones of world were studying, the share of early-ripening forms kept only 18%.

Big saturation of selection breeding ground with early-ripening forms (44%) is being explained by presence here of big amount of selection forms, which were delivered immediately from different breeding grounds of CIMMYT (the international center for improving of corn and wheat). Much less saturation was with early-ripening forms was in the control breeding ground (25%) and preliminary research (20 %). Here local selection material

was mixed with additions of Mexican wheat. However, it was much less of last ones in selection breeding ground, so long as in conditions of station research adaptive and competitive ability of most forms of other regions origin was decreased. Low share of early-ripening forms is being studied in contest research (5%).

The extended sicknesses of wheat in the world are powdery mildew and brown (leaf) rust. According to resistance to powdery mildew the early-ripening forms were shared to groups (by amount of samples): very high (mark 9)-1, high (mark 7)-4, medium (mark 5)- 4, low (mark 1)-1. These data have to be estimated like positive so far as 5 samples (or 50%) of early-ripening forms have high and very high resistance and only 1 sample (10%) is being defined negative. Among resistant samples, 1 sample belongs to ultra early, 2-to early and 2-to medium early sorts, i.e. high early-ripeness does not stipulate the higher resistance to pathogen. The early forms CNO79/PRL, Dob.SG had very high resistance.

According to resistance to brown rust the forms were separated to the next groups: very high-2 samples, high-4, medium-3, low-1. These data show high positive result as far as prevalent majority (6 samples or 60%) of early-ripening forms distinguish themselves by high and very high resistance to brown rust. Among this majority samples were registered like ultra early-1, early-2, medium early-3 samples. Like in the previous case, high early-ripeness does not stipulate higher resistance to pathogen. Among samples with very high resistance we have to mark out the ultra early and early Dob.SG, CNO79/PRL, TAM200/Turaco. The forms created by hybridization method Dob.SG are the best in the group of medium early ones with very high resistance.

The samples which are shown in the Table 1 have the group resistance to above-named sicknesses. The ultra early forms are absent among them, early ones share 37% and medium early-63 %.

It is obvious that early-ripening forms with group resistance to phytopathogen-4 samples

(40% of general amount)-don't have interdependent indications, i.e., reduction of vegetation period (through genetically stipulated level of indications) of individual sort does not provide synchronous rise of group resistance to brown rust and powdery mildew.

CONCLUSIONS

The world variety of summer soft wheat has high saturation with early-ripening forms. The selection sources are marked out among them. The majority of early-ripening samples are characterized by high and very high resistance to powdery mildew-51% and brown rust- 68% Thirty five percent of early-ripening forms show resistance to both pathogens. Genetic stipulated reduction of vegetation period is not combined with rise of resistance to sicknesses.

The selection of early-ripening forms has to be conducted according to duration of vegetation period from growth to earing.

We advise to conduct the differentiation of summer wheat according to duration of vegetation period on the basis of 3-years study with difference 2 days between groups of ripeness.

For apply as selection sources of ripeness and also resistant to powdery mildew we suggest CNO79/PRL, Dob.SG, to brown rust-TAM200/Turaco, CNO79/PRL, Dob.SG.

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