International Journal of Virology and Molecular Biology 2022, 11(2): 17-20
DOI: 10.5923/j.ijvmb.20221102.01

# Methods of Selection of Raw Materials for Breeding Winter Wheat in Saline Soils

**Utkirjon T. Jumanov[1], Tojidin X. Kuliyev[2], Musulmon I. Madraximov[1]**

[1]Researcher, Gulistan State University, Gulistan, Uzbekistan
[2]Candidate of Agricultural Sciences, Associate Professor, Gulistan State University, Gulistan, Uzbekistan

**Abstract** This article describes methods for determining the resistance of genotypes of winter soft wheat to salinization and their criteria. The study was conducted in the laboratory of "Experimental biology" of Gulistan State University. About 300 genotypes of winter soft wheat were obtained as the object of the study. When determining the degree of salinity of winter wheat genotypes in conditions of slightly saline soil, the arimetic mean (X±) and standard deviation (S) were used. With the help of these indicators, they are recognized as resistant to salinization if the marking index is greater than X ± 2S. The yield was 846 g/m2, the dry matter content was 3.0 kg/m2. In laboratory conditions, a 1.0% solution of sodium chloride salt shows an increase in fertility by 51.0%.

**Keywords** Productivity, Dry substance, Genotype, Collection, Concentration of solution, Sodium chloride salts, Germination, Salinity resistant, Non-resistant, Medium resistant, Correlation, Variation, Determination, Indicator

## 1. Introduction

Winter wheat is one of the main grain crops that meet the demand of the population for flour and flour products. In the "Strategy for the development of agriculture of the Republic of Uzbekistan for 2020-2030 ", the most important strategic objectives are to achieve an average yield of grain crops of 70 kg/ha by 2025. To do this, first of all, it will be necessary to choose scientifically sound, reliable primary sources for conducting breeding work. The initial resources are selected in the territory where the selection is carried out, which makes it possible to choose the genotypes suitable for this territory.

Currently, the main methods for determining plant resistance to salinization are yields [1]. Productivity is a product of the environment and genotype, despite the fact that it is a highly variable, complex indicator. The productivity of the genotype in the salty fly indicates its resistance to salinization. One of the quick methods is to determine the resistance of genotypes to salinization using sodium chloride salt in laboratory conditions [2]. About 300 collection samples of winter wheat were analyzed using these methods. In this study, the resistance of winter wheat genotypes to salinization in a salty environment was studied for the first time. When selecting genotypes resistant to salinization, the criteria of the above-mentioned methods were calculated.

The main purpose of the study was the selection of initial sources for the selection of winter wheat on saline soils.

Received: Apr. 6, 2022; Accepted: Apr. 26, 2022; Published: Apr. 29, 2022
Published online at http://journal.sapub.org/ijvmb

## 2. The Main Results and Findings

286 genotypes of winter soft wheat Triticum aestivum L were taken as the object of the research, which were studied in 2019-2021 at the field experimental site of Gulistan State University. The following methods were used to determine the salinity resistance of plants in laboratory conditions [3,4]. The primary data were analyzed in the statistical program SPSS-17 [5]. Using this program, the correlation coefficients (r), determination (r2) and variation (Sv,%) between the studied features were calculated. The coefficient of determination of each feature (R2ch) and its average value (R2m) were calculated using the formulas [6].

The results of statistical calculation of the characteristics of winter wheat genotypes and their quantitative indicators are shown in Table 1 below. From the above data, it follows that in conditions of slightly salted soil, the genotypes of winter wheat had an average height of 92.6 cm. According to this indicator, it can be seen that there is a difference between the genotypes in the minimum (60.0 cm) and maximum (130.0 cm) indicators. It is quite natural that such a condition is noted. Because each collection sample shows that the winter soft wheat variety has low, medium and low growth genotypes among the collection samples that have been studied by repeating characteristics. The number of spikes averaged 263, the minimum - 31, the maximum - 570. From these data it can be seen that this indicator is highly variable. In this case, the character will depend not only on the genotype, but also on the external factor. Variability was

noted in all the studied signs.

In this case, it makes sense to study the specifics of variation and determination of features. These data are shown in Figure 1. It can be seen from the figure data that the spikes are strongly deterministic and waarified by They (2), the mass of the spike (3), productivity (5) and the amount of dry matter (8). Especially 2,3. In 5-digit symbols, this has become a clear precedent. Strong determinism of a trait (*determinism means that the trait is limited*) means that they are strongly related to each other, and variability means that they are related to others. It follows that in saline soil conditions, productivity depends more on the mass of the spike, the number of spikes, and the amount of dry mass. This suggests that in terms of productivity, it is possible to distinguish genotypes resistant to salinization.

The weight of one spike (4), the length of a spike (6), the length of a flag leaf (7), the germination of grain in the control (9) germination in 1.0% sodium chloride salt (10) were poorly determined and varied. These indicators have independent variability and do not depend much on others. Grain germination was most strongly changed and less deterministic in 1.5% sodium chloride salt[11]. This shows the dependence on the external environment, that is, on the concentration of the solution.

Based on the above data, productivity in a salty environment, the number of spikes associated with it, the weight of the spikes were strongly determined and varied. These indicators in this case can be called ecological and biological indicators. These signs will depend not only on the genotype, but also on the external environment. Consequently, in a salty environment, productive genotypes are resistant to salinization. These signs strongly correlate with each other (Fig. 2). The data in the figure showed that the correlation coefficient between such features as the number of spikes (2), the weight of the spike (3), productivity (5) and the amount of dry matter (8) was strong (r=>0.7). When choosing salinity-resistant genotypes, it will be necessary to pay attention to their productivity. When choosing a single one, it is worth paying attention to such signs as the weight of one spike (4), the length of the spike (6), the length of a flag leaf (7), and when choosing a gross one, productivity.

**Table 1.** Signs of winter wheat genotypes and their quantitative indicators

| Height of a plant.cm | Number of spikes. 1 sq.m | Weight of a spike.g | Weight of a grain in a spike,g | Weight of a grain.g | Length of a spike, cm | Length of a flag leaf, cm | Dry substance | Germination, in water | At 1,0% | At 1,5% |
|---|---|---|---|---|---|---|---|---|---|---|
| Average indicator | | | | | | | | | | |
| 92.66 ±1.18 | 263.03 ±11.73 | 607.01 ±23.91 | 1.77 ±0.03 | 445.22 ±18.15 | 10.56 ±0.13 | 22.74 ±0.43 | 1.41 ±0.07 | 93.86 ±0.66 | 35.36± 0.71 | 3.76± 0.39 |
| Minimum | | | | | | | | | | |
| 60,0 | 31,0 | 84,0 | 0,54 | 56,0 | 5,60 | 1,66 | 0,09 | 63,33 | 13,33 | 0,00 |
| Maximum | | | | | | | | | | |
| 130,0 | 570,0 | 1280,0 | 2,80 | 978,0 | 14,8 | 41,2 | 3,57 | 100,0 | 53,33 | 20,00 |

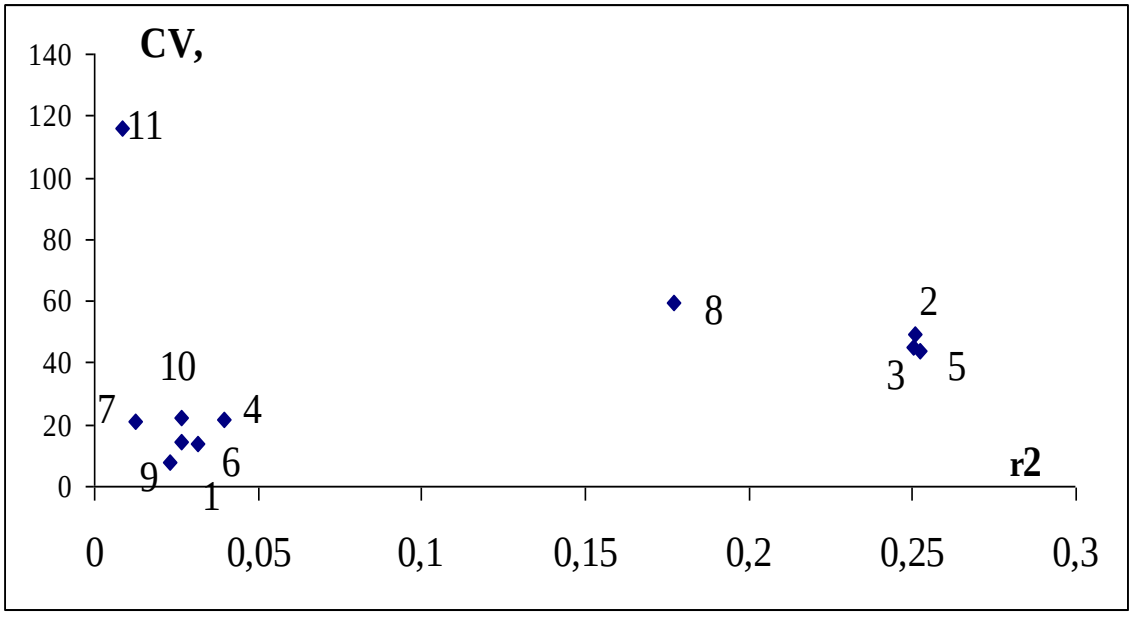


**Figure 1. Effect of sodium chloride salt on germination of winter wheat genotype** (*Note: 1- Height of a plant.cm;2- Number of spikes.in 1 sq.m field, pcs;3- Weight of spikes, in 1 sq.m field,g; 4- Weight of a grain in a spike,g; 5- Weight of a grain, in 1 sq.m field,g;6- Length of a spike, cm 7- Length of a flag leaf, cm;8- Dry substance,g/sq. m. 9-germination in control; 10-germination in 1.0% solution; 11- germination in 1.5% solution.*)

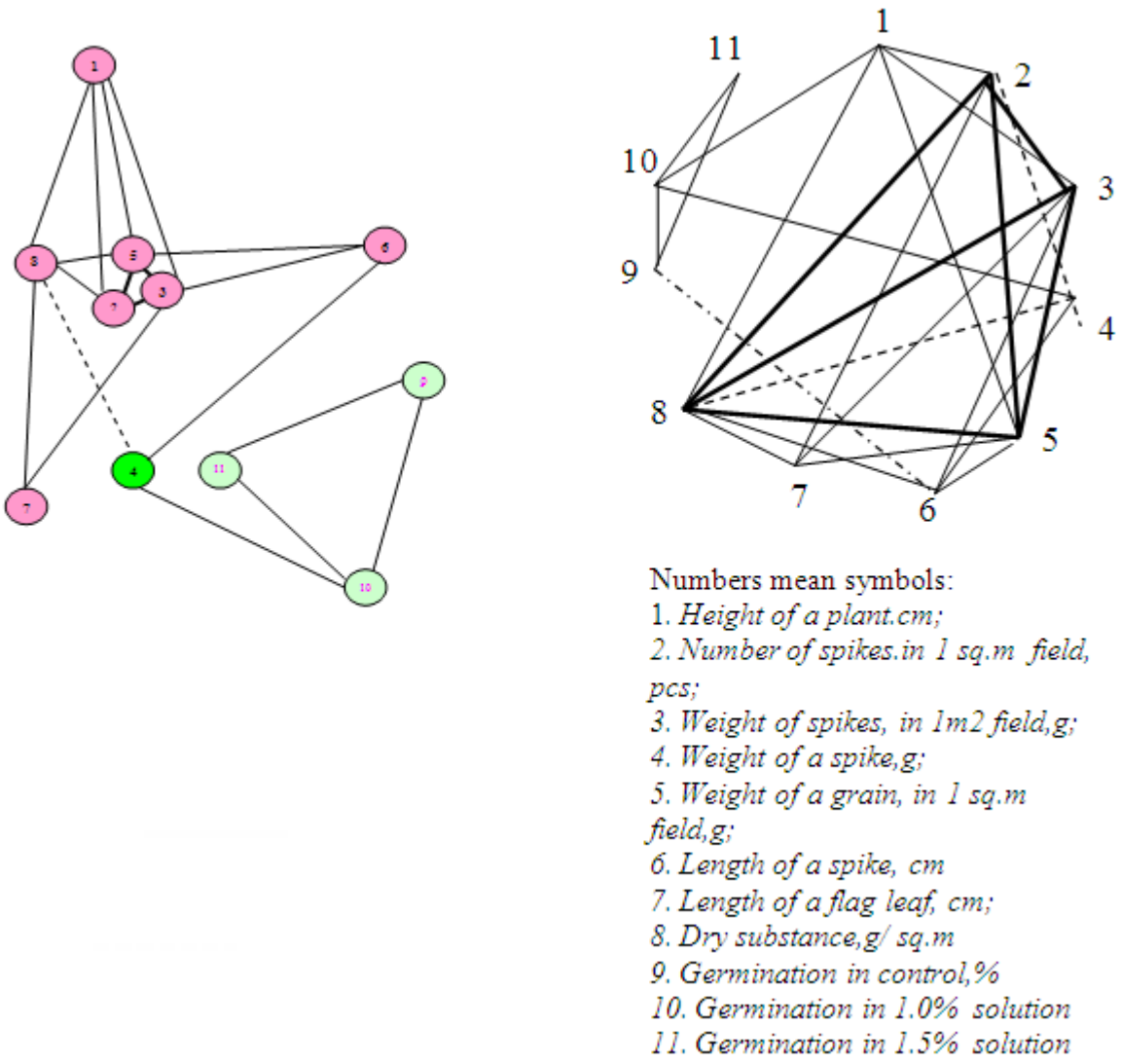


**Figure 2. Degree and structure of correlations between quantitative characteristics of durum varieties and wheat samples** ( R=0.3-0.5 r=0.5-0.7; R=>0.7; r=-0.3-0.5.)

When selecting genotypes resistant to salinization using saline solutions in the laboratory, a weak correlation between fertility indicators was noted (9,10,11). This suggests that the grain sprouted in the control turned out to be even in a saline solution. When the concentration of the spotted solution exceeds 1.0%, germination decreases sharply. Based on these data, it was recommended in the laboratory to use a 1.0% solution to determine the resistance of wheat genotypes to salinization. This solution was recognized as the most optimal concentration for the selection of salinity-resistant genotypes. When the concentration of the solution was 1.5%, it affected the genotypes as a stress factor. This led to a strong variation.

The correlation between the characteristics of winter wheat can be divided into two groups. The first group of correlations was called "performance". This group formed a powerful garden consisting of 2, 3, 5, 8 characters. Recall that the numbers indicate the degree of correlation of symbols between them. The closer the distance between the signs, the more strongly they are connected. This can also be seen by the lines between the numeric symbols 2, 3 and 5. This correlation group includes the length of the spike (6), and the length of a flag leaf (7) and the height of the plant (1).

The second correlation group was named "grain germination". This group combines the symbols of the numbers 9,10,11. The weight of one barrel (4) connected both groups. A weak correlation was noted between the grain weight in a spike (4) and the length of a spike (6) and the germination of 1.0% solution (10). On this long spike, the grain will be heavy, which, in turn, ensured the grain's resistance to salinization.

Based on the results of the statistical analysis, when choosing the genotypes of winter wheat in conditions of slightly salted soil, it is recommended first of all to pay attention to the yield. Based on the standard deviation indicator, the genotypes were divided into three groups (stable, medium, stable) (Table 2).

**Table 2.** Criteria of methods for determining the salinity resistance of plants

| Concentration of sodium chloride salt | Salinity non-resistant | Salinity medium resistant | Salinity resistant |
|---|---|---|---|
| Weight of a spike,g | Less than 2.2 | 2.2 -2.50 | More than 2.50 |
| Productivity q/1 sq. m | Less than 646 | 646- 846 | More than 847 |
| Dry substance, kg/1 sq. m | Less than 2.0 | 2.0-3.0 | More than 3.0 |
| Level of germination in laboratory condition in 1,0% solution | Less than 43.0% | 43-51 | More than 51.0% |

From the data in the table, it can be called stable if the productivity of the genotype is less than 646 per 1 sq.m of area, stable if the yield is 646-846 g with an average yield of more than 846. It is established that the amount of dry substance of stable genotypes should be greater than 3.0.

## 3. Conclusions

1. It is noted that in conditions of slightly salinized soil, the yield of winter wheat genotypes should be 846 g/sq.m with a dry matter content of 3.0 kg/ sq.m with a mass of one spike of more than 2.5 grams;
2. When determining the genotypes of resistance to salinization in the laboratory, it is recommended to use a 1.0% sodium chloride solution. At the same time, it is noted that the germination rate should be higher than 51%.

## REFERENCES

[1] Методика диагностики устойчивости растений(засухо-, жаро-, соле- и морозо-устойчивости) / Г.В. Удовенко, Т.В. Олейникова, Н.Н. Кожушко, Э.А. Барашкова и др. Л.: ВИР, 1970. 74 с.

[2] Практикум по росту и устойчивости растений. Под редакцей В.В.Полевого, Т.В.Чирковой. Издательство С-Петербургского университета. 2001.- 221 с.

[3] Л.А. Чудинова, Н.В. Орлова. Физиология устойчивости растений. Перм. ун-т. –Пермь, 2006. – 124с.

[4] Шишлянникова Л.М. Математическое сопровождение научной работы с помощью статистического пакета SPSS for Windows 11.5.0// Учебно-методическое пособие М., 2005. С. -107.

Ростова Н.С. Корреляции: структура и изменчивость // СПб.: Изд-во С. -Петерб. ун-та, 2002. Т. 94. С. -308с.