American Journal of Biology and Natural Sciences
https://biojournals.us/index.php/AJBNS
ISSN: 2997-7185

Variability of Biological Indications of Winter Wheat Varieties in Saline Soil Conditions

[1] Kushiev Kh. Kh., [2] Saidzoda M., [2] Khujamberdiev Ch. T., [1] Kuliev T. Kh.
[1] Scientific Research Institute Agribiotechnologies and Biochemistry of Gulistan State University, Uzbekistan
[2] Khujand State University after named academician B.Gafurov

Received: 2024, 15, Oct
Accepted: 2024, 21, Oct
Published: 2024, 08, Nov

Annotation: The article clarifies results of conducted researches of specific variation and determinacy of winter wheat of Triticum aeustium type indications in salinated soil conditions. There was noted peculiarities of wheat ear mass and wheat ear quantity strong determinacy while onthogenetic development of winter wheat. Also there were identified weak, average and strong correlation bonds' levels between biologic indications of wheat.

Keywords: winter wheat, soil, salinity, biologic indications, variation, determinacy, correlation, correlation group.

Introduction

Studying impact levels of plants to external stress factors and increasing endurance level are important issues in the science. As soil salinity level increases it reflects to plant growth and development negatively. Especially, agricultural plants can not obtain necessary nutrition and elements in order to be fruitfulness and qualitative indicators due to salts in the soil. This definitely causes to increasing of non-resistancy and not corresponding of product ingredient to ecologic features in variety of extreme situations as required organic substances can not develop in the plant. Assessment of sustainability level of seed vegetation indicator in salinated soil conditions is one of the main factors [1-4].

It is necessary to pay attention to the following issues while effectively exploitation of salinated cultivation areas.

Selection of salinity sustainable plant types and creating new types are related with scientifically

substantiated criteria. There are different points of view among the researchers regarding to this issue. Some researchers consider that it is reasonable to assess productivity as the main indicator for salinity sustainability of plants [5], and others consider that it has low heredity [6]. Of course, both considerations exist. Firstly, productivity of genotype expresses its correspondence with external environment. Secondly, genotype that was chosen as productive may be less productive next year. That is why, it is necessary to clarify eco-biologic, biologic, genotypic and ecologic symptoms (indicators) in order to analyze quantitative indications and conduct selection activities for identifying sustainability of plants [7].

The following article is devoted to the solutions of abovementioned issues and its main goal is to analyze specific indications of variation and determinacy of winter wheat in salinated soil conditions.

Object and methods of the research

As an object we have chosen types of winter soft wheat named Surkhak, Khazoni Safedak, Grom, Alekseich, Bezostaya 100 that belongs to Triticum aeustium family. Chosen types of wheat were studied in 3 ways. In the first way 1м^2 200 pieces, in the second - 1м^2 500 pieces, in the third way 1м^2 700 pieces were planted accordingly in October, November and December. The experiments (2005-2015) were conducted in average salinated experimental field of Khujand State University with 4 repeated times. Phenologic observations and calculations were done based on proper methodological instructions. Statistical calculations between studied indicators were conducted by the special program device SPSS-14 [8]. Correlation (r), determinacy (r^2) and coefficiencies of variation (cv,%) between studied indicator there was used formulae d = 1-r in order to identify distance between them [7].

Achieved results

Achieved results (Table 1) has shown that when sowing norms contain 200 pieces of wheat per 1м^2 (1 way) vegetation became 66,69%, in the 2 way – 75,9 %, and in the 3- way - 80,1%. These data allowed to increasing vegetation of winter wheat types in the cultivation fields as sowing norms were also increased. It is considered to be extremely important in the soil that is inclined to salinity. Because vegetating winter wheat types fully in salinated soil is one of the biggest problems [9].

One of the factors reflecting to the productivity of winter wheat types is quantity of wheat ear (productive ear). This indicator in sowing norms was equal in 1- way to 218 pc, 3-way to 730 pieces. Increasing the sowing norms in its turn causes to increasing of productive ears.

Weight of one grain in one ear also considered to be reflecting factor to the productivity. This indication in 1-way was 1,52 г, and sowing norms in the 3-way consisted of - 0,94 г. Therefore. As sowing norm increases then it causes to decreasing grain weight in the ear.

Table. Reflection of sowing norm to the productivity of winter wheat

No.	Indications	Sowing norm, 1 m2 (piece)					
		200(1-way)		500(2 –way)		700(3-way)	
		$\overline{X}$	±	$\overline{X}$	±	$\overline{X}$	±
1	Sowing norm, gram 1 m^2	7,5	0,13	19,7	0,49	26,7	0,6
2	Vegetation, %	66,6	1,04	75,9	0,87	80,0	0,84
3	Ripening period	240.0	0,75	238.0	0,7	234.0	0,78
4	Height of the plant,cm	90,9	1,58	96,5	1,28	110,6	2,8
5	Grain quantity in 1 m^2, pc	218,3	7,91	562,8	5,5	730,1	16,5
6	Weight of one grain, gram	1,52	0,02	1,33	0,02	0,94	0,02
7	Productivity, 1 m^2	259,5	4,11	562,8	5,5	539,8	4,8
8	Outcrop of grain, %	69,6	1,06	69,16	1,06	66,1	1,07
9	Index of harvest	0,26	0,01	0,30	0,01	0,20	0,03
10	Length of ear, cm	9,6	0,17	9,6	0,13	9,2	0,14

11	Quantity of grain in the ear, pc	41,4	1,13	40,3	1,0	34,0	1,62
12	Weight of 1000 grains, gram	48,2	6,85	40,71	0,9	37,6	0,87

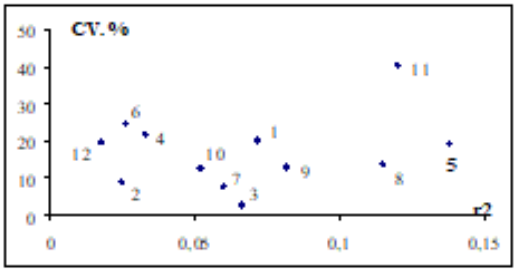
We can make sure that initial data has allowed to variation of productivity of winter wheat and to the indicators related with them. And in its turn it allowed us to analyze these changes by using special statistical methods.

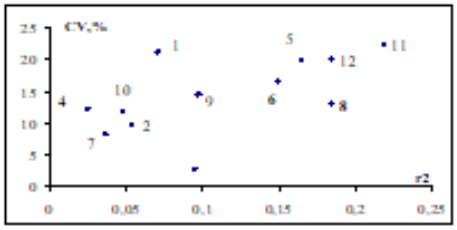
Peculiarities of variation of winter wheat quantitative indications are given in the picture 1. By the data in the picture there was identified that sowing norms in the 1 way consisted of (1 m^2 200), i.e. when wheat is planted thinned 1 m^2 quantity of grain (5) and index of harvest (8) strongly determined and less varieties. And there was identified that quantity of grain in the ear (11) was strongly determined and strongly changeable. It is known that thinny planted winter wheat types get crowded much. Therefore it allows to strongly changing of grain quantity in the ear. Due to this there were identified average variation and less determinacy of productivity (7), ripening period (3), vegetation (2), index of harvest (9), length of ear (10).

In the second method of the experiment (500 pieces) as strongly changeable and also determined there were found indications such as grain quantity in the ear (11), weight of 1000 grain (12), grain quantity in 1 m2 (5), weight of one ear (6) (picture 1). When sowing norm compounds 700 pieces per 1 m^2 there was identified strongly determined and changed such as grain quantity in 1 m^2 (5) and grain quantity in the ear (11). It was found that weight of the ear (6), grain outcrop (8), weight of 1000 grains (12) and productivity (7) were strongly determined and weakly varied. There was also observed less determinacy and variation of ripening period (3) (picture 1).

In general, as sowing norm increases, it reflects on determinacy of quantitative indications and interrelation system as well. There was observed from studied quantitative indications strong determinacy and strong variation of grain quantity in 1 m^2, productivity, ear weight. There was identified that variation of indications happen in accordance with other indications. We have observed that ripening period, height of the plant are to be less determined and their variation are happened independently**.**

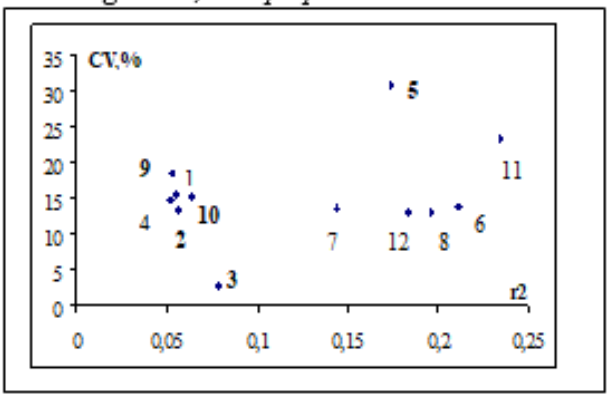
Sowing norm does not only reflects on variation of winter wheat indications, but also to the correlation bond levels between them. This can be seen from the data in the picture 2. In the first method there was observed weak (r=0.35) correlation bond between sowing norm (200 grains per 1m^2) (1) and productivity. This was also observed in the rest 2 and 3 methods. So, as sowing norm increases so it allows to grain productivity in cultivation field conditions. Productivity (7) is due to grain quantity (5) in all methods. There was observed positive correlation between these indications.





Sowing norm, 500 pc per 1 m²

Sowing norm, 200 pc per 1 m2

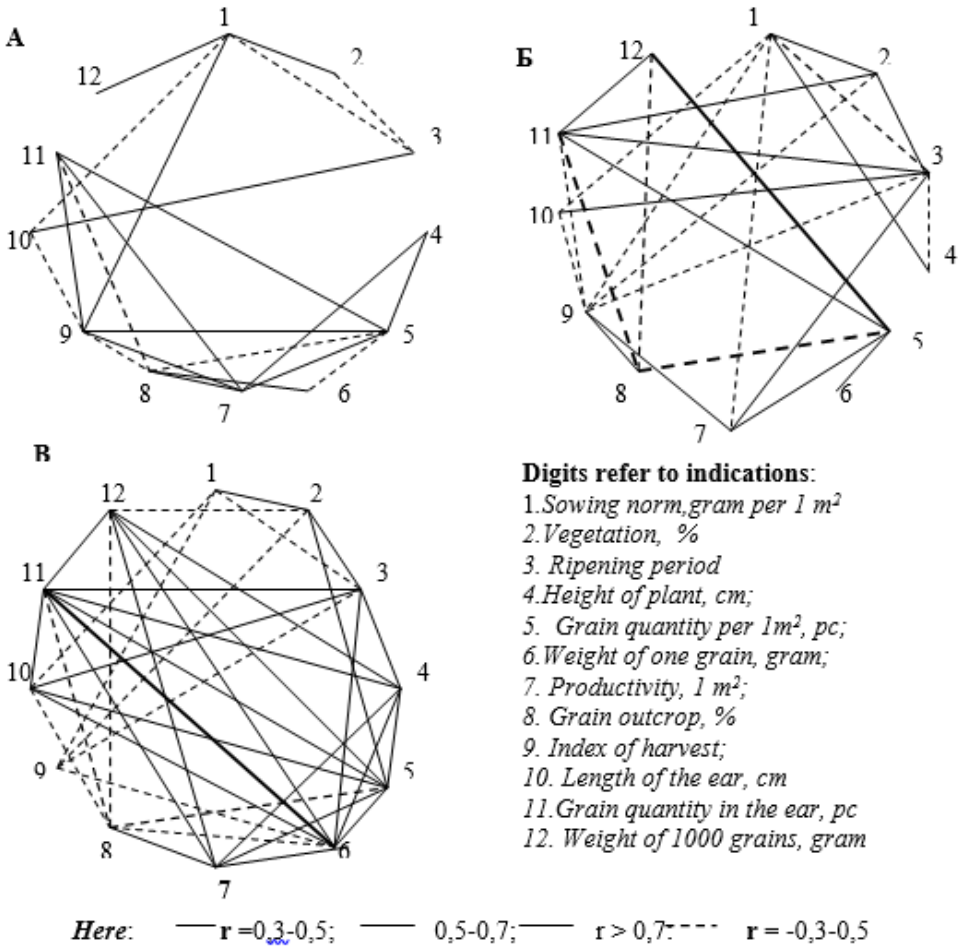


Sowing norm, 700 pc per 1 m²

Digits refer to indications:
1.*Sowing norm,gram per 1 m²*
2.Vegetation, %
3. Ripening period
4.Height of plant, cm;
5. Grain quantity per 1m², pc;
6.Weight of one grain, gram;
7. Productivity, 1 m²;
8. Grain outcrop, %
9. Index of harvest;
10. Length of the ear, cm
11.Grain quantity in the ear, pc
12. Weight of 1000 grains, gram

Picture 1. Reflection of sowing norm on variation of winter wheat indications (CV,%) and determinacy (r2)

The abovementioned data shows that due to increasing sowing norms allows to increasing levels of correlation between the types of winter wheat. Results of calculation have shown that average determinacy co efficiency was equal to 0,06 in the 1 method (200 pieces) and it was equal to 0,12 in the 3 method (700 pieces) of winter wheat indications. Due to increase of sowing norm in allowed to twice increasing the levels of indicator determinacy. Therefore, as sowing norm increases it creates uncomfortable conditions for plant. This situation can be evaluated also due to the increase of correlation bonds' levels between plant's quantitative indications [7].



Picture 2. Reflection of sowing norm on the level of correlation bonds between winter wheat indications
A-sowing norm 2 million; B – sowing norm 5 million; C- sowing norm 7 million

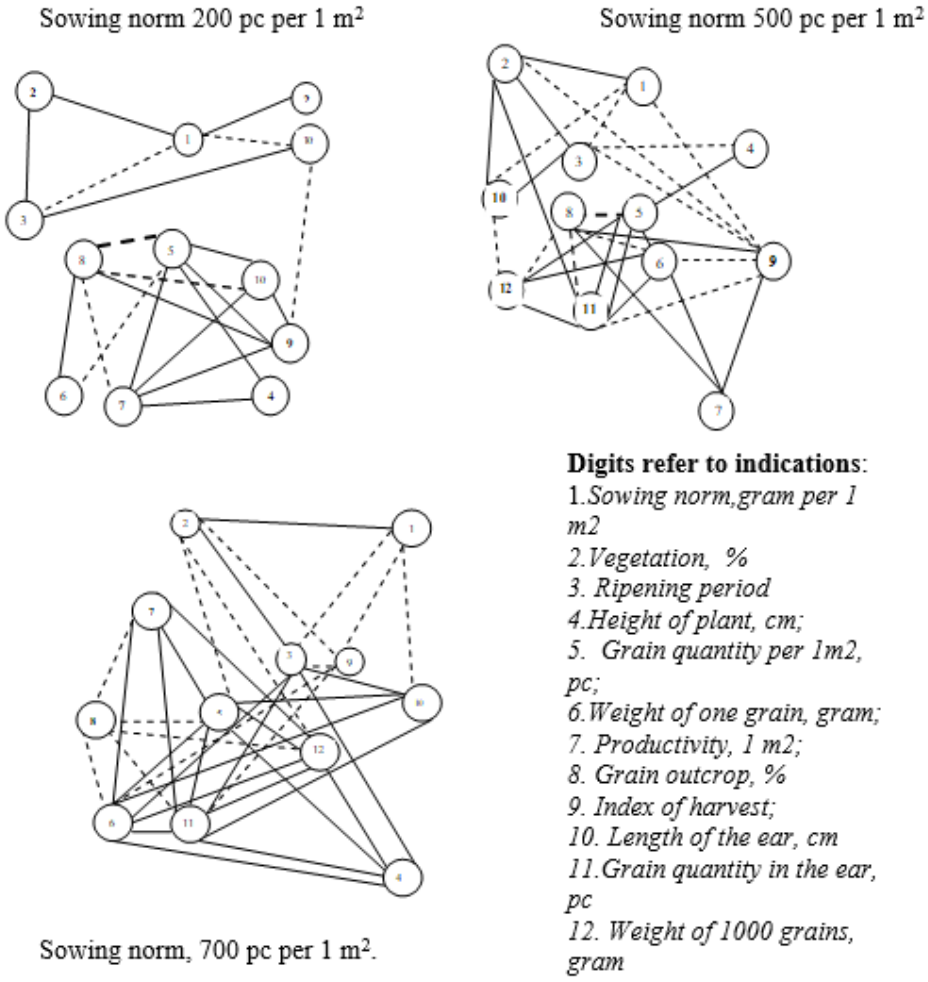
Sowing norm has also reflected on correlation bonds' levels between winter wheat indications and the structure as well. This can be seen from the picture 3. In the first method (200 grains per 1m^2) correlation bonds between studied winter wheat indications were distributed into two exact groups. First group was named *"pproductivity"*. It contained the indications reflecting on productivity. Particularly, the following indications compiled the correlation group such as height of the plant (4), index of harvest (9), grain quantity in the ear (11), ear quantity in 1 m^2 area (5), weight of one ear (6), productivity (7), grain outcrop (8).

The second correlation group consisted of indications such as sowing norm (1), ripening period (3), vegetation (2), weight of 1000 grains (12), length of the ear (10). This group can be named *"wheat ear"*. It is necessary to note that there was observed inverse bond between first and second correlation groups. Therefore, length of the ear (10) causes to less amount of harvest index (9).

Sowing norm allowed to proper changes in the system of correlation bonds between the quantitative indications of winter wheat. It can determined by comparison of correlation matrixes received through methods. The results have shown that adequacy of first and second methods correlation matrixes were 36.1 %, and 3 –method was 40.6 %. The second and third methods' (sowing norm 700 grains) adequacy was equal to 77, 1 %. So, second and third methods in terms of correlation bonds are much closer to each other rather than the first method. From the abovementioned data we can make sure that sowing norm can make changes in the system of correlation bonds between quantitative indications. This we can figure out from the picture 3 from changes happened in correlation bonds' structure. The data from the picture showed that increase of indications between correlation bonds' levels in the second (500 pieces) and third method (700 pieces) are due to gathering around the productivity group.

Conclusion

1. In the steps of growth and development of wheat in the conditions of average salinated soil conditions biologic indications such as weight of ear and grain quantity in the ear with external stress factors could determinate strongly by showing features of sustainability. There was observed that variation of these indications happen in accordance with other indications. Ripening period, height of the plant, ear length were found as weak varied and less determined indications.
2. There were observed weak, average and strong correlation bonds' level among winter wheat indications. It was found that productivity is more due to the quantity of the ear.
3. Increasing of the sowing norm caused to increasing correlation bonds' degrees between quantitative indications of winter wheat.
4. The structure of correlation bonds between the quantitative indications of winter wheat was mostly divided into two groups *"productivity"* and *"wheat ear"*. There was observed an increase of bonds' levels between indications that are parts of correlation group.
5. The results of comparison of correlation matrixes has shown that sowing norm makes changes in proper system of correlation bonds between the quantitative indications of winter wheat as an external factor (adequacy of matrixes were 36.0 -77.0 %).
6. It was substantiated to pay attention to the length of ear and its weight while conducting selection activities in salinated soil conditions.



Picture 3. The structure of correlation bonds between winter wheat indications.

Bibliography

1. A.K.Eshkuvvatov, T.H.Kuliev, H.H.Kushiev. Influence of salt solution to swelling of winter wheat grain//Commentaries of Uzbekistan agrarian sciences.2016.№.1(63). P.42-45.
2. Sergey Shabala, Trasey A.Cuin, Igor Pottosin Polyamines NaCI-induced K^+ efflux from pea mesophyll by bloking non-selective cation channels //FEBS Letters 2007. -581. -P.1993-1999.
3. Chen Z.H., Zhou M.X., Newman I.A., Zhang G.P., Shabala S. Potassium and relations in salinised barley tissues as a basis of deferential salt tolerance. //Funct. Plant Biol. -2007. -34. -P.150-162.
4. Alcazar R., Marco F., Cuevas J.C., Patron M., Ferrando A., Carrasco P., Tiburcio A., Altabella T. Involment of polyamines in plant response to abiotic stress. //Biotechnol. Lett. -2006. -28. -P.1867-1876.
5. Udovenko G.V. Adaptation mechanisms of plants to the stresses//Physiology and biochemistry of cultivated plants. Moscow, 1978.V.11.№2. P.99-107.
6. Simongulyan N.G, Muhamedhanov S.R, Shafrin A.N. Genetics, selection and seed growing of cotton. Tashkent: Mehnat,1987.- p.320.
7. Rostova N.S. Correlations: Structure and variation // Saints-Petersburg: Publishing house of Saints Petersburg University, 2002. V.94.C.- p.308.
8. Shishlyannikova L.M. Mathematical support of research work through the statistical pack of SPSS for Windows 11.5.0// Teaching-methodological manual, Moscow, 2005. //www.web Statistica.- 2005.
9. Aliboeva D, Kuliev T. Peculiarities of plants seeds growth in the process of swelling. Materials of VII International scientific-practical conderence. Russia, Nevynnomysk: NIEUP, 2014. - p. 245-247.