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ORIGINAL ARTICLE

Productivity of watermelon output in the conditions of the forest-steppe zone of Ukraine

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In the Institute of Vegetable and Melon Growing of National Academy of Agrarian Sciences of Ukraine (Kharkiv region), we held screening and monitoring of 101 genotypes of watermelon from 13 countries, which are represented by collection and selection samples of different breeding characteristics. There were determined the parameters of productivity, yield, average fruit weight, number of fruits on the plant, and their variability. According to the analysis of the source material of watermelon, the limits (Lim=Xmin… Xmax) and amplitudes (Am=Xmax-Xmin) of variation of their values were established as well. Analysis of the source material of watermelon revealed significant variability of the main selection traits: overall productivity (Lim=1.48-6.50, Am=5.02 kg/plant), marketable productivity (Lim=1.29-6.31, Am=5.02 kg/plant), average weight of marketable fruit (Lim=0.99-3.99, Am=3.00 kg), number of fruits per plant (Lim=0.9-3.6, Am=2,7 pcs/plant), total yield (Lim=15.1-65.7, Am=50.60 t/ha), commodity yield (Lim=13.2-64.5, Am=51.30 t/ha) and insignificant marketability (Lim=74.9-100, Am=25.10%). The sources of valuable economic traits for heterosis selection are identified: by total productivity-19, by marketable productivity-13, by yield of marketable fruits-17, by average fruit weight-5, and the average number of fruits per plant-14. The purpose of the research is to assess the productive and marketable qualities of the collection genofond of watermelon, to identify the sources of productivity valuable for heterosis selection of the table watermelon.

Keywords: Watermelon, collection, sample, productivity, yield, sources.

Introduction

Breeding-the most affordable and effective means of transition to an adaptive strategy of intensification of agriculture, achieving its resource efficiency and environmental safety (Zenkina and Oseeva.,2020).

According to the WHO, in 2020, 1.9 billion (39%) of the adult population (over 18 years of age) were overweight, 650 million (13%) of which were obese. In order to treat and prevent this disease, doctors recommend eating more vegetables and melons (Sunharberdina et al., 2021).

Watermelon is an essential component of general and medical and dietary nutrition (Galichkina et al., 2013; Kornienko et al., 2016, Soldatenko ahd Pushnay., 2018, Lymar et al.,2020). According to carbohydrate concentration, watermelon predominates over the main vegetable crops, inferior to table beets and melons. In its pulp, the amount of sugars averages 8.7 g per 100 g, meanwhile in beets and melons-9.0. Due to the ability to harvest in extreme conditions, watermelon can make a figure in the future due to global warming, as a source of water (Mahmaganov, 2016).

According to the FAO, more than 130 countries are engaged in the industrial production of watermelon (the total area is about 3.5 million hectares, gross harvest-926 million tons). The crucial point in the production of watermelon belongs to the varieties and hybrids that determine the consumer qualities of products demanded by market conditions. The introduction of new heterosis hybrids into production can increase watermelon yield by at least 15-20% (Shablya, 2012, Sergienko et al., 2020).

As At Date of February 11, 2021, the varieties and hybrids of 23 foreign and 6 domestic applicants got into the State Register of Plant Varieties Suitable for Distribution in Ukraine. There are 88 hybrids and 37 varieties (125 in total) of varietal resources, 81 hybrids and 9 varieties of which are foreign selection, Ukrainian ones-7 and 28 respectively (Derzhavnyj reyestr sortiv roslyn, 2021).

Almost all foreign companies have switched to hybrids, but at the same time, they have retained the most popular varieties-brands (AU Producer, Crimson World, Charleston gray, Sugarbaby, etc.).

Due to the development of the supermarket chain, the demand for watermelons with a variety of fruit characteristics has increased. In many countries, watermelon is considered to be an extremely valuable source of lycopene and citrulline-indispensable components in healthy eating programs.

The production of mini-watermelons by selection methods has become a new direction. The fruit production with the original shape (pyramidal, square, etc.) is increasing. The world market has shown the undeniable advantages of triploid seedless watermelon hybrids.

An important role in the study of watermelon belongs to the disclosure of its genetic potential. This urgent problem can be solved by testing samples of different ecological and geographical groups on a natural background, which will reveal the effectiveness of genetic sources to create new varieties and hybrids (Sergienk. ahd Loboda, 2010, Tekhanovich et al., 2019; Govor ahd Xatefov, 2020; Nekrasov, 2020).

In order to get a more productive process of creating the source material in the selection, it is necessary to identify correlations between traits (Brytik, 2015).

Workers in the Institute of Vegetable and Melon Growing of National Academy of Agrarian Sciences of Ukraine have been successfully working for many years to develop methodological approaches to selection and creation of source material to create watermelon hybrids of different maturity groups based on identified effective genetic sources, study the inheritance of important traits by hybrids and use of genetic sources in different crosses. (Sergienko, 2016, Sergienko, 2020, Kornienko et al., 2016).
One of the central positions in the selection of vegetable and melon plants is the problem of adaptation. Within the range of culture during its cultivation there are not only favorable or unfavorable conditions. The study of the genofond of culture in specific soil and climatic conditions allows predicting the selection value of watermelon Tulyakov et al.,2019; Pryanishnikov et al., 2020).
The success in heterosis selection is determined by the interaction of genotypes of the maternal and paternal forms of the hybrid (Sergienko et al. 2021).
Therefore, a crucial task in the early stages of breeding work is a comprehensive analysis and selection among the source material of forms with high individual ability to transmit to offspring valuable traits. Involving a variety of watermelon of different ecological, geographical, and genetic origins, with a set of economically valuable traits, will provide original self-pollinated lines that can be promising as both maternal and paternal components of hybrids in heterosis selection (Sergienko, 2020).
The set of domestic regionalized hybrids is insignificant and constantly needs updating and replenishment with high-yielding heterosis hybrids with high taste qualities and adaptive ability, which is possible by identifying sources of productivity.
The purpose of the research is to assess the productive and marketable qualities of the collection genofond of watermelon, to identify the sources of productivity valuable for heterosis selection of the table watermelon.

Materials and Methods

The research was conducted in the Institute of Vegetable and Melon Growing NAAS during 2018-2020 in the open ground of selection crop rotation. The material for the research was the source material which consisted of collection and selection genotypes. The soils of the experimental site are low humic, middle loamy soils with a humus content of 4.0-4.5%, P_2O_5-15 mg/100 g, K_2O-8-10 mg/100 g. This variety belongs to the rather fertile soils, which with favorable water regimes have a significant capacity to supply plants with nutrients. The reaction of the medium in the arable layer is neutral (pH-7.0-7.5), so it is favorable for growing watermelon (Kusmichov, 1965).
You should pay attention to the favorable water and physical properties of the soil. Its total porosity reaches 54-58%, high water permeability, up to 3.3 mm/min. The maximum field moisture content is quite high in the arable layer (0-40 cm)-30%. The soil cultivation is not difficult, the bulk density in the layer up to 30 cm does not exceed 1.2 g/cm^3.
The meteorological conditions in the years of research (2018-2020) had a contrasting nature, which allowed to obtain an objective assessment of the adaptive properties of the samples of the source material in terms of yield, productivity, and its elements (fruit weight, number of fruits per a plant). The climatic conditions during growth and development met the physiological requirements of watermelon and contributed to the manifestation of all phenotypic traits and the formation of a full crop of watermelon fruits of different maturity groups.
The research area is characterized by insufficient moisture and a relatively common phenomenon-atmospheric drought, which can occur more than once a year. The average annual rainfall in the region is 517 mm. The distribution of precipitation during the year in the region is uneven. In the growing season of watermelon, the average rainfall is 285.00 mm.
The object of research is 101 samples of watermelon (Citrullus lanatus (Thunb) Matsum. et. Nakai) of domestic and foreign selection. By country of origin, the gene pool was represented by 13 countries, by genetic status-samples, breeding varieties, and lines created in IOB NAAS. Grade standard (st)-Max plus (selections IOB NAAS) (Sergienko ahd Loboda, 2010).
The establishment of experiments was carried out in accordance with the methods of field research and methods of research with melons (Dospehov,1985; Bondarenko ahd Yakovenko, 2001; Lyma,r 2001). The standard sample was placed every 10 genotypes. The studied samples were sewn by hand in the optimal agronomic terms: the first and second decades of May. The sowing scheme is as follows-1.4 x 0.7 m, 2-3 seeds per hole. The feeding area of one plant is 0.98 m^2. The number of plants on plots-20 plants of each sample. The area of plots-19.6 m^2. The first thinning of plants was carried out after the first inter-row cultivation (in the phase of one-two leaves); the second and final-in the phase of three or four leaves, leaving one plant. The technology of watermelon cultivation in the experiment complied with DSTU 5045: 2008 Kavun, dynya, garbuz. Tekhnologiya vyrocshuvannya, 2009).
Economic and biological assessment of the genotypes of the source material was carried out according to the "Wide unified classifier of the CMEA genus CITRULLUS SCHRAD" (Shyrokij ynifitsirovanyij klassifikator, 1989) and the Methodology of the VOS (Metodyka provedennya expertyzy, 2015).
The analysis of experimental data was performed by variational analysis methods (Dospehov, 1985) using the ANOVA method. Using the Tukey test (Tukey, 1949), where the differences were considered significant at $P < 0.05$ (taking into account the Bonferroni correction) there were determined the differences between values in different variants of the experiment (Armstrong, 2014).

Results and Discussion

The analysis of the source material of watermelon revealed a significant amplitude (Am) and limit (Lim) of the variability of the main economic characteristics: total productivity (1.48-6.50 kg/plant), marketable productivity (1.29-6.31 kg/plant), the average weight of marketable fruit (0.99-3.99 kg), fertility (0.9-3.6 fruits per plant), total yield (15.1-65.7 t/ha), marketable yield (13.2-64.5 t/ha), marketability of the harvest (74.9-100%) (Table 1).
The most important feature for assessing the biological resources of watermelon genotypes is productivity, i.e. the weight of all fruits from one plant. During the experiments, there was observed a significant variability of these traits depending on the weather conditions of the year, genotype, and genotype-environment interaction.

The standard variety was characterized by high indicators of general and marketable productivity (6.34 and 6.25 kg/plant) and respectively high overall (64.7 t/ha), marketable (63.8 t/ha) yield, and a fairly high level of marketability of the obtained harvest (98.6%).

Table 1. The variability of yield components of genotypes of watermelon source material, 2018-2020.

Indicator	Indicator Value					
	Max Plus (st)	The Average For The Collection $X_{cp} \pm Sd$	Lim min	Lim max	Am	V, %
Total productivity, kg/plant	6,34	4,01 ± 0,12	1,48	6,50	5,02	29,36
Productivity, kg/plant	6,25	3,78 ± 0,11	1,29	6,31	5,02	30,56
The average weight of the fruit, kg	2,50	2,23 ± 0,04	0,99	3,99	3,00	21,09
The average number of fruits, pcs/plant	2,50	1,80 ± 0,07	0,90	3,60	2,70	32,14
Total yield, t/ha	64,70	41,10 ± 1,20	15,10	65,70	50,60	29,33
Commodity yield, t/ha	63,80	36,20 ± 1,16	13,20	64,50	51,30	30,56
Marketability, %	98,60	92,90 ± 0,01	74,90	100,00	25,10	23,09

Numerical data in the table are presented as × ± SD (n=10).

Analyzing the information in Table 1, we can see that the evaluation of the source material by the variability of the components of the yield made it possible to set limits on the variation of characteristics and the amplitude of their values. Thus, the value of the sign "total productivity" varied from 1.48 to 6.5 kg/height, the amplitude of variation of the sign was Am=5.02. The value of the sign "productivity" varied from 1.29 to 6.31 kg/plant, the amplitude of variation of the sign was Am=5.02. The value of the sign "the average weight of the fruit" varied from 0.99 to 3.99 kg/plant, the amplitude of variation of the sign was Am=3.00. The value of the sign "the average number of fruits" varied from 0.90 to 3.60 kg/plant, the amplitude of variation of the sign was Am=2.7. The value of the sign "total yield" varied from 15.10 to 65.7 kg/plant, the amplitude of variation of the sign was Am=50.60. The value of the sign "commodity yield" varied from 13.20 to 64.5 kg/h., The amplitude of variation of the sign was Am=51.30. The value of the sign "marketability" varied from 74.90 to 100.00 kg/plant, the amplitude of variation of the sign was Am=21.10. The coefficient of variation clearly shows the level of variability of the signs. The variability of all traits of yield components was significant, which indicates a significant dependence of the level of manifestation of traits on growing conditions to a greater extent.

The process of samples screening by components of yield allowed to identify genotypes that were marked by the greatest manifestation of each trait. The highest overall productivity in three years of research showed a sample of a Bochka Medy (K 108099), (6.50 kg/plant). Another 5 samples formed a total productivity of more than 6 kg: Orpheus (K 108141), (6.01 kg/plant), Lad (K 104937), (6.10 kg/plant), Minimeloni (K 108104), (6.32 kg/plants), standard sample Max plus, (6.34 kg/plants), Karapuz (K 108109), (6.43 kg/plants).

There was noted high overall productivity (5-6 kg/plants) among 13 samples-Yatum 2 (Oak) (5.00), Snezhok (K 107897), (5.14), Shapka Imperatora (K 107872), (5, 24), Shidnyi Prince (K 108120), (5.29), Sweet Diamond (K 107874), (5.46), Sweet Dakota (K 107985), (5.48), Cold (K 107884), 5.50), Atamansky (K 108114), (5.54), No. 545 (5.67), Samurai (K 107882), (5.71), Yatum 2 (Cesia) (5.75), Royal Majestic 2 (K 108146), (5.80), A-14 Tour (K 107582), (5.88).

The productivity also varied greatly depending on the genetic characteristics of the sample. The high level of marketable productivity in the conditions of Bogara formed 13 samples: Karapuz (K 108109), (6,31 kg/plants), Max plus (6,25 kg/plants), Barrel of honey, (K 108099) (6,22 kg/plants), Orpheus, (K 108141), (5.82 kg/plants), Samurai (K 107882), (5.62 kg/plants), A-14 Tour (K 107582), (5.58 kg/plants), Royal Majestic 2 (K 108146), (5.53 kg/plant), Sweet Dakota (K 107985) and Lad (K 104937), (5.43 kg/plant), Sweet Diamond (K 107874), (5, 31 kg/plant), Minimeloni, (K 108104) (5.30 kg/plant), Refined (K 108091), (5.28 kg/plant), Shidnyi Prince (K 108120), (5.02 kg/plant)). With the density of standing plants at the sowing scheme of 1.4 × 0.7 m, the potential marketable yield of these samples in production can be 50-65 t/ha.

Over three years of research, the yield of the Max Plus standard variety averaged 64.7 t/ha. Only two samples exceeded the standard in terms of the total yield-Bochka Medy (K 108099) (66.3 t/ha or ± 2.5% to the Max plus standard) and Karapuz (K 108109) (65.7 t/ha, ± 1.0% to the standard).

According to the results of the study, among the studied samples (63 samples, which is 62% of the studied), there was found a very low yield (<45.3 t/ha) relative to the standard one (Table 2).

Table 2. The monitoring of genotypes of source material on the basis of "total yield", 2018-2020.

Yield Relative To The Standard Variety	Total Yield, t/ha Lim (X_{min}…X_{max})	Number of Samples pcs.	%
Very low (less than 70% to the standard)	< 45.3	63	62
Low (70-90%)	45.3-58.2	28	28

Middle (91-110%)	58.9-71.2	10	10
High (111-130%)	71.8-84.1	-	-
Very high (more 130%)	>84.1	-	-

Low (70-90% to the standard) yield was determined in 28 samples (28%), medium (91-110%) to the Max plus standard was noted in 10 collection samples (10% of the studied ones).

The main goal in the production of watermelon products is to obtain high yields of more than 50 t/ha per bog. Therefore, it is important to know the potential of watermelon genotypes that predict their adaptability in a particular region (zone).

The yield of marketable products is an important component of production efficiency. The quality of the harvest is always affected by the number of immature, non-marketable (deformed and diseased fruits). During the years of research, there was noted relatively minor damage and damage by plants and fruits to diseases and pests, which manifested itself in the level of marketability of watermelon samples that were screened and monitored.

As a result of a three-year study, there was determined the unequal reaction of watermelon samples to weather conditions, which manifested itself in the level of yield. The highest commodity yield (>60 t/ha) was formed by 3 samples: Karapuz (K 108109) (64.3 t/ha), standard variety Max plus (63.8 t/ha) and Bochka Medy (K 108099), 5 t/ha). The high (at the level of 50-60 t/ha) total yield was noted in 14 samples: A-14 Tour (K107582) (60.0 t/ha), Royal Majestic 2 (K 108146) (59.3 t/ha), Samurai (K 107882) (58.3 t/ha), No. 545 (K 104934) (57.9 t/ha), Atamansky (K 108114) (56.5 t/ha), Kholodok (K 107884) (56.1 t/ha), Sweet Dakota (K107985) (56.0 t/ha), Sweet Diamond (K 107874) (55.7 t/ha), Shidnyi Prince (K 108120) (54.0 t/ha) ha), Rafinad (K 108091) (53.9 t/ha), Shapka Imperatora (K 107872) (53.5 t/ha), Snezhok (K 107899) (52.5 t/ha), № 9 (K 108178) (51.6 t/ha), Krasen (K 108108) (50.7 t/ha).

Commodity yield of 40.0-50.0 t/ha was formed by 25 samples, 30.0-40.0 t/ha-by 34, 20.0-30.0 t/ha-by 20 samples. Another 5 samples were low-yielding in the conditions of bogharic lands (<20 t/ha).

Since the productivity of watermelon is formed by its two main elements-the average fruit weight and the number of fruits on the plant, we studied both of these productivity parameters. One of the most important varietal characteristics that has a significant impact on yield is the average fruit weight (Table 3).

Table 3. Monitoring of genotypes of watermelon source material on the basis of "average fruit weight", 2018-2020.

Fruit by Weight	Genotype Name, No. of Registration (K), Average Fruit Weight (kg)	Percent in the General Population, %
Very small (<1.50)	6 samples: Zheltiy rannyi, (K 108105) (0.99), Zheltoe chudo, (K 108102) (1.19), Tailand No. 1, (K 108153) (1.32), Pivnichnesiaivo, (K 108127) (1.35), Leshchyna kustovaia, (K 107790) (1.36), No. 4, (K 108160) (1.45)	6
From very small to small (1.51-2.00)	33 samples: Roza Yuho-Vostoka, (K108122) (1.51), Skhidnyi prynts, (K 108120) (1.58), Marmeladniy, (K 109238), (1.60), Tender svyt oranzheviy, (K 108088) (1.61), Polosatiy bok,(K 107896), (1.62), CostaRica, (K 108177), (1.62), Yatum 2,(Symar) (1.63), Lakomiy kusochek,(K 107898), (1.67), Yarylo, (K 108124), (1.71), Bochka medu, (K 108099) (1.73), Wm 18, (K 107587), (1.76), Klondaik, (K 107886), (1.77), Yanusyk, (K 108107), (1.78), Shapka ymperatora (K 107872), (1.82), Wm 15, (K 107584), (1.83), Shustryk, (K 107906), (1.84), Spaskyi, (K 108143) (1.84), Mryia, (K 108100) (1.88), No. 6, (K 108158), (1.88), KlondikeRS57, (K 108181), (1.90), Sakharniy malysh, (K 108113) (1.91), Tiulpan, (K 108115) (1.91), Orfei, (K 108141) (1.91), Favoryt, (K 108123) (1.93), Krasen,(K 107891), (1.96), Zelenoplodniy, (K 107881) (1.98), Karapuz, (K 108109) (1.98), Binho, (K 108112) (1.99), Lunniy, (K 108093 (1.99), Ganosik, (K 108148) (1.99), Zhyzel, (K 107616) (1.99), Snezhok, (K 107899) (2.00), Astrakhanskyi, (K 107901) (2.00)	33
Small (2.01-2.50)	47 samples: Snezhok, (K 107897), (2.03), No. 545, (K 104934), (2.05), Arb. kust. Leshchyna, (K 107791), (2.05), Lezheboka medoviy, (K 108116) (2.05), Korall, (K 107875), (2.06), Khersonskye ohny, (K 109240) (2.08), Rubynovoe sertse, (K 107880), (2.09), Charivnyk, (K 107900) (2.09), Kniazhych, (K 108092), (2.10), Kakhovskyi, (K 108106) (2.10), No. 9, (K 108178) (2.10), No. 5, (K 108159) (2.11), Yarylo, (K 108098), (2.13), Semyk, (K 109208), (2.14), No. 5F, (K 104939) (2.16), Atamanskyi, (K 108114) (2.17), Wm 21 k, (K 107590), (2.18), Aliy sladkyi, (K 107902) (2.19), Asar, (K 108087) (2.20), Siurpryz, (K 108121) (2.20), Minimeloni, (K 108104) (2.20), Skarb, (K 107892) (2.21), Medovyk, (K 107873) (2.23), Sladkaia dakota, (K 107985) (2.24), Foton, (K 108097) (2.24), Volzhanyn, (K 108128) (2.24), Svitoranzh, (K 108088) (2.26), Kytai No. 6, (K108158) (2.28), Rafinad, (K 108091) (2.29), Wm16, (K 107585) (2.29), Bolshaia pekynskaia radost, (K 107876) (2.30), Borysfen, (K 108095) (2.30), Wm19 (K 107588) (2.32), Sladkyi bryly ant, (K 107874) (2.34), Medok, (K 108086) (2.35), Yasen, (K 105522) (2.37), Wm 14, (K107583) (2.37), Charlston Hrei,(K 108110) (2.37), Tayland No. 2, (K 108152) (2.39), Lypa, (K 107638) (2.39), Serkhrannyi Dyksy, (K 107883) (2.40), Yatum 2 (Tsezia), (2.42), Wm 20, (K 107589) (2.43), Kytai No. 3, (K 108161) (2.46),	45

	Maks plius, (st) (2.50), Alians, (K 108089) (2.50)	
From small to middle (2.51-3.00)	11 samples: Sontsedar, (K 107879) (2.51), Tselnolystniy, (K 107887) (2.54), Roial Madzhestyk 2, (K 108146) (2.56), A-14 Tur, (K 107582) (2.57), Lad, (K 104937) (2.60), No. 7Zx, (K 108154) (2.64), Royal Madzhestyk, (K 108144) (2.69), Kholodok, (K 107884) (2.72), Monomakh, (K 108103) (2.72), Dub, (K 104928) (2.86), Solnyshko, (K 108136) (2.99)	11
Middle (3.01-4.00)	5 samples: Samurai, (K 107882) (3.04), Wm 23, (K 107592) (3.11), Sladkyi bryllyant, (K 107874) (3.14), Foton, (K 108096) (3.16), Podarok solntsa, (K 10809) (3.99)	5
From middle to big (4.01-5.0)	-	0
Big (5.01-6.0 кг)	-	0
From big to huge (6.01-7.0)	-	0
Huge (>7.0)	-	0
In total	**101**	**100**

According to the data in the table, the vast majority of samples in the study were characterized by low fetal weight: very small (<1.5 kg)-6 samples (6% of those studied); from very small to small (1.51-2.0 kg)-33 samples (33%); small (2.01-2.50 kg)-47 samples (45%); from small to medium (2.51-3.0 kg)-11 samples (11%); medium (>3 kg)-5 samples (5%) Fruits with the weight from medium to big, big, from big to very big and very big were not identified.

The following genotypes were characterized by the greatest weight of a fruit: Samurai (K 107882) (3,04), Wm23 (K 107592) (3,11), Sladkyi bryllyant (K 107874) (3,14), Foton (K 108096) (3,16), Podarok solntsa (K 10809) (3,99). Thus, in the genofond of watermelon was studied by us small-fruited forms which weight is within very small (6%), from very small to small (33%) and small (86 samples that are 85%) weight of fruits which is equal to 0,99 prevail. -2.50 kg.

The productivity of watermelon genotypes also depends on the second quantitative indicator-the number of fruits per plant. (table 4).

Table 4. Monitoring of genotypes of watermelon source material on the basis of "average number of fruits per a plant", 2018-2020.

The Number Of Fruits per Plant, pcs.	Genotype Name, No. of Registration (K), Average Number Of Fruits Per Plant (pcs.)	Percent in the General Population, %
Very small (0.00-0.50)	-	0
Small (0.51-1.00)	16 samples: Royal Madzhestyk 2, (K 108146) (2.56), A-14 Tur, (K 107582) (2.57), Lad, (K 104937) (2.60), No. 7Zx, (K 108154) (2.64), Royal Madzhestyk, (K 108144) (2.69), Kholodok, (K 107884) (2.72), Monomakh, (K 108103) (2.72), Dub, (K 104928) (2.86), Samurai, (K 107882) (3.04), Wm 23, (K 107592) (3.11), Sladkyi bryllyant, (K 107874) (3.14), Foton, (K 108096) (3.16), Arb. kust. Leshchyna, (K 107791), (2.05), Sontsedar, (K 107879) (2.51), Solnyshko, (K 108136) (2.99), Podarok solntsa, (K 10809) (3.99)	16
From small to middle (1.01-2.00)	34 samples: Yarylo, (K 108098), (2.13), Semyk, (K 109208), (2.14), No. 5F, (K 104939) (2.16), Atamanskyi, (K 108114) (2.17), Wm 21 k, (K 107590), (2.18), Aliy sladkyi, (K 107902) (2.19), Asar, (K 108087) (2.20), Siurpryz, (K 108121) (2.20), Minimeloni, (K 108104) (2.20), Skarb, (K 107892) (2.21), Medovyk, (K 107873) (2.23), Sladkaia dakota, (K 107985) (2.24), Foton, (K 108097) (2.24), Volzhanyn, (K 108128) (2.24), Svitoranzh, (K 108088) (2.26), Kytai №6, (K108158) (2.28), Rafinad, (K 108091) (2.29), Wm16, (K 107585) (2.29), Bolshaia pekynskaia radost, (K 107876) (2.30), Borysfen, (K 108095) (2.30), Wm19 (K 107588) (2.32), Sladkyi bryly ant, (K 107874) (2.34), Medok, (K 108086) (2.35), Yasen, (K 105522) (2.37), Wm 14, (K107583) (2.37), Charlston Hrei, (K 108110) (2.37), Tayland №2, (K 108152) (2.39), Lypa, (K 107638) (2.39), Serkhrannyi Dyksy, (K 107883) (2.40), Yatum 2 (Tsezia), (2.42), Wm 20, (K 107589) (2.43), Kytai №3, (K 108161) (2.46), Maks plius, (st) (2.50), Alians, (K 108089) (2.50)	33
Middle (2.00 шт.)	18 samples: Tselnolystniy, (K 107887) (2.54), Zheltoe chudo, (K 108102) (1.19), Tailand No. 1, (K 108153) (1.32), Pivnichnesiaivo, (K 108127) (1.35), Leshchyna kustovaia, (K 107790) (1.36), No. 4, (K 108160) (1.45), Tender svyt oranzheviy, (K 108088) (1.78), Yanusyk, (K 108107) (1.61), No. 545, (K 104934), (2.05), Lezheboka medoviy, (K 108116) (2,05), Korall, (K 107875), (2.06), Khersonskye ohny, (K 109240) (2.08), Rubynovoe sertse, (K 107880), (2.09), Charivnyk, (K 107900) (2.09), Kniazhych, (K 108092), (2.10),	18

	Kakhovskyi, (K 108106) (2.10), No. 9, (K 108178) (2.10), No. 5, (K 108159) (2.11)	
From middle to big (2.01-3.00)	19 samples: Zheltiy rannyi, (K 108105) (0.99), Snezhok, (K 107897), (2.03), Roza Yuho-Vostoka, (K108122) (1.51), Skhidnyi prynts, (K 108120) (1.58), Marmeladniy, (K 109238) (1.60), Polosatiy bok, (K 107896), (1.62), CostaRica, (K 108177), (1.62), Yatum 2,(Symar) (1.63), Lakomiy kusochek, (K 107898), (1.67), Yarylo, (K 108124), (1.71), Bochka medu, (K 108099) (1.73), Wm 18, (K 107587), (1.76), Klondaik, (K 107886), (1.77), Shapka ymperatora (K 107872), (1.82), Wm 15, (K 107584), (1.83), Shustryk, (K 107906), (1.84), Spaskyi, (K 108143) (1.84), Mryia, (K 108100) (1.88), No. 6, (K 108158), (1.88),	19
Big (3.01-4.00)	14 samples: KlondikeRS57, (K 108181), (1.90), Sakharniy malysh, (K 108113) (1.91), Tiulpan, (K 108115) (1.91), Orfei, (K 108141) (1.91), Favoryt, (K 108123) (1.93), Krasen,(K 107891), (1.96), Zelenoplodniy, (K 107881) (1.98), Karapuz, (K 108109) (1.98), Binho, (K 108112) (1.99), Lunniy, (K 108093 (1.99), Ganosik, (K 108148) (1.99), Zhyzel, (K 107616) (1.99), Snezhok, (K 107899) (2.00), Astrakhanskyi, (K 107901) (2.00)	14
Huge (>4.01)	-	0
In total	**101**	**100**

According to the data from the table of monitoring of samples of source material by the number of fruits on the plant, it was found that the vast majority of studied samples were marked by the number of fruits-from small to medium (1.0-2.0 pcs.)-33% of the studied; 14% of genotypes were noted by a big (3.0-4.0 pcs.) number of fruits, a small (0.0-1.0 pcs.) number-16%, a medium (2.0) - 18% of genotypes. From medium to big (2.1-3.0 pcs.) 19% of genotypes. There was not determined a very small and very big number of fruits on the plant by the general set of genotypes. It gives a chance to define selection sources on this sign for the actual purposes of selection and modeling of new genotypes.

Conclusion

According to the results of research, 101 genotypes of watermelon in the forest-steppe of Ukraine were screened and monitored for valuable economic traits. The economic value of different genotypes was determined by a set of traits (productivity, yield, marketability, average fruit weight, number of fruits on the plant). The analysis of watermelon source material revealed significant variability (Am=Xmax-Xmin) of the main breeding traits: overall productivity-6.50, Am=5.02 kg/height, V=29.36%), commodity productivity (Lim=1.29-6.31, Am=5.02 kg/height, V=30, 56%), the average weight of the marketable fruit (Lim=0.99-3.99, Am=3.00 kg, V=21.09%), the number of fruits per plant (Lim=0.9-3.6, Am=2.7 pieces/plant, V=32.14%), total yield (Lim=15.1-65.7, Am=50.60 t/ha, V=29.33%), marketable yield (Lim=13.2-64.5, Am=51.30 t/ha, V=30.56%), marketability (Lim=74.9-100, Am=25.10%, V=23.09). We monitored the components of the share of manifestation of different levels of traits in the general set of genotypes. And on the plant "the vast majority of genotypes (33%) had a level of manifestation of the trait" from small to medium ". Sources of valuable economic traits for selection are identified: by total productivity-19, by marketable productivity-13, by yield of marketable fruits-17, by average fruit weight-5, fruit weight-5, and an average number of fruits per plant-14. The sources will be involved in the selection process for the creation of varieties and hybrids of watermelon.

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