

Article

The Number of Grains in One Ear At Different Harvest Periods of Common

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Abstract: This article studies the characteristics of changes in the number of grains per ear at different harvest times of soft winter wheat varieties. The study analyzed the process of grain formation and filling in the ear of wheat varieties, the effect of harvest time on the number of grains, and the differences between varieties. The number of grains per ear was determined based on samples selected at different harvest times and evaluated in relation to the biological characteristics of the varieties. The results of the study show that determining the optimal harvest time is of great importance in obtaining high and stable yields from soft winter wheat varieties. The data obtained are of practical importance in assessing the yield indicators of wheat varieties, improving variety selection and cultivation technology.

Keywords: winter soft wheat, variety, ear, grain number, harvest time, productivity, grain filling, morphological characters, agrotechnology, variety characteristics.

Introduction

Wheat is one of the most important grain crops in the world and is of strategic importance in providing the population with food. Obtaining high and high-quality yields, especially from soft winter wheat varieties, is an important factor in increasing the efficiency of grain production in our country.

Wheat yield depends on many morphological and biological characteristics, among which the number of grains per spike is one of the most important yield elements. The formation and filling of grains in the spike is directly related to the genetic characteristics of the variety, weather conditions, moisture and nutrition levels, as well as the harvest date [1].

Accurately determining the ripening period of the plant and harvesting at the optimal time are important for preserving grain yields. Early or late harvesting can affect the complete formation of the grain, the preservation of grains in the ear, and the final yield indicators. From this point of view, studying the number of grains per ear at different harvesting times of winter soft wheat varieties is

relevant from the point of view of determining the biological characteristics of the varieties and determining the optimal harvesting times [2].

The purpose of the study is to determine the effect of different harvest periods on the number of grains in one spike in soft winter wheat varieties and to evaluate the characteristics of this indicator change in the section of varieties.

Materials and Methods

The research was conducted on the varieties of soft winter wheat selected for the experiment. The experiment studied the growth and development of the varieties, the effect of ripening period and harvest dates on yield elements. The object of the research was soft winter wheat varieties. The experimental variants were formed according to the varieties and harvest dates [3]. Harvest deadlines of the grain cooking stages and of the plant outside morphological to the signs mainly marked. Every one from the option experience to the requirements suitable in a way random in the method plant examples was obtained [4]. By choice taken spikes in laboratory conditions analysis done, every one in the ear number of grains in hand counting in the manner was determined. Every according to one option taken information summarized and averaged indicators was calculated. One the number of grains in the ear in determining in the ear all shaped grains listed by option arithmetic mean value was determined. Received information varieties and various harvest deadlines according to compared [5]. Research statistical re-testing of the results biometric in performance and from variational statistical methods use in view eclipsed. Average Arithmetic value, standard deviation and coefficient of variation like from indicators using, being studied of the sign variability level was evaluated. Necessary in cases options between of differences reliability statistical criteria based on was identified [6].

Research during agrometeorological conditions, varieties biological characteristics and harvest deadlines to account This is taken. and one of the number of grains in the ear to the formation impact doer comprehensive assessment of factors possible gave [7].

Results

The number of grains per ear - like the length of the ear and the number of spikelets, the number of grains per ear has been found to vary under the influence of the variety characteristics and soil and climatic conditions. In our studies, it was found that the average number of grains per ear of the Yaksart variety was 45.8 grains in Kasbi district and 47.2 grains in Karshi district, while in Shakhrisabz district it was 47.8 grains, or 2 grains more than in Kasbi district and 0.6 grains more than in Karshi district (see Figure 1) [8].

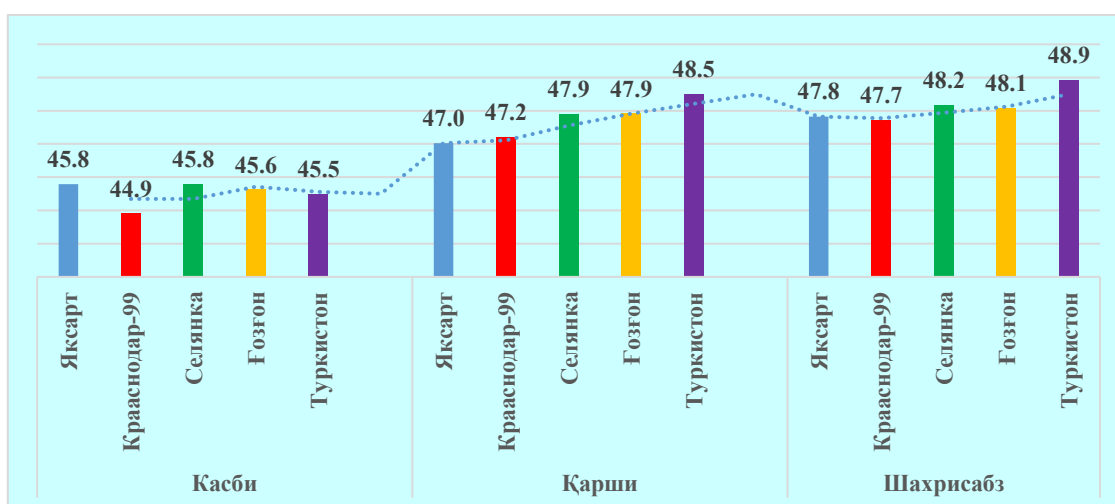


Figure 1. Changes in the number of grains in the spike under the influence of climate [9]

The average number of grains in the spike of the Krasnodarskaya-99 variety was 44.9 grains in the desert region, and it was almost the same in the desert and mountain regions, 47.2-47.7 grains. Also,

this law was observed in other varieties, and in conclusion, in the conditions of the desert region of Kashkadarya region (Kasbi district), it was proved that during the formation of the number of grains in the ear, the temperature is hot, the amount of precipitation and, accordingly, the relative humidity is low (see Table 1).[10]

Table 1. The number of grains in one ear at different harvest times of soft winter wheat varieties [11]

No	Harvest times according to grain moisture	Type	Desert area	Desert got territory	Mountain got territory
1		Jaxart	45.5	47.7	48.5
2	Harvesting in the 1st term (20-22% humidity)	Krasnodarskaya-99	45.5	47.1	48.6
3		Peasant	45.9	47.6	48.5
4		Gozgan	45.6	48.5	49.2
5		Turkestan	45.5	48.6	49.1
6		Jaxart	45.7	48.2	49.5
7	Harvesting in the 2nd term (14-16% moisture)	Krasnodarskaya-99	46.2	47.4	49.4
8		Peasant	46.8	48.6	49.6
9		Gozgan	48.1	49.6	49.4
10		Turkestan	47.7	49.5	49.7
11		Jaxart	43.0	46.1	47.7
12	Harvesting in the 3rd term (10-12% moisture)	Krasnodarskaya-99	43.2	45.5	47.2
13		Peasant	43.7	46.7	47.5
14		Gozgan	45.4	47.3	47.3
15		Turkestan	45.7	46.9	47.7
16		Jaxart	40.4	43.4	45.1
17	Harvesting in the 4th period (8-9% humidity)	Krasnodarskaya-99	39.1	41.6	44.8
18		Peasant	40.3	43.0	45.1
19		Gozgan	42.5	45.0	44.8
20		Turkestan	44.0	43.4	45.2

According to the results of our research, in the Kasbi district, when one ear of the Yaksart variety was harvested with a grain moisture content of 20-22%, the number of grains was on average 45.5 grains, and increased to 45.7 grains in the 2nd period (with a grain moisture content of 14-16%). In the third period of harvest, when the grain moisture content reached 10-12%, the number of grains in the ear decreased to 43 grains, and at a grain moisture content of 8-9%, it was 40.4 grains [12]. In the Selyanka variety (grain moisture content of 14-16%) it decreased from 46.8 grains (at 8-9% moisture) to 40.3 grains. In the Turkestan variety, the highest number of grains in the ear was observed in the 2nd period of harvest with a grain moisture content of 14-16%, and amounted to 45.5 grains. In the 4th period harvest, when the moisture content of the grain was 8-9%, it decreased to 42.9 grains. The fact that Kasbi district belongs to the desert region and the daily air temperature is 35.0 °C, the relative humidity of the air is reduced to an average of 28%, caused grain chattering and grain spillage, which in turn had an effect on grain productivity [13].

The territory of Karshi district belongs to the semi-desert region, and it is shown in Table 3.4 that the moisture content of grain decreases proportionately with the increase of air temperature, which affects the number of grains in the ear. In Krasnodarskaya-99 variety, the number of grains in one spike was 47.4 grains on average at optimal 14-16% humidity, 45.5 grains when grain moisture decreased to 10-

12%, and 41.6 grains at 8-9% moisture [14]. In the Gozgon variety, the decrease in the number of grains in the ear is less observed than in other varieties, and it was found that it was 49.6 grains at 14-16% grain moisture, 47.3 grains at 10-12% moisture, and 45.0 grains at 8-9% moisture [15].

Discussion

The results of this study demonstrate that the number of grains per ear in soft winter wheat is strongly influenced by the interaction between varietal characteristics, harvesting time, and agroclimatic conditions. Across the investigated varieties and growing regions, harvesting at a grain moisture content of 14–16% generally produced the most favorable number of grains per ear. In contrast, delaying harvest until grain moisture declined to 10–12% and particularly to 8–9% resulted in a noticeable reduction in grain number. This pattern indicates that the timing of harvest is an important agronomic factor for maintaining the yield-forming potential of winter wheat. Although the biological number of grains is largely established before physiological maturity, excessive delay in harvesting may increase field losses through grain shedding, ear damage, and exposure to unfavorable environmental conditions. Therefore, the observed reduction in recoverable grains per ear at later harvest periods can be interpreted primarily as a consequence of harvest-related losses rather than the formation of fewer grains after maturity.

The response to harvest timing also differed among varieties, indicating an important genotype-dependent effect. In Kasbi district, for example, the Yaksart variety showed 45.7 grains per ear at 14–16% grain moisture, but this value declined to 43.0 grains at 10–12% moisture and 40.4 grains at 8–9% moisture. A similar declining pattern was recorded for the other varieties when harvesting was delayed. These findings emphasize that varietal characteristics determine not only the potential number of grains formed in the spike but also the ability of the plant to retain those grains until harvest. This interpretation is consistent with the general understanding that wheat productivity is determined by the interaction between genotype, crop development, and environmental conditions, making appropriate varietal selection essential for achieving stable productivity under contrasting production environments.

The differences among locations further demonstrate the importance of agroclimatic conditions. The relatively unfavorable conditions of the desert area, represented by Kasbi district, were associated with lower grain numbers compared with the semi-desert and foothill environments. The study recorded high daily temperatures of approximately 35°C and relative humidity of about 28% in Kasbi, conditions associated with increased grain shedding and losses. High temperature and low atmospheric humidity during the later stages of crop development can accelerate grain drying and increase the susceptibility of mature spikes to mechanical and physiological losses. Consequently, harvesting operations in hotter and drier environments should be scheduled more carefully to minimize the interval between optimum maturity and actual harvest.

In Karshi district, the same relationship between declining grain moisture and reduced grain retention was evident. Krasnodarskaya-99 produced an average of 47.4 grains per ear at the optimal moisture level of 14–16%, which decreased to 45.5 grains at 10–12% moisture and 41.6 grains at 8–9% moisture. By comparison, Gozgon maintained 49.6, 47.3, and 45.0 grains per ear at the corresponding moisture levels, indicating a comparatively smaller decline. This difference suggests that Gozgon may possess greater stability in grain retention under delayed harvesting conditions. Such varietal variation is agronomically important because varieties that maintain a relatively high number of grains under declining moisture conditions may provide greater harvest flexibility and reduce the risk of yield loss when harvesting cannot be conducted at the optimum time.

The foothill conditions of Shakhrisabz were generally more favorable for grain formation and retention than the desert environment. The manuscript reports that favorable soil and climatic conditions in this region supported grain formation and filling in both the lower and upper portions of the ear. Krasnodarskaya-99, for instance, recorded 48.6 grains per ear at 20–22% moisture and increased to 49.4 grains at 14–16% moisture, whereas delayed harvesting at 8–9% moisture reduced the number by approximately 4.8 grains. Gozgon and Selyanka similarly showed high grain numbers during the optimum harvesting period, followed by reductions under lower grain-moisture conditions. These

results demonstrate that favorable environments can enhance the expression of varietal yield potential, but they do not completely eliminate losses associated with excessively delayed harvesting.

Overall, the findings indicate that a grain moisture content of approximately **14–16% represents the most favorable harvesting stage** among the evaluated treatments for maintaining a high number of grains per ear. The consistency of this pattern across several varieties and ecological zones strengthens the practical significance of harvest timing as a management decision. At the same time, the magnitude of decline after the optimum period differed among varieties and locations, confirming a genotype × environment × harvest-time interaction. From a practical perspective, wheat producers should therefore determine harvest schedules by considering both grain moisture and the adaptation characteristics of individual varieties rather than applying a uniform harvesting date across different production zones. This approach may help reduce grain shedding and field losses while preserving the yield potential and economic efficiency of soft winter wheat production.

Conclusion

The number of grains in one ear has an effect on productivity indicators and, in turn, on economic efficiency indicators. The number of grains in the spike depends on the characteristics of the variety and changes depending on the climatic conditions and harvest period. The favorable sub-mountainous soil and climate of the Shakhrisabz region also affected the number of grains in the ear, causing good formation and filling of grains in both the lower and upper parts of the ear. In the Karasnodarskaya-99 variety, the grain moisture content was 48.6 grains at 20–22%, and 49.4 grains at 14–16%, and at 8–9% moisture, the grain number decreased by 4.8 grains. This proves that the Krasnodarskaya-99 variety is favorable for cultivation in the soil and climate zones of the foothills compared to other regions, and the percentage of grain yield loss is lower. In Gozgon and Selyanka varieties, the number of grains in one spike in the optimal periods was 49.6–49.4 grains, at 10–12% moisture it was 47.2–47.3 grains, and at 8–9% moisture it was 45.1–44.8 grains, which decreased by 4.5–4.6 grains compared to the optimal moisture content.

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