Scientific basis of appropriate sowing of wheat varieties on irrigated land of Uzbekistan

M Makhammatova1*, M Ashurov1, S Tursoatov1, and A Fayzullaev2

1Tashkent State Agrarian University, 100140 Tashkent, Uzbekistan
2Kashkadarya Grain and Legume Research Institute, Karshi, Uzbekistan

Email: maxammatovamexriniso@mail.ru

Abstract. In the irrigated lands of Tashkent province, regionalized wheat varieties are usually planted at a rate of 250 kg/ha, but it would be possible to increase yields and grain quality if a scientifically based optimal sowing rate was recommended for each variety. Another opportunity to increase wheat yields in the region is the development of seed production. Numerous studies and practices have shown that it is possible to increase wheat yields by 20-25 by sowing wheat seeds. In this regard, the most pressing issue is to increase the level of seed germination. In this article, it is important to study the scientifically based sowing norms, physiological maturation of seeds, and their impact on yield and grain quality in order to take full advantage of the potential of regionalized varieties of wheat in irrigated lands. The determination of the most optimal planting norms, taking into account their biological properties, is based on research.

1. Introduction

Increasing grain production is an important factor in strengthening the economy of our country and providing the people with food. In recent years, Uzbekistan has gained grain independence, but also laid the groundwork for the export of wheat [1].
In the irrigated lands of Tashkent province, regionalized wheat varieties are usually planted at a rate of 250 kg/ha, but it would be possible to increase yields and grain quality if a scientifically based optimal sowing rate was recommended for each variety. Another opportunity to increase wheat yields in the region is the development of seed production. Numerous studies and practices have shown that it is possible to increase wheat yields by 20-25 by sowing wheat seeds. In this regard, the most pressing issue is to increase the level of seed germination [2, 3]. This is important in determining the timing of seed processing and sowing of varieties. It is important to identify. Therefore, taking into account the biological characteristics of varieties, it is necessary to study the impact of sowing norms on the physiological maturation of seeds, yield formation, grain quality in irrigated lands, and on this basis to develop practical recommendations [4].

Improving the yield of wheat and seeds in the conditions of irrigated lands of Tashkent province, the development and implementation of recommendations by determining the most optimal planting norms and taking into account the biological characteristics of varieties grown in the region [5].

An important novelty of the research is the fact that for the first time in the irrigated typical gray soils of Tashkent province, regionalized wheat varieties, growth, development, yield, grain quality depend on planting norms, biological characteristics of the variety, growing conditions, yield dependence and scientific substantiation of reduction methods [6, 7].

In the soil and climatic conditions of this region, depending on the biological characteristics of 8 regionalized soft wheat varieties, the most optimal sowing rate has been scientifically determined. It is scientifically based on the physiological maturation period of seeds of these varieties and ways to reduce it [8].

The laws identified as a result of the study have a specific practical significance. The obtained results proved that it is possible to further increase the overall yield and improve grain quality by applying the most optimal sowing standards in the irrigated lands of Tashkent province with gray soils [9, 10]. It was recommended to produce Kroshka, Sanzar-8, Umanka, and Kupava wheat varieties with the highest quality grain yield and high efficiency. Ways to increase the fertility of wheat seeds, reduce the physiological maturation period were recommended to farms engaged in seed production.

2. Materials and Methods

Field and laboratory experiments were conducted at the Department of Genetics, Selection and Seed Production of Agricultural Crops of Tashkent.
Table 1. Experimental scheme

| Varieties      | Sowing rate, in millions of seeds (kg/ha) |
|---------------|------------------------------------------|
| Sanzar-8      | 3-(130)                                  |
|               | 4-(168)                                  |
|               | 5-(200)                                  |
|               | 6-(230)                                  |
| Fertile wheat | 3-(127)                                  |
|               | 4-(165)                                  |
|               | 5-(200)                                  |
|               | 6-(234)                                  |
| Kroshka       | 3-(116)                                  |
|               | 4-(152)                                  |
|               | 5-(186)                                  |
|               | 6-(217)                                  |
| Umanka        | 3-(117)                                  |
|               | 4-(154)                                  |
|               | 5-(184)                                  |
|               | 6-(212)                                  |
| Polovchanka   | 3-(120)                                  |
|               | 4-(156)                                  |
|               | 5-(187)                                  |
|               | 6-(211)                                  |
| Kupava        | 3-(120)                                  |
|               | 4-(156)                                  |
|               | 5-(190)                                  |
|               | 6-(218)                                  |
| Demetra       | 3-(115)                                  |
|               | 4-(150)                                  |
|               | 5-(180)                                  |
|               | 6-(211)                                  |
| Knyazhna      | 3-(114)                                  |
|               | 4-(148)                                  |
|               | 5-(178)                                  |
|               | 6-(209)                                  |

State Agrarian University in Tashkent, Uzbekistan, according to the method of the State Commission for Variety Testing of Agricultural Crops.

In the first experiment, the planting norms of regionalized soft wheat varieties were studied and included the following tasks:

- germination of seeds in laboratory and field conditions;
- duration of the vegetation period of plants;
- resistance of wheat varieties to sedimentation;
- disease resistance of wheat varieties;
- yield elements of wheat varieties;
• yield of conditioned seeds by wheat varieties;
• yield of wheat varieties, grain quality and cost-effectiveness indicators were studied.

The seeds were stored in a warehouse that met the requirements of state standards. The protein and gluten content in the grain, the quality indicators of the grain were determined.

Field experiments were performed in four tiers, with the size of the plots to be taken into account, 50 m², in two tiers.

In the production test, the most optimal sowing norms were applied to 8 wheat varieties, which were planted on October 10 with S3-3.6 seeders, 15 cm between rows, 4-5 cm deep. The calculation area of each wheat variety is 1 hectare.

In field experiments, ammonium nitrate (34%), superphosphate (20%), and potassium salt (40%) were used. Phenological observations and biometric measurements were carried out according to the method of the State Commission for Variety Testing of Varieties of Agricultural Crops in Model Plants.

Model plants - germination of seeds of wheat varieties sown on odd variants on 1 m² permanent plots, plant thickness was determined. The plant height, number of productive branches, number of grains in the spike, and weight were determined in 100 model plants taken from the marked plots under laboratory conditions (Table 1).

Seed germination was determined at 20 °C in a thermostat and continued until 95% germination was achieved. From the quality indicators of grains of wheat varieties, the amount of gluten was determined by the method of Centrifuge GOST-13586-1-68, the amount of protein by the method of Keldal, seed germination by GOST-10467-76, weight of 1000 seeds by the method of GOST-135861-68 [11].

The variance analysis of the obtained data on productivity was determined on the basis of B.A. Dospekhov and economic efficiency F.A. Yudin methods [12, 13].

In the fall, the experimental fields were irrigated at a rate of 1000 mZ/ha before plowing. After sowing, the soil was plowed to a depth of 30-35 cm with a plow SN-4-35-A harrow (preduplujnik). It was then chiseled with a ChKU-chisel cultivator and leveled with a break. Phosphorus (P₉₀ kg/ha) and potassium fertilizers (K₉₀ kg/ha) were applied at full rate before plowing, nitrogen fertilizers (N₁₈₀ kg/ha) were applied in early spring (50%), accumulation and tillage (50%) phases. Varieties were sown on October 10-20 with a seeder C 3-3.6 with row spacing of 15 cm and a depth of 4-5 cm. During the growing
season, irrigation was carried out at the rate of 700 m$^3$/ha in the phases of harvesting (March), tubing (April), threshing (May) and grain formation. Soil moisture was maintained at a rate of not less than 70% of the field moisture capacity.

3. Results and Discussion
Influence of sowing norms on growth and development of wheat varieties. Field germination of seeds. The degree of germination of seeds and grasses in obtaining high yields from wheat varieties

The study of thickness is an important measure. According to such experiments [10-14], the effect of sowing norms on the field germination of wheat seeds is less dependent on the field germination of seeds than laboratory germination. This situation was also found in our experiment (Table 2).

| Varieties      | Laboratory germination of seeds, % | Number of sprouted grasses per 1 m$^2$, pcs | Field fertility, % | Number of sprouted grasses per 1 m$^2$, pcs | Field fertility, % | Number of sprouted grasses per 1 m$^2$, pcs | Field fertility, % | Number of sprouted grasses per 1 m$^2$, pcs | Field fertility, % | Number of sprouted grasses per 1 m$^2$, pcs | Field fertility, % |
|----------------|-----------------------------------|---------------------------------------------|-------------------|---------------------------------------------|-------------------|---------------------------------------------|-------------------|---------------------------------------------|-------------------|---------------------------------------------|-------------------|
| Sanzar-8       | 96.3                              | 270.9                                       | 90.3              | 352.0                                       | 88.0              | 429.5                                       | 85.9              | 506.4                                       | 84.4              |
| Fertile wheat  | 97.8                              | 273.6                                       | 91.2              | 354.8                                       | 88.7              | 432.5                                       | 86.5              | 508.8                                       | 84.8              |
| Kroshka        | 98.3                              | 270.0                                       | 90.0              | 351.2                                       | 87.8              | 429.5                                       | 85.9              | 502.8                                       | 83.8              |
| Umanka         | 97.6                              | 272.1                                       | 90.7              | 353.2                                       | 88.3              | 431.5                                       | 86.3              | 508.2                                       | 84.7              |
| Polovchanka    | 97.3                              | 266.4                                       | 88.8              | 346.4                                       | 86.6              | 424.0                                       | 84.8              | 498.6                                       | 83.1              |
| Kupava         | 97.1                              | 266.7                                       | 88.9              | 346.8                                       | 86.7              | 423.5                                       | 84.7              | 499.2                                       | 83.2              |
| Demetra        | 97.0                              | 265.8                                       | 88.6              | 346.0                                       | 86.5              | 422.0                                       | 84.4              | 496.8                                       | 82.8              |
| Knyazhna       | 97.0                              | 268.5                                       | 89.5              | 348.8                                       | 87.2              | 425.5                                       | 85.1              | 501.0                                       | 83.5              |

Laboratory data show that the seeds of wheat varieties have a high degree of germination. This figure changed from 96.3% (Sanzar-8) to 98.3% (Kroshka). According to the results of our field experiments, it was observed that in 8 wheat varieties studied, the field germination of seeds decreased as the sowing rate increased. Field fertility varied sharply across cultivars studied under the influence of planting norms. The highest results were observed in the Fertile wheat variety of wheat - 91.2% when sown at the rate of 3 million seeds per
hectare, 88.7% at 4 million seeds, 86.5% at 5 million seeds and 6 million seeds per hectare. For all varieties, the highest seed germination rate was 3 million and the lowest germination rate was 6 million seeds.

Table 3. Influence of sowing norm on biological and valuable economic characteristics of wheat

| Varieties | Optimal for the rate of one million germinated seeds per 1 m² | Duration of the growing season, days | Number of productive stems, pcs M⁻¹ m⁻¹ | Number of plants stored before harvesting, pcs m⁻² | Number of grain per spike, g M⁻¹ m⁻¹ | Plant height, cm M⁻¹ m⁻¹ | Weight of 1000 grains, g M⁻¹ m⁻¹ | Grain weight in 1000 g, g M⁻¹ m⁻¹ |
|-----------|-------------------------------------------------------------|-------------------------------------|------------------------------------------|-------------------------------------------|----------------------------------|------------------------|-----------------------------|--------------------------------|
|           | Options for the rate of one million germinated seeds per 1 m² | Duration of the growing season, days M⁻¹ m⁻¹ | Number of productive stems, pcs M⁻¹ m⁻¹ | Number of plants stored before harvesting, pcs m⁻² | Number of grain per spike, g M⁻¹ m⁻¹ | Plant height, cm M⁻¹ m⁻¹ | Weight of 1000 grains, g M⁻¹ m⁻¹ | Grain weight in 1000 g, g M⁻¹ m⁻¹ |
| Sanzar-8  | 3 215±2.5 207±4.7 69.0±1.1 2.70±0.4 102.0±4.1 50.0±2.3 2.03±0.1 43.3±2.1 |
|           | 4 214±1.8 204±3.8 66.1±1.1 2.48±0.6 103.6±3.8 48.0±1.8 1.92±0.2 42.1±2.4 |
|           | 5 213±2.3 302±5.9 61.0±0.9 2.22±0.3 105.1±4.4 45.3±1.4 1.80±0.2 40.0±1.7 |
|           | 6 211±1.9 324±5.1 54.0±1.9 1.94±0.1 107.2±3.9 44.0±2.2 1.65±0.3 38.2±1.1 |
| Fertile   | 3 217±2.7 205±4.3 68.2±2.1 2.73±0.3 104.1±4.1 54.1±1.4 1.90±0.6 42.2±2.3 |
| wheat     | 4 215±2.9 260±6.1 65.0±1.9 2.60±0.7 106.0±3.6 52.8±2.3 1.72±0.4 41.3±2.6 |
|           | 5 214±2.4 297±4.8 59.4±2.7 2.36±0.4 107.9±2.9 50.2±3.7 1.49±0.7 40.0±1.9 |
| Kroshka   | 3 220±3.4 217±2.8 72.5±1.9 2.61±0.4 95.8±1.7 46.7±2.4 2.05±0.6 38.5±1.5 |
|           | 4 219±2.8 277±2.0 69.3±2.2 2.38±0.1 98.0±1.6 45.0±2.1 1.9±0.4 38.0±1.9 |
|           | 5 218±2.4 310±5.0 62.0±1.9 2.14±0.6 99.5±1.9 43.4±2.4 1.80±0.7 37.2±1.8 |
|           | 6 217±2.2 340±4.8 56.7±0.8 1.97±0.2 101.9±2.0 42.1±2.0 1.70±0.8 36.1±1.4 |
| Umanak    | 3 224±2.0 219±2.2 73.0±2.6 2.75±0.5 104.0±2.6 52.1±3.7 2.09±0.7 39.0±1.5 |
|           | 4 226±1.9 281±3.4 70.2±2.7 2.56±0.4 105.8±2.2 50.8±2.9 1.94±0.3 38.6±1.3 |
|           | 5 225±2.1 322±3.1 64.5±2.1 2.31±0.3 107.7±2.5 48.2±2.6 1.73±0.4 38.8±1.2 |
|           | 6 223±3.0 350±4.9 58.4±1.8 2.05±0.7 110.0±2.7 45.8±2.0 1.64±0.3 35.3±1.1 |
| Polovce   | 3 228±3.1 224±1.7 74.7±1.7 2.53±0.1 100.0±4.6 49.0±2.6 2.07±0.9 40.1±2.3 |
| hanka     | 4 227±3.0 284±2.9 71.0±1.1 2.27±0.4 102.2±3.7 47.5±2.2 1.93±0.9 39.0±1.9 |
|           | 5 226±2.8 327±3.3 65.5±1.3 2.03±0.7 105.1±2.5 45.1±1.9 1.7±0.5 37.4±1.7 |
|           | 6 225±2.4 360±4.6 60.0±1.0 1.80±0.2 107.2±3.0 44.0±2.8 1.65±0.4 35.2±2.4 |
| Kupav     | 3 226±2.9 218±2.7 72.8±2.7 2.60±0.6 101.5±3.1 49.7±3.0 2.13±0.3 40.0±1.8 |
|           | 4 224±2.2 280±3.6 70.1±1.9 2.39±0.5 103.1±2.7 48.0±2.7 1.97±0.4 39.1±2.0 |
|           | 5 223±2.3 324±3.4 64.9±1.3 2.14±0.3 105.0±3.1 46.2±3.0 1.75±0.5 38.0±1.9 |
|           | 6 221±2.1 347±3.8 57.8±1.1 1.90±0.3 107.2±3.3 44.3±2.4 1.66±0.2 36.3±1.1 |
| Demetr    | 3 224±2.5 222±1.5 73.5±2.4 2.62±0.4 102.3±3.6 50.3±3.6 2.06±0.4 38.3±2.0 |
|           | 4 223±1.9 284±2.7 71.0±2.2 2.43±0.5 104.5±2.6 50.0±4.8 1.83±0.4 37.4±2.1 |
|           | 5 221±1.5 325±5.4 65.0±1.1 2.17±0.4 106.3±1.7 48.4±4.1 1.65±0.3 36.1±1.9 |
|           | 6 220±2.4 352±4.7 58.7±1.0 1.95±0.1 108.1±2.9 47.1±3.6 1.48±0.5 35.2±1.6 |
| Kayaz     | 3 226±2.6 222±2.2 74.1±2.3 2.58±0.4 102.0±4.0 53.0±3.5 2.01±0.7 38.1±1.1 |
| hna       | 4 225±2.4 285±3.7 71.2±2.2 2.36±0.3 103.7±3.1 51.2±2.9 1.82±0.2 37.0±1.8 |
|           | 5 223±1.7 327±3.2 65.4±1.4 2.22±0.6 106.0±3.8 49.4±3.1 1.58±0.4 35.7±1.0 |
|           | 6 221±1.8 254±1.7 59.0±0.9 1.98±0.2 107.8±3.1 48.5±2.8 1.50±0.5 34.8±1.4 |
For example, in the case of high-yielding wheat varieties, the difference was 6.4%. Such a pattern was rarely observed in bonga varieties. Thus, in the conditions of irrigated lands of Tashkent province, the highest level of field germination of seeds of soft wheat varieties was identified at 3 million per hectare and the lowest at 6 million seeds per hectare.

Many researchers have commented that the duration of the vegetation of wheat depends on the heredity of the variety, light, temperature, soil and air humidity, disease and pest infestation, nutritional level, planting time and norm [5].

As a result of our research, it was found that sowing norms influenced the duration of the growing season of wheat varieties (Table 3). With the increase in planting norms, the duration of the growing season was shortened. For example, when the Kroshka variety of wheat was sown with 3 million seeds per hectare, the vegetation period was 220 days, while when 4 million seeds were sown, it was 219 days; it changed to 218 days when 5 million were planted and 217 days when 6 million were planted. So, in the variants where 3 million and 6 million seeds were sown, the difference was 3 days.

In general, in all varieties studied in the irrigated lands of Tashkent province, the duration of the growing season was the longest when sown at the rate of 3 million germinated seeds, and its shortening was observed with increasing sowing rates.

Thus, in the conditions of irrigated lands of Tashkent province, the norms of sowing affect the duration of the growing season of soft wheat varieties, and as they increase, the duration of the growing season decreases.

The data from our experiment show that sowing norms affect the number of grains in the spike. A large number of grains in the ear were recorded in the Fertile Wheat variety. According to the options, the number of grains in the cob is 54.1 when 3 million seeds are sown; 52.8 when 4 million seeds were sown; 50.2 when 5 million seeds are sown; When 6 million grains were sown, it was 48.9 grains, and a decrease was found as the sowing norms increased. The same pattern was observed in other varieties.

Thus, in the conditions of irrigated lands of Tashkent province, it was noted that soft wheat has the highest number of grains in the sprout of the Fertile wheat variety. With the increase in sowing norms, a decrease in the number of grains in the grain was detected in the wheat varieties studied.

In our experience, Kroshka, Umanka, Kupava, Demetra, Polovchanka, Knyazhna varieties of wheat created in Krasnodar Krai were superior to Unumudy wheat and Sanzar-8 varieties created in the republic in terms of grain weight. The highest result was recorded in the Kupava variety of wheat. Wheat weighs 2.13 g per hectare of Kopava variety, 1.97 g per 4 million seeds, 1.75 g
per 5 million seeds and 1.66 g per 6 million seeds per hectare when 3 million seeds are sown per hectare and a decrease in the weight of the grains in the head was detected with an increase in the sowing rate. The same pattern was observed in other varieties. Thus, in the conditions of irrigated lands of Tashkent province, wheat varieties created in Krasnodar Krai (Kroshka, Umanka, Kopava, Demegra, Polovchana, Knyazhna) gave higher results in terms of grain weight than Sanzar-8 and Fertile wheat varieties. With the increase in the sowing rate, a decrease in the weight of the grains in the head was detected. In hot and dry climates of the Republic of Uzbekistan, wheat weighs 1000 grains, grain size, and ripeness and plays an important role in the formation of high yields (Karshieva, 2001). and Fertile wheat varieties were significantly superior to those developed in Krasnodar Krai, especially in the Sanzar-8 variety with a weight of 43.3 g per 1000 grains in the variant where 3 million seeds were sown per hectare; 42.1 g per 4 million units planted; 40.0 g per 5 million seedlings; When 6 million seeds were planted, it was 38.2 g. The data presented show that the weight of 1000 grains of Sanzar-8 variety is significantly higher than other varieties studied in another experiment. The largest grains were identified when 3 million seeds were sown per hectare in the studied wheat varieties. As the sowing rate increased, the weight of 1000 grains decreased. For example, in the Sanzar-8 variety, the decrease in variants was as follows: 1.2; 2.1 and 1.8 g.

In our experiment, the average grain yield of wheat according to sowing norms and varieties was 45.5 - 63.4 quintals (q)/ha. The effect of sowing rate on wheat varieties was different. The highest grain yield of Sanzar-8 wheat was 57.7 tons/ha when 3 million seeds were sown per hectare. Planting norm 4; 5; Yield 4.1 with an increase of 6 million units; 4.6; and decreased by 3.5 quintals. The highest yield of high-yielding wheat variety was recorded at the rate of 4 million seeds per 58.3 thousand hectares. Yields decreased by 3.2 quintals at 3 million and 3.9, 4.4 quintals at 5-6 million.

In Krasnodar Krai, a large difference in the yield between varieties was found (46.1 q/ha - Knyazhna variety, 63.4 q/ha - Kopava variety). The yield was obtained by sowing 5 million seeds per hectare. Decrease in productivity was observed when it fell below the norm (3.4 million tons) or increased (6 million tons).

Thus, in the irrigated lands of Tashkent province, 3 million grains of soft wheat of Sanzar-8 variety were sown per hectare, 4 million grains of fertile wheat, 5 million grains of Kroshka, Umanka, Polovchanka, Kopava, Demetra, and Knyazhna. Exceeding or decreasing the optimal sowing rate also led to a decrease in grain yield (Table 4).
### Table 4. Yield of winter wheat varieties

| Varieties     | Options (at the rate of 1 ha/million seeds) | Productivity q/ha | Average |  |
|--------------|---------------------------------------------|-------------------|---------|-
|              |                                             | First year        | Second year | Third year |  |
|              |                                             | 1                 | 2        | 3          | 4          | 5     | 6     |-
| Sanzar-8     |                                             | 3                 | 4        | 5          | 6          | 7     | 8     | 9     | 10    |-
|              |                                             | 63.3              | 52.8     | 57.0       | 57.7       |       |       |       |       |-
|              |                                             | 57.6              | 49.3     | 54.1       | 53.6       |       |       |       |       |-
|              |                                             | 52.6              | 45.6     | 49.4       | 49.0       |       |       |       |       |-
|              |                                             | 49.6              | 42.4     | 44.8       | 44.5       |       |       |       |       |-
| Fertile wheat|                                             | 59.6              | 51.2     | 54.5       | 55.1       |       |       |       |       |-
|              |                                             | 61.2              | 55.4     | 58.2       | 58.3       |       |       |       |       |-
|              |                                             | 57.2              | 51.9     | 54.1       | 54.4       |       |       |       |       |-
|              |                                             | 53.4              | 46.4     | 50.2       | 50.0       |       |       |       |       |-
| Kroshka      |                                             | 50.9              | 44.6     | 47.6       | 47.7       |       |       |       |       |-
|              |                                             | 54.7              | 47.7     | 51.1       | 52.5       |       |       |       |       |-
|              |                                             | 63.5              | 56.8     | 59.7       | 60.0       |       |       |       |       |-
|              |                                             | 59.5              | 53.3     | 57.0       | 56.6       |       |       |       |       |-
| Umanka       |                                             | 55.6              | 49.7     | 51.0       | 51.1       |       |       |       |       |-
|              |                                             | 58.7              | 51.5     | 54.8       | 55.0       |       |       |       |       |-
|              |                                             | 65.4              | 57.9     | 61.2       | 61.5       |       |       |       |       |-
|              |                                             | 60.0              | 55.3     | 56.3       | 57.2       |       |       |       |       |-
| Polovchanka  |                                             | 50.5              | 43.0     | 47.2       | 46.9       |       |       |       |       |-
|              |                                             | 55.8              | 48.9     | 53.4       | 52.7       |       |       |       |       |-
|              |                                             | 62.9              | 55.5     | 58.6       | 59.0       |       |       |       |       |-
|              |                                             | 59.7              | 51.4     | 56.3       | 55.8       |       |       |       |       |-
| Kupava       |                                             | 54.2              | 46.6     | 51.0       | 50.6       |       |       |       |       |-
|              |                                             | 57.5              | 49.8     | 54.7       | 54.0       |       |       |       |       |-
|              |                                             | 67.0              | 59.1     | 64.1       | 63.4       |       |       |       |       |-
|              |                                             | 60.5              | 54.5     | 59.3       | 58.1       |       |       |       |       |-
| Demetra      |                                             | 51.2              | 42.8     | 46.1       | 46.7       |       |       |       |       |-
|              |                                             | 54.0              | 47.4     | 51.3       | 50.9       |       |       |       |       |-
|              |                                             | 61.5              | 55.0     | 58.7       | 58.4       |       |       |       |       |-
|              |                                             | 56.0              | 51.6     | 54.4       | 54.0       |       |       |       |       |-
| Knyazhna     |                                             | 50.3              | 42.8     | 45.2       | 46.1       |       |       |       |       |-
|              |                                             | 53.4              | 46.8     | 51.0       | 50.4       |       |       |       |       |-
|              |                                             | 61.3              | 53.9     | 58.2       | 57.8       |       |       |       |       |-
|              |                                             | 56.4              | 49.5     | 54.0       | 53.3       |       |       |       |       |-

### Table 5. Influence of sowing rate on conditioned seeds of wheat varieties.

| Varieties     | Options at the expense of forgetful seeds (1 ha/mln) | Amount of conditioned seed germination |  |
|--------------|---------------------------------------------------|---------------------------------------|-
|              |                                                   | First year | Second year | Third year | Average |  |
|              |                                                   | q/ha       | %           | q/ha       | %           | q/ha       | %           | q/ha       | %           |-
|              |                                                   | 1          | 2           | 3          | 4           | 5          | 6           | 7          | 8           | 9          | 10         |-
| Sanzar-8     |                                                   | 2          | 3           | 4          | 5           | 6          | 7           | 8          | 9           | 10         | 11         |
| Varieties | Options at the expense of forgetful seeds (1 l/m) | Amount of conditioned seed germination |
|-----------|-----------------------------------------------|--------------------------------------|
|           | Protein content, %                           | Gluten content, %                    |
|           | First year | Second year | Third year | Average | First year | Second year | Third year | Average |
| 1         |            |             |            |         |            |             |            |         |
| Sanzar-8  | 14.0       | 15.1        | 14.5       | 14.5    | 28.2       | 29.2        | 28.8       | 28.7    |
| Fertile wheat | 12.2      | 13.3        | 12.7       | 12.7    | 27.1       | 28.1        | 27.6       | 27.4    |
Sowing of pure and high-quality seeds of regionalized varieties in production increases wheat yield by 15-25% [2]. Therefore, it is advisable to sow conditioned seeds that meet the established requirements for sowing qualities. In our experiment, we observed that sowing norms affect the conditioned seed yield of wheat varieties. It was noted that there is a big difference in the yield of conditioned seeds by varieties. The highest yield of conditioned seeds was found in wheat varieties Kroshka (84.4%) and Kupava (84.3%). As the sowing rate increased, the yield of conditioned seeds decreased. For example, when 3 million seeds of wheat were sown per hectare, the yield of conditioned seeds was 84.4%, 4 million seeds were 83.3%, 5 million seeds were 81.2%, and 6 million seeds were 76.4% and decreased by 1.1, 2.1 and 4.8%, respectively. The same pattern has been observed in other varieties. However, the most conditioned seed yield should be summarized from the data obtained in our experiment for each wheat variety. Sanzar-8 has the highest yield of conditioned seeds when sown at the expense of 3 million seeds per hectare of fertile wheat
varieties, 5 million seeds per hectare of Kroshka, Umanka, Kopava, Demetra, Polovchanka, and Knyazhna varieties. 

Thus, in the conditions of irrigated lands of Tashkent province, when the effect of sowing norms on conditioned seed yield of wheat varieties is observed, the highest conditioned seed yield is observed when Sanzar-8 variety of wheat is sown with 3 million germinated seeds, 4 million germinated seeds per hectare. Umanka, Polovchanka, Demetra, Kupava and Knyazhna varieties were sown with 5 million seeds (Table 5).

The quality of wheat depends on the characteristics of the variety, agronomic techniques, harvesting, storage and processing conditions of the grain. The higher the content of protein and gluten in wheat grains, the higher the quality of bread. Many researchers have noted that high yields are obtained from wheat when optimal planting norms are applied, and that the amount of protein and gluten in the grain is highly dependent.

In our experiment, the amount of protein and gluten in the grain varies depending on the characteristics of the varieties and planting norms. The highest amounts of protein and gluten were found in the grains of soft wheat varieties Kroshka (14.0 and 30.2%), Umanka (13.8 and 29.7%) and Sanzar-8 (15.1 and 29.1) (Table 5).

When the effect of the increase in sowing rates on protein and gluten content was studied, when 3 million seeds of wheat were sown per hectare in Kroshka variety, the protein content was 13.3-14.0% and gluten was 29.0-30.2%. It was noted that the amount of protein and gluten decreased with the increase of sowing norms. A similar pattern was observed in other studied varieties. Thus, in the conditions of irrigated lands of Tashkent province, high-quality grain (protein and gluten content) is formed in Kroshka and Umanka varieties of soft wheat. As the sowing rate increases, the amount of protein and gluten decreases.

4. Conclusions

1. The effect of seed quality and sowing rate of misted soft wheat on plant growth duration, development and yield was determined.
2. Increasing the sowing rate from 114-130 kg to 209-230 kg per hectare shortened the growing period of the studied soft wheat varieties by 3 days and accelerated the ripening of the crop.
3. Due to the increase in sowing rate, the field germination of seeds decreases, the plant height increases, the grain weight per 1000 grains and one grain decreases.
4. It was found that the yield of conditioned seeds depends on the genetic structure of the studied varieties and the sowing rate.
5. The optimum sowing rate of wheat in Kroshka, Umanka, Polovchanka, Kopava, Demetra, Knyazhna varieties in typical gray irrigated lands of Tashkent province is 5 million Sanzar-8 3 million, the highest yield is 4 million in U-variety.

6. The amount of protein and gluten by varieties was 14 and 30.2% in Kroshka, 13.8 and 29.7% in Umanka, 15.1 and 29.1% in Sanzar-8, and their content decreased with the increase of sowing norms.

7. In areas with high agronomic practices (N80P90K60) and crop rotation, the physiological maturity of wheat harvested during the full ripening phase was reduced by 30 days compared to sowing (N150P45) and late-harvested varieties used in production.

We gave also our recommendations below:

1. Kroshka (186 kg), Umanka (184 kg), Kopava (190 kg), Demetra (180 kg), Polovchanka (187 kg), Knyazhna, it is recommended to sow (178 kg) varieties at the rate of 5 million per hectare, Fertile wheat 4 million, (165 kg) Sanzar-8 3 million, (130 kg) seeds.

2. Seed farms are recommended to harvest wheat seeds no later than after full ripening, introducing high agronomic techniques, adhering to alternating sowing to reduce the physiological maturation period of wheat seeds to 30 days.

References
[1] Amanov A, Urinboev T, Siddikov R 2013 *Wheat of Uzbekistan* 4 25.
[2] Isaev S, Khasanov S, Ashirov Y, Karabaeva T, Gofirov A 2021 *E3S Web of Conferences* 244 02012.
[3] Isaev S, Khasanov S, Ashirov Y, Gofirov A, Karabaeva T 2021 *E3S Web of Conferences* 244 02047.
[4] Kulmatov R, Mirzaev J, Abuduwalli J, Karimov B 2020 *Journal of Arid Land* 12(1) 90-103.
[5] Khalilov N 2002 *J. Agriculture of Uzbekistan* 5 27-28.
[6] Emets VM, Kulmatov RA 1983 *Doklady Biological Sciences* 271(1-6) 370-372.
[7] Kulmatov RA, Kist AA 1978 *IND. LAB* 44(12) 1689-1692.
[8] Abdullaev B, Kulmatov RA, Kist AA 1989 *Industrial Laboratory (USSR)* 54(7) 710-713.
[9] Savenko VS, Kulmatov RA 1997 *Geochemistry International* 35(11) 1028-1030.
[10] Namozov NCh, Kidirova DA, Usmonova MI 2020 *International journal of scientific & technology research* 9(03) 5491-5493.
[11] Urmanova M, Kuziev A, Burkhanova D, Kadiova D, Namozov N, Shadieva N 2021 E3S Web of Conferences 244 02036.
[12] Islamov S, Namozov N, Saidova M, Kadiova D 2021 E3S Web of Conferences 244 03028.
[13] Namozov N, Tursinbaev M, Yuldashev I, Yuldasheva S 2021 E3S Web of Conferences 244 02007.
[14] Karimov M, Namozov N, Teshaboev B 2021 E3S Web of Conferences 244 02025.