International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 12s,2025
https://theaspd.com/index.php

Growing Onions (Allium Cepa L.) By Seedlings At Repeated Sowing Period In Uzbekistan Conditions

[1]Mirzaosimjon Mirzasoliyev, [2] Ravza Mavlyanova, [3]Shakhnoza Aripova, [4]Rustam Nizomov, [5]Shokirov Alisher, [6]Khakimov Rafikjon, [7]Rakhmatov Anvar, [8]Lapasov Sayfiddin, [9]Alimukhamedov Saidmurat, [10]Mamatov Kamol

[1]PhD., Senior researcher, Head of the Seed production and seed science of vegetables and melon crops laboratory, orcid.org/0009-0000-2138-4689, mirzasoliyevmirzaosimjon@gmail.com

[2]DSc., Professor, Head of the Vegetable, Melon Crops and Potato Genebank Laboratory, orcid.org/0009-0008-9035-1969, mavlyanova.ravza@gmail.com

[3]PhD., Senior researcher, Head of the Breeding and introduction of non-traditional crops laboratory, Research Institute of Vegetable, Melon crops and Potato,0000-0002-8711-2632, aripovashakhnoza@gmail.com

[6]https:// orsid.org/ 0009-0004-6760-2644 xakimovrafiq@gmail.com

[4]DSc., Professor, Director of the Research Institute of Vegetable, Melon crops and Potato

[5]DSc., Professor, Advisor to the Director of the Institute

[6]Candidate of Agricultural Sciences, Senior researcher, Head of the Laboratory of Genetics and Breeding of Melon Crops, org/ 0009-0004-6760-2644, xakimovrafiq@gmail.com

[7]DSc., Senior researcher, Head of the Laboratory of Product Storage and Primary Processing Technologies

[8]PhD., Senior researcher, Head of the Laboratory of Genetics, Breeding and Seed Production of Potatoes, org/ 0009-0009-0959-0522, sayfiddin0120@gmail.com

[9]Candidate of Agricultural Sciences, Senior researcher, Head of the Organic farming

[10]Candidate of Agricultural Sciences, Senior researcher, Head of the Greenhouse agrotechnology

Abstract

In this article article provides information on the study of seven onion varieties and hybrids when grown by the seedling method in repeated culture. Field germination of onion seeds is high – 94,3-92,7% in varieties and hybrids Pespazak, Banko F1, Daytona F1, Yellow Spanish and Ispanskiy 313. It was found that 12-13 days after full sprouts the first, 3-4 leaves are formed 18-22 days after the formation of the first leaf. Before planting determine the number of true leaves - 4.1-3.1, pieces, the length of the large leaf – 17,9-28,1 cm, leaf diameter – 4,8-6,5 mm, the average weight of seedlings – 5,4-8,9 g. It was found that hybrids Daytona F1, Banko F1 and Istikbol yielded 51-70% more than the Karatalskiy (standard) variety and was higher than all other varieties. The average weight of marketable bulbs of this variety and hybrids was 10-21 g higher than that of the control variety. The number of mature bulbs in the marketable yield is 85,6% in Daytona F1, 60,4% in Banko F1 and 63,9% in Istikbol variety, and their average weight increased to 26,0 g from 18,0 g.

Keywords: *onion, variety, hybrid, seed, germination, seedling, planting date, planting scheme, plant, yield.*

INTRODUCTION

Onion is one of the important crops for the nutrition of the population and is used throughout the year. When grown in Uzbekistan, bulbs accumulate 13-20% dry matter, 3,5-4,5% protein, 0,6-1,1% mineral salts and vitamins A, B, B_1 B_2, C, and PP. The leaves of green onions contain up to 95 mg/% ascorbic acid and 3,75 mg/% carotene. Onion varieties contain phytoncides with strong bactericidal action [1].

At present, the area of onion cultivation in Uzbekistan is more than 36 thousand hectares, gross yield is 1 million 464 thousand tons. The average yield of onions is 25,6 tons/ha.

The onion crop is sold locally and exported to neighboring countries. In Central Asia, the climatic conditions are suitable for onion cultivation. Since ancient times, onions have been grown here in the traditional way, i.e. by sowing seeds in the open ground. The need to increase onion production to fully meet the needs of the population of Uzbekistan and increase onion exports during the transition to a market economy is a requirement of the time. At present, the increase in onion production cannot be achieved through the expansion of areas, as irrigated agriculture is limited. One of the resources to increase onion production is its cultivation as a second crop on irrigated arable land vacated after early vegetables such as cabbage, radish, potatoes, cereals, and other crops. However, these lands are freed from early crops in late May - early June, and sowing onion seeds during this period does not lead to full formation and maturation of bulbs due to the shortening of the vegetation period in September- October.

Considering that in Uzbekistan there have been no studies on onion cultivation by seedling method as a second crop, on selection of varieties and hybrids, optimal planting scheme, and peculiarities of onion cultivation technology, this direction is of scientific and practical importance.

In this regard, to fully mature bulbs and obtain a harvest before the onset of cold weather in the fall, we have studied the cultivation of onion seedlings and the development of onion cultivation technology as a second crop in the soil and climatic conditions of Uzbekistan.

Onion (*Allium cepa* L.) is a widespread crop in the world. The Central Asian center of origin of cultivated plants according to N.I. Vavilov is the birthplace of onions of the Central Asian subspecies and there is a great diversity in shape, color of scales, and other features [2].

Onions require high soil and air moisture. Seeds do not sprout without additional moisture, the root system develops slowly during the first stage of vegetation, during which its resistance to drought becomes weak. At the same time, onions become sensitive to soil moisture exceeding the norm - they dull and bulge on the ground surface [3].

Surveys are being conducted in various countries to determine the relationship between growing conditions, yield, and bulb quality [4].

Organic farming is promoted as a tool for implementing European policies to reduce environmental impacts. In Denmark, for seedling onions planted for summer cultivation after harvesting, 27 % of the climate impacts of nitrous oxide emissions are attributable to nitrous oxide emissions [5].

Scientists who have conducted studies of onion growth and development when grown under controlled conditions believe that reliable results can be obtained, especially with molecular studies [6].

In the research on onion, it was found that mother bulb size and planting dates had a significant effect on growth, bulb and seed yield of onion. Large mother bulb (20 g) and early planting on October 30 contributed to higher yields of bulbs (17,52 t/ha) and seeds (402,80 kg/ha) [7].

In growing onions, importance is attached to varieties and hybrids adapted to environmental conditions. Onion varieties and hybrids that form high yields and quality products in different soil and climatic conditions are well adapted and are of great value.

A number of studies have been conducted in many countries on the selection of varieties and cultivation techniques for onions at different sowing dates and methods. Different onion varieties are recommended for cultivation in different seasons.

Many scientists note that depending on the region of cultivation changes the biochemical composition of bulbs of local varieties and hybrids [8].

The study found that local onion variety Parachinar responded well to fertilizer application, increasing the number (15,4) and length of leaves (47,7 cm), plant height (77,9 cm) and increased yield up to 33,1 t/ha [9].

In Mosoro, North Carolina, Brazil experiments conducted showed that a dose of 92 kg/ha N provides the highest gross and marketable yield of bulbs [10].

In Ethiopia, the highest total and marketable bulb yields of 47,69 and 47,42 t/ha, respectively, were obtained when 92 kg/ha of N was applied in combination with 242 kg/ha of NPS-mixed fertilizer, (containing 46 kg of nitrogen, 92 phosphorus and 16.94 sulphur) [11].

A number of countries have switched to the cultivation of onions by seedling method, as this method allows to significantly reduce the cost of seeds, the creation of the necessary density of plants in the field and agrotechnical care.

Changes in plant nutrition area affect growth and development, photosynthesis, morphological traits and yield quality parameters.

Opinions of researchers about different treatment of grown seedlings before planting on a permanent place - diverge.

The effect of pre-sowing magnetic treatment on germination, growth and yield of onion plants (cv Red Creole) under field conditions was studied. Onion seeds were exposed to full-wave rectified sinusoidal inhomogeneous magnetic fields (MFs) of 60 Hz frequency induced by a 160 mT electromagnet for 15 and 20 min. The treatments resulted in significant increases in shoot emergence, root length, seedling height, seedling dry weight and leaf area per plant. At the bulb maturity stage, all magnetic treatments significantly increased average bulb weight, bulb yield per area, number of shells per bulb, bulb diameter and dry bulb weight compared to the control [12].

In practice, onion seed treatment methods are used by soaking seeds in solutions of various mineral salts. There is evidence that treatment promotes seedling development and increases resistance to environmental stressors. However, different onion varieties react differently to the treatment and this fact should be taken into account [13].

According to literature data, many scientists have noted the influence of planting dates and optimal planting density on the yield and quality of onions (14, 15, 16, 17, 18, 19, 20).

In Maharashtra, India it is recommended to sow seeds in July-August, plant seedlings in September-October and harvest in January-March [21].

In Brazil, when 58-day-old onion seedlings of Aurora, Madrugada and Primavera varieties were planted, their yields were 29,54 t/ha; 25,06 and 26,31 t/ha, respectively [22].

Under Romanian soil and climatic conditions, 50-day-old seedlings grown in cassettes were planted in the field in the first decade of April, which resulted in a good quality yield (27,2 t/ha) [23].

In Egypt, planting Texas Early Yellow Grano x Giza onion seedlings between December 15 and January 1 contributed to high productivity and bulb quality [24].

Haq et al (2015) observed that as plant density increased, there was a tendency for survival rate, plant height, number of leaves and bulb weight of onion to decrease, but total yield increased [25].

In Pakistan, seedling planting dates (December 15, December 31 and January 15) and row spacing (15, 20, 25 and 30 cm) were used in the cultivation of onion variety Swat-I. High results were obtained in the December 15 seedling transplanting variant in terms of number of leaves per plant (9,94), plant height (47,58 cm), leaf width (1,42 cm), bulb diameter (6,06 cm), average bulb weight (79,70 g) and yield (28,64 t/ha). Maximum number of leaves per plant (10,18) and average bulb weight (91,59 g) were observed at row spacing of 30 cm. Maximum yield of - 29,29 t/ha was obtained in the variant with seedling planting on December 15 and spacing of 20 cm [26].

Experiments in Egypt found that at three different planting dates (December 15, January 1 and January 15) on ridges and wide furrows at planting densities of 30, 45 and 60 plants/m2, the best results (total and marketable bulb yield, highest gross and net returns) were obtained when onion seedlings were planted on December 15 on wide furrows at a density of 45 plants/m^2. At a later planting date of January 15, the highest average bulb weight was observed at a planting density of 30 plants/m^2 [16].

The timing of seed sowing depends on climatic conditions. Tsuchiya et al. (2021) believes that in Japan in the high latitude region (41 - 46°N) it is advisable to use long-day genotypes for cultivation. Seeds are sown in a seedling nursery from mid-February to early March and 60 days after sowing the seedlings are ready for transplanting to the field. Harvesting takes place from early August through September. In low latitude regions (33-34°N) it is advisable to grow short-day or medium-day varieties. Seeds are sown from mid-September to early October and onions are harvested in late March to mid-June [27].

In India, early planting date of November 10 resulted in good plant growth, maximum bulb yield and yield [27].

Experiments conducted in Sudan showed the promise of planting onion seedlings in early and mid August for higher and marketable onion yields [16].

In Ethiopia, the difference between Bomby red, Adama red and Nasic red varieties with different bulb planting distance of 4, 6, 8 cm (control-10 cm) showed different results. Nasic Red variety gave the highest yield (324 ± 65 kg/ha), Bomby Red (301,58 ± 77 kg/ha) had lower yields and Adama red (220,55 ± 84 kg/ha) had the lowest yield [28].

The highest total bulb yield (36,14 t/ha) was observed at 5 to 7,5 cm spacing (33,82 t/ha). The highest total bulb yield (35,2 t/ha) was also obtained in Melkam variety. However, the lowest yield (29,86 t/ha) was obtained from Adama Red variety. Higher marketable yield was also observed at 5 and 7,5 cm plant spacing than 10 cm spacing [29].

Closer spacing (10 × 10 cm) and planting on November 25 proved to be the best for onion cultivation under Manipur, India and resulted in higher yield up to 358 kg/ha. This variant had maximum number of leaves (8,26), leaf length (50,50 cm), leaf area (87,93 cm2), yield (267,20 kg/ha), height (4,92 cm), and bulb diameter (53,68 mm), average weight per bulb (68,48 g), bulb dry matter (13,68%) [30]. In Bangladesh, the highest yield was obtained with 15×10 cm planting pattern and the lowest yield was with 15×15 cm planting pattern [31].

In South Africa, cultivation of onion variety Jaquar on May 11 and 25 produced the best yields and bulb quality at a stand density of 61 to 74 plants/m2 [32].
Sarker at al (2017) recommended the use of SRC Raised bed + Spices Research Centre (SRC) methodology in onion trials, which provided high yields up to 14.42 t/ha [33].
In India, at wider onion planting distance of 15×20 cm, number of leaves (49,52), number of bulbs in nest (clump) (14,38) and neck girth (6,36 mm), raw bulb weight (41,7 g), height (22,92 mm) and diameter (16,59 mm) and average bulb weight (2,54 g) were higher as compared to other variants. However, maximum plant height (45,47 cm) and yield per hectare (21,34 t/ha) were obtained with more dense planting of 10×10 cm plants [34].
In Afghanistan, when 60-day old onion seedlings were planted using two-row method on May 10, June 1 and June 20, 90 days after planting, the highest number of leaves per plant (7,18), leaf length (30,07 cm), leaf area per plant (277,43 cm2) were at planting on May 10. At this date, the highest marketable yield (37,01 t/ha) and total yield (40,08 t/ha) were obtained [35].
In Afghanistan, it was found by experiments that distance has a significant effect on biomass and marketable yield. The optimum planting pattern of 7,5×15 cm seedlings contributed to the maximum marketable yield of 31,24 t/ha [36].
Bulb size and weight have a significant effect on yield.
Kahsay at al (2013) observed that when plant spacing was increased from 5 to 10 cm, the average bulb weight increased in Melkam (75,77 g) and Bombay Red (67,29 g) varieties [29].
In Haq et al (2015) experiments, maximum yields (56,9 t/ha, 55,7 and 53,8 t/ha, respectively) were recorded when planted at 5 cm, 7,5 cm and 10 cm spacing with very small bulb size. When planted with maximum bulb size at larger spacing (12,5 cm, 15 cm and 17,5 cm), yields were not significantly different from more densified planting schemes and were 53,5 t/ha, 52,2 and 51,3 t/ha, respectively. As a result, it was concluded that total yield had a negative and highly significant correlation with rooting percentage, plant height, number of leaves and bulb weight, while it had a positive and highly significant correlation with small bulb size. Based on these results, it is recommended to use dense planting schemes to maximize yield with medium sized bulbs [25].
In a study by Ali et al (2016) onion seedlings transplanted with large size bulbs (45-60 mm) at a spacing of 6 inches between plants in the field contributed to an increase in onion yield up to 19,47 t/ha [26].
In India, experiments have found that planting onion in plain is the best cultivation method in cold desert conditions which provides large bulb weight (66,0 g), bulb diameter (51,33 mm) and yield per hectare (440,2 quarts) [37].

MATERIALS AND METHODS

Scientific research was conducted in the conditions of Tashkent region, located in the north-eastern part of the Republic of Uzbekistan. Here is located Chirchik plain, the height of which is 486 m above sea level. Ground waters lie at a depth of 5-7 metres. The sources of irrigation of agricultural crops are the Chirchik River and canals.
The climate of Tashkent region is characterized by an abundance of light, sharp temperature fluctuations during the day and seasons, dry and hot summers and uneven winter temperatures. The duration of sunny days is 2800-2900 hours per year (360-400 hours in summer and 90-100 hours in winter). The average annual air temperature is +13...+14^{0}C. The average air temperature in January is – 0,4...+1,5^{0}C, July - +27...+29^{0}C. The absolute minimum air temperature is minus 28...-35^{0}C, which happens once in ten years. The absolute maximum temperature is +43...+44^{0}C.
The amount of precipitation throughout the year is 250-500 mm and most of it falls in the winter and spring months. Snow cover in winter persists for an average of 25-70 days. Hot days are observed 220 days a year with a temperature of +15°C from 14 April to 5 October, which is 173 days. The air temperature from May to October is favorable for growing all crops.
The soils, on which the experiments were conducted, are represented by typical grey soils and by mechanical composition belong to loams.
The aim of our research was to study and isolate high-yielding varieties and hybrids suitable for onion seedling cultivation as a repeat crop.
Seven onion varieties (Karatalskiy, Peshpazak, Zafar, Spanish 313, Istiqbol, Margilanskiy udlinyonniy mestniy,

Sumbula) and 3 hybrids (Daytona F1, Banquo F1, Yellow Spanish F1) served as material for research. The tested varieties and hybrids mainly had yellow skin colour, only Margilanskiy udlinyonniy mestniy variety had white scales. The bulbs of the varieties and hybrids were round-oval and elongated-cylindrical in shape.
The experiments were conducted for three years. To grow seedlings, seeds of each onion variety were sown on the nursery plot in the open ground in the second decade of April on the scheme 4x1 cm. When bulb diameter reached 1-2 cm in the first decade of June, onion seedlings were collected from the nursery and transplanted to the experimental plot.
Experiments were laid in 4-fold repetition on plots of 8,4 m^2 each. The seedlings were planted in a ribbon pattern (40+15+15)/2x7,5 cm (0,0175 m^2) with a distance of 15 cm between the ribbons and 2 cm between plants in the row. Each strip was planted with 40 seedlings and 120 seedlings per plot.
Field experiments were conducted using the methodological guidelines "Methods of conducting experiments in vegetable, pea and potato growing" [38]. Statistical analysis was carried out according to the method "Field experiment methodology" [39].
The following observations and records were made at the experimental site.
Determination of seed germination under field conditions was carried out by sowing 200 seeds per bed in one row in repetitions. The date of germination of 10% and 75% of seedlings was taken into account.
During phenological observations of onion varieties, the dates of seed sowing, the beginning and mass emergence of seedlings, the formation of the first true leaf, the dates of planting seedlings in the experimental plot were taken into account.
Seedling quality was determined for 10 plants in three repetitions before planting: number of leaves, length of the largest leaf and seedling weight.
During the growing season, the date of bulb formation, the beginning of leaf yellowing, and maturity were determined.
Biometric measurements were carried out: leaf length and number of leaves on 20 plants of each variety.
During the vegetation period, we carried out agrotechnical measures: in accordance with the generally accepted method of onion cultivation.

RESULTS AND DISCUSSION

In order to determine the quality of seeds of the studied onion varieties - samples and hybrids, the germination rate and field germination of seeds were determined (Table 1).
The speed of complete formation of onion sprouts differed significantly between varieties and hybrids. The first sprouts appeared 11-13 days after sowing. Hybrid Daytona F1, onion varieties Yellow Spanish and Sumbula gave the first sprouts 11 days after sowing, hybrid Banko F1 and varieties standard Karatalskiy, Zafar - in 12 days, and varieties Spanish and Margilanskiy udlinyonniy mestniy- in 13 days after sowing.

Table 1. Sprout emergence and seed germination of onion varieties and hybrids

Varieties and hybrids	From sowing to sproutin, days	Field germination of seeds, %
Karatalskiy (standard)	17,3	89,7
Daytona F1	17,3	93,3
Banquo F1	17,7	93,7
Yellow Spanish	16,3	93,3
Peshpazak	15,7	94,3
Zafar	18,0	91,7
Ispanskiy 313	18,7	92,7
Istiqbol	16,3	91,7
Margilanskiy udlinyonniy mestniy	18,7	87,7
Sumbula	17,0	88,0
$\bar{X}$	17,1	91,59
LSD_{05}	0,01	1,1

The rate of sprout formation of onion varieties and hybrids in full (75 %) according to the law of formation

of the first (10 %) sprouts is as follows.
Among the studied onion varieties Peshpazak, Yellow Spanish and Istikbol - in 15-16, standard Karatalskiy, Banko F1 hybrid, varieties Sumbula - 17-18, and Zafar and Ispanskiy 313 - in 19 days after sowing gave (75 %) sprouts.
It can be said that compared to the formation of the first (10 %) seedlings, the full formation of seedlings (75 %) is fast.
When growing seedlings of onion varieties and hybrids in the open ground, the germination of their seeds was high, but uneven. The lowest field germination of seeds (87,7-89,7 %) in varieties Margilanskiy udlinyonniy mestniy, standard Karatal and Sumbula, the highest (92,7-94,3 %) in varieties Ispanskiy 313, Yellow Spanish, Zafar, Peshpazak and hybrids Banko F1 and Daytona F1.
Onion varieties differed from each other in the rate of development of the above-ground part (leaf formation) (Table 2).
The first true leaves were formed 12-15 days after the onion varieties' shoots were fully formed. Hybrid Daytona F1 and Istikbol 3, hybrid Banko F1, Yellow Spanish, Zafar and Sumbula were 2 days earlier than standard Karatalskiy, the other varieties were close to standard Karatalskiy by this indicator.
The duration of formation of 3-4th leaves was the same as in the first variety.

Table 2. Duration of development stages of onion varieties

Varieties and hybrids	Days until mass emergence	Days until:			Formation of onion head after planting seedlings, days
		formation of the 1st true leaf	formation of 3-4 true leaves	beginning of bulb formation	
Karatalskiy (standard)	17	15	22	63	18
Daytona F_1	17	12	18	58	13
Banko F_1	17	13	20	58	13
YYellow Spanish	16	13	21	60	15
Peshpazak	16	14	21	57	12
Zafar	18	13	21	66	21
Ispanskiy 313	18	14	21	65	20
Istiqbol	16	12	20	58	13
Margilanskiy udlinyonniy mestniy	18	14	18	69	24
Sumbula	17	13	21	60	15
$\bar{X}$	17	13,3	20,3	61,4	16,4
LSD_{05}	0,02	0,03	0,05	1,3	1,3

However, Daytona F1 hybrid and Margilanskiy udlinyonniy mestniyvariety had this stage 4 days later, and Banko F1 and Istikbol variety - 2 days later. It was found that the tested onion varieties enter the head formation stage 57-69 days after sprouting and 12-24 days after seedling planting. Compared to the standard variety, Pespazak entered this stage 6 days earlier after sprouting and planting. Daytona F1, Banko F1 hybrids and Istiqbol variety - after 58 and 13 days of bulb formation.
Onion varieties Zafar (66; 21 days) and Margilanskiy udlinyonniy mestniy (69; 24 days) were found to enter this stage late compared to the standard.
Thus, it is possible that early or late onion varieties and hybrids grown from seedlings in the same soil and climatic conditions depend on their biological features - early maturity, medium and late maturity.
The quality of seedlings of tested onion varieties and hybrids was determined before planting in the open ground (Table 3).

Table 3: Quality index of seedlings of onion varieties and hybrids grown as a second crop before planting in a permanent place

Varieties and hybrids	Number of true leaves per plant, pcs.	Average length of the largest leaf, cm	Stem diameter, mm	Average weight of 1 seedling, g
Karatalskiy (standard)	3,4	26,6	6,3	8,7
Daytona F_1	3,7	18,5	5,3	5,5
Banko F_1	3,4	23,3	5,3	7,1
Yellow Spanish	3,8	17,9	5,1	5,4
Peshpazak	4,1	18,9	5,1	5,8
Zafar	3,2	19,3	4,8	5,9
Ispanskiy 313	3,3	24,3	5,6	7,8
Istiqbol	3,8	20,6	5,0	6,1
Margilanskiy udlinyonniy mestniy	3,1	25,8	6,1	8,1
Sumbula	3,6	28,1	6,5	8,9
$\bar{X}$	3,54	22,33	5,51	6,93
LSD_{05}	0,2	0,4	0,3	0,3

Onion variety Peshpazak had 4,1, Yellow Spanish variety, Istikbol variety had 3,8 and Daytona F1 hybrid had 3,7 leaves on each plant, which was different from standard Karatalskiy and other varieties. The number of leaves in these varieties and hybrids on each plant is 0,7 of the number of leaves in the variety, respectively; It was found to be higher by 0,4 and 0,3 units.

Among the studied onion varieties, the largest leaf in Sumbula variety was 1,5 cm longer than the leaf of standard Karatalskiy. In the experiment, it was found that the largest leaves of the other varieties were significantly shorter than standard. Including Yellow Spanish – 8,7; Hybrid Daytona F1 and Pespazak -7,7; -7,3-6,0 in Zafar and Istikbol varieties; Banko F1 and Spanish 313 - 3,3-2,3 cm short.

It was found that the leaf diameter of onion varieties is different. Compared to the stem diameter of the standard variety, the stem diameter of onion varieties Zafar is - 1,5; Istiqbol – 1,3; Daytona F1, Banko F1-1,0; Yellow Spanish and Pespazak decreased by 1,2 mm.

The seedlings of onion varieties and hybrids differed from each other in that the average weight of each seedling was different.

The average seedling weight of the tested onion varieties was within the range of 5,5-8,9 g. From the weight of seedlings of standard Karatalskiy variety Yellow Spanish is -3,3; Daytona F1 hybrid - 3,2; Peshpazak - 2,9; Zafar – 2,8; Istikbol – 2,6; Banko F1 and Spanish 313 – 1,6...0,9, Margilanskiy udlinyonniy mestniy 0,6 g lighter, Sumbula seedlings were close to the standard weight (8,9 g).

After planting seedlings of onion varieties and hybrids on a permanent place their viability was determined in observations conducted 7 days after planting seedlings and at the stage of leaf yellowing (Table 4).

Seven days after planting the seedlings of the studied onion varieties, the number of errors compared with the number of errors of plants of the Karatalskiy variety Yellow Spanish – 10,0, Daytona F1 – 9,6, Istikbol – 7,9, Banko F1 – 7,5, Peshpazak – 6,0, Sumbula – 5,6, Margilanskiy udlinyonniy mestniyvariety – 3,8%.

This indicator corresponds to 21,2 in varieties Ispanskiy 313 and Zafar; 22,0% were close to the frequency of dropout of the control variety.

For three years of repeated observations in the phase of onion leaf yellowing it was found that the number of dead plants increased by 10,3-3,3% compared to the first observation for all tested onion varieties.

The highest number of dead seedlings during this period died in the control variety Karatalsky and was 10,3%.

The number of dying before yellowing of leaves of other tested onion varieties was 7.0% in the variety Yellow Spanish, in the varieties Istikbol and Margilanskiy udlinyonniy mestniy – 6,0-5,7%, in the hybrid Daytona F1 and varieties Peshpazak – 6,0-5,7%, 5,0% lower viability - frequency of dropouts – 4,3-3,5% in the varieties Spanish - 313 and Zafar.

It was found that the number of dead plants increased by 10,3-3,3% compared to the first observation for all tested onion varieties when repeated at the leaf yellowing stage for three years.
Whether the dropout was small or large, it negatively affected the number of actual plants per hectare. That is, the total sum of dropouts in the Karatal variety was 31,1% and in the Yellow Spanish variety was 14,1%, which in turn led to a decrease in the theoretical number of plants per hectare from 177,300 to 80,500 plants per hectare.

Table 4: Number of plant dropouts in onion varieties at repeated cultivation

Varieties and hybrids	Amount of lunges, %	Since the seedlings were planted				Number of dead plants per hectare, plants/ha	Actual number of seedlings per hectare, thousand pcs/ha
		after 7 days.		when the leaves start to turn yellow			
		dropout rate, %	number of dead seedlings, pcs.	dropout rate, %	number of dead seedlings, pcs.		
Karatalskiy (standard)	31,1	20,8	118550	10,3	58840	177390	394010
Daytona F_1	16,5	11,2	64000	5,3	30250	94250	477150
Banko F_1	18,1	13,3	75996	4,8	27485	103421	467979
YYellow Spanish	14,1	10,8	61700	3,3	18855	80555	490845
Peshpazak	20,1	14,8	84570	5,3	30280	114850	456550
Zafar	28,0	22,0	125700	6,0	34277	159977	411423
Ispanskiy 313	28,0	21,2	121136	6,8	38854	159990	411410
Istiqbol	17,2	12,9	73700	4,3	24577	98277	473123
Margilanskiy udlinyonniy mestniy	21,4	17,0	97140	4,6	26284	123424	447976
Sumbula	20,4	15,2	86850	5,2	29710	116560	454840
$\bar{X}$	21,49	15,92	90934,2	5,59	31941,2	122869	448531
LSD_{05}	2,4	3,5		2,1			

Therefore, regardless of whether the same-aged onion varieties were planted at the same time and grown under the same conditions, their viability was different. The onion varieties tested, Yellow Spanish (14,1 %), Daytona F1 (16,5 %) and Istikbol (17,2 %) had higher viability than sprouts of other varieties and hybrids. Onion varieties tested for three years were found to differ from each other in total and marketable yields (Table 5).

Table 5. Productivity of onion varieties at repeated sowing

Variety and hybrid	Total yield, t/ha	Marketable yield, t/ha	Productivity, %
Karatalskiy (standard)	28,1	25,4	90,2
Daytona F_1	44,1	43,2	98,1
Banko F_1	39,3	38,2	97,2
Yellow Spanish	32,8	32,1	97,8
Peshpazak	36,1	35,5	98,2
Zafar	31,2	28,7	91,9
Ispanskiy 313	29,2	27,2	93,3
Istiqbol	38,8	38,3	98,8
Margilanskiy udlinyonniy mestniy	27,4	25,1	91,7
Sumbula	33,6	32,6	97,1
$\bar{X}$	34,06	32,63	95,43
LSD_{05}	0,3	0,2	-

Among the studied onion varieties - hybrids Daytona F1 (44,1 t/ha), Banko F1 (39,3 t/ha), as well as varieties Istikbol (38,8 t/ha) and Peshpazak (36,1 t/ha) varieties gave significantly higher yield than the variety standard Karatalskiy (28,1 t/ha). The total yield of these varieties was found to be 8,0-16,0 t/ha higher than that of the standard variety.

The total yield of onion varieties Yellow Spanish, Zafar and Sumbula did not exceed the yield of the control variety by 5,5...3,1 tonnes/ha.

The yield of the variety Ispanskiy 313 was close to the productivity of standard Karatalskiy (29,2 t), the yield of the variety Margilanskiy udlinyonniy mestniy (27,4 t/ha) was lower than the productivity of standard Karatalskiy.

The share of marketable yield in the total harvest was 90,2-98,8% for all studied varieties.

The tested onion varieties and hybrids differed from each other not only in total productivity, but also in the percentage of full, immature and unmarketable onion heads in the product yield and its content (Table 6).

Marketable yield from the total yield of standard Karatalskiy variety was 25,3 tonnes/ha or 90,2%. It was found that in hybrids Daytona F1, Banko F1 and varieties Yellow Spanish, Peshpazak, Istikbol and Sumbula these indicators are 98,8-97,1%, and marketable yield is in the range of 32,6-43,2 t/ha. Hybrids Daytona F1 (43,2 t/ha), Banko F1 (38,2 t/ha) and Istikbol (38,3 t/ha) gave the highest yield compared to the control.

The number of marketable bulbs obtained from these hybrids and varieties exceeded that of the control variety: 70,7; 53,4 and 51,0 per cent were higher.

The average weight of marketable bulbs was 93,0-82,0 g of this variety and hybrids.

One of the main factors was that the average weight of marketable bulbs was 20-10 g higher than the standard Karatalskiy commercial bulbs.

It was also found that the number of fully matured and immature heads of commercial harvest onion is different. The number of full-grown bulbs in the yield of onion varieties grown under the same conditions is 20,1-41,2 t/ha, ranging from 80,9-95,4%, for the studied varieties and hybrids.

Among the tested onion varieties Daytona F1 – 20,9 g, Banko F1 – 26,3 g and Istikbol – 17,7 g was higher compared to the weight of whole bulbs standard Karatalskiy (76,9 g).

This indicator was higher by 7,2-10,5 g in varieties Peshpazak, Sumbula and Zafar, and the average mass of Yellow Spanish and Ispanskiy 313 ripened bulbs was close to this indicator of the standard.

From the studied onion varieties it was found that the mass of ripe onions of Margilanskiy udlinyonniy mestniyvariety was 9 g less than the average mass of onions standard Karatalskiy.

The number of unripe bulbs in the variety standard Karatalskiy yield (25,3 t/ha) was 12,1% (3,1 t/ha), the average mass of bulbs did not exceed 68,0 g, and the mass of unripe bulbs was 9,8% (2,8 t/ha).

During 2016-2018, it was found that the number of immature bulbs produced by Daytona F1, Banko F1, Sumbula and Peshpazak varieties was 7,5-4,1% less than the standard Karatalskiy variety.

The number of immature bulbs formed in Ispanskiy 313 and Sumbula varieties was close to that of the standard Karatalskiy variety (11,6; 10,1%).

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 12s,2025
https://theaspd.com/index.php

Table 6: Quality of marketable yield of onion varieties and hybrids in repeated crops

Varieties and hybrids	Composition of marketable crop												Unmarketable	
	marketable				ripened				unripened					
	bulb percentage, %	yield, t/ha	relative to the standard, %	average bulb weight, g	bulb percentage, %	yield, t/ha	relative to the standard, %	average bulb weight, g	bulb percentage, %	yield, t/ha	relative to the standard, %	average weight of bulbs, g	percentage of bulbs, %	yield, t/ha
Karatalskiy (standard)	90,2	25,3	100	72,1	87,9	22,2	100	76,9	12,1	3,1	100	68,0	9,8	2,8
Daytona F_1	98,1	43,2	170,7	93,0	95,4	41,2	185,6	97,8	4,6	2,0	64,5	88,2	1,9	0,9
Banko F_1	97,2	38,2	151,0	84,0	93,2	35,6	160,4	103,2	6,8	2,6	83,8	64,8	2,8	1,1
Ellou spanish	97,8	32,1	126,9	76,9	90,1	28,9	130,2	78,5	9,9	3,2	103,2	75,3	2,2	0,7
Peshpazak	98,2	35,5	140,3	79,0	92,0	32,7	147,3	86,4	8,0	2,8	90,3	71,6	1,8	0,6
Zafar	92,1	28,7	130,4	76,0	82,2	23,5	105,9	84,1	17,8	5,2	167,7	67,9	7,9	2,6
Ispanskiy 313	93,3	27,2	107,5	71,0	88,4	24,0	108,1	72,8	11,6	3,2	103,2	69,2	6,7	2,0
Istiqbol	98,8	38,3	153,4	82,0	93,9	36,0	163,9	94,6	6,1	2,3	74,2	69,4	1,1	0,4
Margilanskiy udlinyonniy mestniy	91,7	25,1	98,0	61,1	80,9	20,1	90,5	67,9	19,1	5,0	161,3	54,3	8,3	2,6
Sumbula	97,1	32,6	129,6	74,2	89,9	29,5	132,9	86,3	10,1	3,1	100	62,1	2,0	0,8
$\bar{X}$	95,45	32,62	130,78	76,93	89,39	29,37	132,48	84,85	10,61	3,25	104,82	69,08	4,45	1,45
LSD_{05}	-	0,2	-	0,4	-	0,4	-	0,4	-	0,2	-	0,4	-	-

In terms of yield of unripe marketable bulbs, the varieties Margilanskiy udlinyonniy mestniy (19,1%) and Zafar (17,8%) prevailed over the control variety. At the same time, the total amount of unmarketable yield in these varieties was the same (2,6 t/ha). The average weight of immature bulbs was similar (62-75 g) in almost all tested varieties. In hybrid Daytona F1 this indicator was 20 g higher compared to the control variety, and in the variety Margilanskiy udlinyonniy mestniy 14 g less.

Production requires not only a high-yielding variety, but also high profit. With this in mind, an analysis was carried out to determine the economic efficiency of onion varieties and hybrids that gave a higher yield compared to the standard variety when growing onions from seedlings as a second crop.

Profitability was the highest in the variety Istikbol – 123,9%, and the hybrid Daytona F1 – 109,5%, and this indicator was higher than the yield of the variety standard Karatalskiy – 58,5%, 72,9%.

CONCLUSIONS

1. Complete formation (75%) of seedlings of tested onion varieties and hybrids occurs early (after 16 days) in Peshpazak, Yellow Spanish and Istikbol varieties, and later (17-19 days) in other varieties and hybrids.
2. Field germination of onion seeds is high (94,3-92,7%) in varieties and hybrids Pespazak, Banco F1, Daytona F1, Yellow Spanish and Spanish 313, in other varieties this indicator is 91,7-87,7%.
3. It was found that 12-13 days after full sprouts form the first, 3-4 leaves 18-22 days after the formation of the first leaf.
4. Bulbs began to form 69-93 days after fully formed seedlings in the tested varieties and hybrids. It was found that hybrids Banko F1, Daytona F1 and variety Istikbol entered this stage 10 days earlier, Sumbula, Yellow Spanish 6 days earlier, Zafar - 6 days earlier, Margilanskiy udlinyonniy mestniy- 12 days later relative to the standard Karatalskiy.
5. Before planting determined the number of true leaves – 4,1-3,1, pieces, the length of the large leaf – 17,9-28,1 cm, leaf diameter – 4,8-6,5 mm, the average weight of seedlings – 5,4-8,9 g.
6. It was found that onion varieties have different degrees of fallout from the moment of planting on a permanent place until the beginning of leaf yellowing. Dropouts of standard Karatalskiy (31,1%) compared to the standard varieties Daytona F1 – 14,6%, Istikbol – 13,9%, Banko F 1 – 13,0%, Pespazak and Sumbula - 11.0%, Margilanskiy udlinyonniy mestniy – 9,7%, Zafar and Ispanskiy 313 – 3,1% were less.
7. The number of real plants per hectare decreased from 80,5 thousand to 177,3 thousand seedlings due to small or large number of dropouts.
8. Hybrids Daytona F1, Banko F1 and Istikbol onion varieties, having reliably high yields in total and marketable yields, outperformed not only the standard variety but also other tested varieties.
9. Daytona F1 and varieties Yellow Spanish, Peshpazak and Istikbol formed marketable onion yields which were 8-9% higher than the yield of the control variety.
10. Hybrids Daytona F1, Banko F1 and Istikbol onion cultivars gave yields 51-70% higher than the standard Karatalskiy cultivar and were higher than all other cultivars. The average weight of marketable bulbs of this variety and hybrids was 10-21 g higher than that of the control variety.
11. The number of ripe filled bulbs in the marketable crop is 85,6% in Daytona F1, 60,4% in Banko F1 and 63,9% in Istikbol variety, and their average weight increased to 26,0 g from 18,0 g.

LITERATURE

[1] Zuev VI, Mavlyanova RF, Dusmuratova SI, Buriev HCh. (2016). Vegetables are food and medicine. A Book. Tashkent, Publishing house "Navruz", 250 p
[2] Leskovar, D. I., & Vavrina, C. S. (1999). Onion growth and yield are influenced by transplant tray cell size and age. Scientia Horticulturae, 80(3–4), 133–143. https://doi.org/10.1016/s0304-4238(98)00256-8
[3] Brewster JL. (1994). Onions and other vegetable Alliums.Wallingford.: CAB; International, p. 236
[4] Sekara, A., Pokluda, R., Del Vacchio, L., Somma, S., & Caruso, G. (2017). Interactions among genotype, environment and agronomic practices on production and quality of storage onion (Allium cepa L.) - A review. Horticultural Science, 44(1), 21–42. https://doi.org/10.17221/92/2015-hortsci
[5] Jensen, A., Mogensen, L., Van Der Werf, H., Xie, Y., Kristensen, H., & Knudsen, M. (2024). Environmental impacts and potential mitigation options for organic open-field vegetable production in Denmark assessed through life cycle assessment. Sustainable Production and Consumption. https://doi.org/10.1016/j.spc.2024.02.008
[6] Khosa, J., Lee, R., Joshi, S., Shaw, M., McCallum, J., & Macknight, R. (2018). A Guide for the Cultivation of Onion under Controlled Environment Conditions. HortScience, 53(12), 1746–1749. https://doi.org/10.21273/hortsci13515-18

[7] Ud-Deen, M.M. (2008) Effect of Mother Bulb Size and Planting Time on Growth, Bulb and Seed Yield of Onion. Bangladesh Journal of Agricultural Research, 33, 531-537.
[8] Ariyanti, N. A., Torikai, K., Kirana, R. P., Hirata, S., Sulistyaningsih, E., Ito, S., Yamauchi, N., Kobayashi, N., & Shigyo, M. (2018). Comparative Study on Phytochemical Variations in Japanese F₁ Varieties of Bulb Onions and South-East Asian Shallot Landraces. The Horticulture Journal, 87(1), 63–72. https://doi.org/10.2503/hortj.okd-066.
[9] Shah ST, Sajid M., Alam R., Rab A., Mateen A., Jan I., Ali A. and Wahid F. (2012). Comparative study of onion cultivars at Mardan, Khyber Pakhtunkhwa, Pakistan. Sarhad J. Agric. 28(3):399-402.
[10] Gonçalves Fd.C, Leilson C. Grangeiro, Valdivia de F. L. de Sousa, Jandeilson P. dos Santos, Francisco I. de Souza & Luiz R. R. da Silva (2019). Yield and quality of densely cultivated onion cultivars as function of nitrogen fertilization. Revista Brasileira de Engenharia Agrícola e Ambiental Campina Grande, PB, UAEA/UFCG, 23 (11):847-851. DOI: http://dx.doi.org/10.1590/1807-1929/agriambi.v23n11p847-851
[11] Shura, G., Beshir, H. M., Haile, A. (2022). Improving onion productivity through optimum and economical use of soil macronutrients in Central Rift Valley of Ethiopia. Journal of Agriculture and Food Research, 9, 100321. https://doi.org/10.1016/j.jafr.2022.100321
[12] De Souza, A., García, D., Sueiro, L., Gilart, F. (2014). Improvement of the seed germination, growth and yield of onion plants by extremely low frequency non-uniform magnetic fields. Scientia Horticulturae, 176, 63–69. https://doi.org/10.1016/j.scienta.2014.06.034
[13] Pagano, A., Macovei, A., Xia, X., Padula, G., Hołubowicz, R., & Balestrazzi, A. (2023). Seed priming applied to Onion-Like crops: state of the art and open questions. Agronomy, 13(2), 288. https://doi.org/10.3390/agronomy13020288
[14] Oa, S., Orioli, G., Lobartini, J. (2015b). Onion yield as affected by plant density, nitrogen level and loss of leaf area. Phyton, 84(2), 338–344. https://doi.org/10.32604/phyton.2015.84.338
[15] Ali, M. (2016). Influence of transplanting dates and population densities on the growth and yield of onion. Pure and Applied Biology, 5(2), 345–354. https://doi.org/10.19045/bspab.2016.50045
[16] Aboukhadrah, S. H., Alsayed, A. W. a. H. E.-., Sobhy, L., Abdelmasieh, W. (2017). Response of onion yield and quality to different planting date, methods and density. Egyptian Journal of Agronomy, 39(2), 203–219. https://doi.org/10.21608/agro.2017.1203.1065
[17] Singh AK, Singh V. and Singh VK. (2001) Effect of set size, distance and date of planting on growth and bulb yield of Kharif onion (Allium cepa L.). J. Farming Sys. Res., Develop. 7(1): 72- 76
[18] Leilah, A.A., El-kalla, S.A., Mostafa, A.K. and Afifi, H.M.A. (2003) Performance of some local Egyptian onions strains under different planting dates. Sci. J. King Faisal Univ. (Basic and Applied Sciences), 4(1), 119- 136
[19] Musa BEE, Mohammed SG, Muhammad H. (2023). Effect of transplanting dates on the growth and yield of onion (Allium cepa L.) varieties in the rainy season of the Algezira scheme in Sudan. International Journal of Novel Research and Development, 8 (9): 478-492
[20] Gelaye Y., Nakachew K. and Ali S. (2024). A Review of the prospective effects of spacing and varieties on onion yield and yield components (Allium cepa L.) in Ethiopia The Scientific World Journal Volume 2024, Article ID 2795747, 8 pages https://doi.org/10.1155/2024/279574
[21] Warade SD, Desale SB, Shinde KG. (1996). Evaluation of onion cultivars for yield and storageability for Rangda season. J. Maharashtra Agr. Univ, vol. 1, pp. 48-49
[22] Mollica V.S., Egon F.C. (2010). Behavior of onion varieties with the seedling method when growing seedlings on beds and in trays. Rev. Ceres, vol. 307, pp. 399-405
[23] Popandron N. (2011). Research on the development of measures to increase the production of onions. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Horticulture. Vol. 1, p. 482
[24] Kandil A.A., Ali E. Sharief F.H. (2013). Effect of transplanting dates of some onion cultivars on vegetative growth, bulb yield and its quality. Sci J. Crop Prod. 02 (03):72-82.
[25] Haq Z.U., Shah A.H., and Malik A.A (2015). Effect of planting density on the yield of onion. Journal of Biology and Nature, 3(4): 139–144.
[26] Ali L., Hassan MW, Jamil M., Iqbal J., Yaqub MS, Ahmed MI and Hussain A. (2016). Effect of nursery bulb size and planting density on Thirpspopulation, plant height and yield of onion (Phulkara variety) in Bahawalpur, Pakistan. Pak.J. Life Soc. Sci. 14(2): 96 – 103.
[27] Tsuchiya, Y., Nakamura, Y., & Mikami, T. (2021). Japanese bulb onion: production, consumption, and cultivars. Journal of Horticultural Research, 29(1), 75–82. https://doi.org/10.2478/johr-2021-0002
[28] Awas G., Abdisa T., Tolesa K. and Chali A. (2010). Effect of intra – row spacing on yield of three onion (Allium cepa L.) varieties at Adami Tulu Agricultural Research Center (Mid Rift Valley of Ethiopia). J. Hortic. For. 2(1): 007- 011.
[29] Kahsay, Y. (2013). Effect of intra-row spacing on yield and quality of some onion varieties (Allium cepa L.) at Aksum, Northern Ethiopia. African Journal of Plant Science, 7(12), 613–622. https://doi.org/10.5897/ajps2013.1053
[30] Misra, A. D. & Kumar, Ashok & Meitei, Ingo. (2014). Effect of spacing and planting time on growth and yield of onion var. N-53 under Manipur Himalayas. Indian Journal of Horticulture. 71. 207-210
[31] Islam M.R., Mukherjee A., Quddus K.G., Sardar P.K., Hossain M. (2015). Effect of spacing and fertilizer on the growth and yield of onion. International Journal of Scientific & Technology Research, 4 (10): 308-312
[32] Gagopale, B., & Gesine, M. C. (2015). Response of onion (Allium cepa L.) to sowing date and plant population in the Central Free State, South Africa. African Journal of Agricultural Research, 10(4), 179–187. https://doi.org/10.5897/ajar2013.8071

[33] Sarker R., Ratna M., Ray S., Fahim AHF and Tithi MJ. (2017). Effect of planting method on onion (Allium cepa L.) bulb production in Faridpur region of Bangladesh. Effect of planting method on onion (Allium cepa L.) bulb production in Faridpur region of Bangladesh. Archives of Agriculture and Environmental Science, 2(2): 63-67
[34] Bc, P., Devi, A. B., Singh, U. C., Singh, A. H., & Singh, N. O. (2020). Influence of different levels of planting time and spacing on growth and yield of multiplier onion (Allium cepa L. var. aggregatum Don.) Cv. Meitei Tilhou under Manipur condition. International Journal of Chemical Studies, 8(6), 2653–2658. https://doi.org/10.22271/chemi.2020.v8.i6al.11183
[35] Salari1 H., Antil RS and Saharawat YS. (2021). Responses of onion growth and yield to different planting dates and land management practices. Agronomy Research 19(4): 1914–1928. https://doi.org/10.15159/AR.21.154
[36] Omari, S., Majidi, A. H., & Amiri, A. F. (2023). Effect of nitrogen and plant spacing on the growth and yield of onion (allium cepa l.) in Afghanistan. Deleted Journal, 3(2), 99–106. https://doi.org/10.26480/ppsc.02.2023.99.106
[37] Kanwar M.S., and Akbar P.I. (2013). Effect of planting methods on performance of onion varieties under cold desert conditions. The Bioscan, 8(3): 911-913.
[38] Azimov B.J., Azimov B.B. (2002). Sabzavotchilik, polizchlik va kartoshkachilikda tajribalar o‘tkazish metodikasi. O‘zbekiston Milliy Ensiklopediyasi, pp. 180-198.
[39] Dospexov B.A. (1985). Methodology of field experience. Agropromizdat, 185 p.