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STUDY OF INITIAL SOURCES FOR DEVELOPING EARLY-RIPENING ONION VARIETIES IN THE BREEDING PROCESS

Rakhmatov Anvar Mamatovich
Doctor of Agricultural Sciences, Senior Researcher
Head of the Laboratory of the Scientific Research Institute of Vegetable,
Melon Crops and Potato Growing
Soliyev Ziyoiddin Shuhratbek ugli
Researcher at the Scientific Research Institute of Vegetable,
Melon Crops and Potato Growing

Annotation: This article presents the results of evaluating early-ripening onion variety samples under the conditions of the Fergana Valley based on their morphobiological and economically valuable traits, as well as the creation of initial breeding material for further selection work.

Keywords: variety samples, cultivar, leaf, seed, bulb height, bulb diameter, fruit weight, days, yield.

Introduction

In recent years, significant work has been done in Uzbekistan to ensure national food security and meet the year-round demand for onions. Early-ripening and mid-early onion varieties have been introduced, and their cultivation technologies under different methods and periods have been improved.

The Presidential Decree of the Republic of Uzbekistan No. PQ-4863 (October 15, 2020), *"On measures to increase production and export of garlic and vegetable crops grown by the 'toksonbosti' (relay cropping) method"*, emphasizes increasing onion production to meet domestic demand, expanding exports, increasing production of super-elite and elite seeds, introducing advanced technologies and innovative solutions, creating highly productive new onion varieties, and supporting scientific projects aimed at developing early-, mid-, and late-ripening local onion cultivars resistant to various stress factors.

Materials and Methods

Based on the above goals, research was conducted under the conditions of the Fergana Valley to:

• evaluate early-ripening onion samples based on morphobiological and economically significant traits,

• create initial breeding sources,

• develop seed production technology elements,

• identify promising samples,

• and develop new varieties using analytical breeding methods.

Twelve onion varietal samples were sown in open fields on March 10 in a single day, and their phenological stages were studied in detail.

Results and Discussion

The duration of phenological phases varied among the samples. The phases "seed sowing–mass germination" and "mass germination–first true leaf formation" occurred uniformly across varieties and were within 16–19 days. However, from "mass germination–4–5 leaf formation" onward, noticeable differences appeared.

For the control variety, reaching the 4–5 leaf stage required 22 days, while in local varieties this stage occurred later—around 25 days. In contrast, the introduced hybrids *Sibir F1* and *Pandera F1* reached this stage earlier (18–19 days), which is 4 days sooner than the standard.

Similarly, the duration from mass germination to bulb formation varied widely.

• In the control, this period required 62 days.

• For the local cultivars *Zafar* and *Istiqlol*, it was significantly longer—85 and 82 days respectively.

• Other studied hybrids demonstrated nearly equal timing to the control (59–63 days).

The total vegetation period also differed significantly.

Among all varieties, the earliest maturing hybrid was Sibir F1, which formed bulbs in 55 days—7 days earlier than the local standard and 4 days earlier than the hybrid standard *Banko F1*.

Full technical ripeness was reached:

• in the local standard *Sumbula* in 115 days,

• in *Zafar* and *Istiqlol* in 139 and 135 days respectively (20–24 days later than the standard),

• in hybrid *Banko F1* in 121 days,

• while in Sibir F1 in only 109 days, making it the earliest among all studied samples.

Morphological differences were also evident, particularly in bulb color. The local *Zafar* variety stood out with its violet skin and light violet bulb scales, unlike the other samples.

Bulb height varied significantly, with the local *Istiqlol* (8.2 cm) exceeding the control (6.8 cm) by 1.4 cm. Conversely, *Zafar* (5.7 cm) showed lower values.

Among hybrids, the highest bulb height was again recorded in Sibir F1 (7.8 cm), which exceeded the local standard by 1.0 cm and the hybrid standard *Banko F1* by 1.7 cm.

Bulb diameter showed similar patterns, and Sibir F1 demonstrated superior commercial appearance and storability.

Correlation analysis showed strong relationships between key traits:

- average bulb weight ↔ leaf length (r = 0.92–0.98),
- number of leaves per plant ↔ bulb weight (r = 0.95–0.98),
- number of leaves ↔ leaf length (r = 0.86–0.94),
- number of leaves ↔ pseudo-stem diameter (r = 0.89–0.97).

These results confirm that leaf number and leaf length are strongly linked with overall yield.

Yield performance also differed among samples.

The highest yield was obtained from Sibir F1, with a three-year average of 45.4 t/ha, exceeding:

- the local standard *Sumbula* by 5.6 t/ha,
- the hybrid standard *Banko F1* by 5.7 t/ha.

Local varieties *Zafar*, *Okdur*, *Istiqlol* produced 40.9–41.3 t/ha, which is slightly lower than the standard.

Marketable yield ranged between 89.9–98.5% for all varieties.

Average bulb weight:

- *Sumbula*: 104.2 g,
- *Istiqlol*: 110.2 g (higher by 6.2 g),
- hybrids close to *Banko F1*,
- Sibir F1 highest at 130.5 g, exceeding *Banko F1* by 30.7 g.

Experimental errors remained minimal (0.97 t/ha), confirming reliability of results.

Conclusions

1. Among all samples, Sibir F1 was the earliest maturing hybrid, reaching technical ripeness in 109 days—25 days earlier than local varieties and 13 days earlier than other hybrids.

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2. Leaf length was highest in Sibir F1, reaching 29.2 cm.

3. Bulb height was highest in Sibir F1 (7.8 cm), exceeding the local standard by 1.0 cm and the hybrid standard by 1.7 cm.

4. Bulb weight in Sibir F1 reached 130.5 g—30.7 g higher than the hybrid standard *Banko F1*.

These results confirm the high potential of Sibir F1 as an early-ripening, high-yielding, and commercially valuable onion hybrid.

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