

Comparative Evaluation of Phenological Indicators of Cucumber Varieties and Hybrids Under the Conditions of Karakalpakstan

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Abstract: This study presents a comparative evaluation of the phenological indicators of various cucumber varieties and hybrids (F1) under the sharply continental climate conditions of Karakalpakstan over the period 2024–2026. The research findings revealed significant differences in field seed germination, flowering phases, and fruiting periods. The highest field germination rates were observed in the Saturn F1 (93%) and Zena F1 (92%) hybrids, which also produced female flowers earlier (in 32 days) than the other samples. Furthermore, these two hybrids required the shortest time to first harvest (39 days), while demonstrating the longest fruiting period (Zena F1 – 42 days, Saturn F1 – 41 days). Based on these findings, the study concludes that the Saturn F1 and Zena F1 hybrids, which showed high adaptability and productivity indicators under the conditions of Karakalpakstan, can be recommended for cultivation.

Keywords: Cucumber, variety, hybrid, phenological indicators, seed germination, flowering, first harvest, fruiting period.

Introduction: The distinctive soil and climate conditions of the Republic of Karakalpakstan — dry air and sharp temperature rises during the summer season — make it one of today's pressing issues to select promising varieties and hybrids that are resistant to local climate stresses, have high seed germination, and a long fruiting period. In vegetable growing, studying the developmental phases of a crop — that is, conducting phenological observations — is the main criterion for determining the degree of adaptability of varieties. The rate of seed germination, the formation of female flowers, and the period until the first harvest directly determine overall productivity. The purpose of this study is to comparatively evaluate the developmental characteristics of 11 cucumber variety and hybrid samples (Uzbekskiy 740, Fontina F1, Superina F1, Saturn F1, Koshan F1, Mahalliy serhosil F1,

Zena F1, Orzu F1, Majad F1, Samarqand, Lider F1) under the conditions of Karakalpakstan over 2024–2026, and to identify the most optimal genotypes for the region.

METHODOLOGY

Field experiments were conducted over 2024–2026 at the educational-experimental field of the Karakalpakstan Institute of Agriculture and Agrotechnologies, located in Nukus district. Cucumber varieties and hybrids were studied by planting them in open ground. The spacing between strips was 140 cm, between rows 70 cm, and between plants 40 cm, with each plot's feeding area totaling 8.4 m². Each plot contained 40 plants.

RESULTS

The research findings show that, under the sharply continental soil and climate conditions of the Republic

of Karakalpakstan — with hot, dry summers and low relative air humidity — the earliness, field germination, and fruiting duration of cucumber varieties and hybrids are important economic traits. The phenological indicators of the varieties and hybrids studied were comparatively evaluated against the Uzbekskiy 740 standard variety.

The research findings showed that significant biological differences exist among the varieties and hybrids in terms of seed germination rate, field germination, the timing of female flower blooming, the time to first harvest, and the duration of fruiting. In particular, the Saturn F1 and Zena F1 hybrids stood out from the other samples through their high field germination, early

formation of female flowers, early entry into first harvest, and long fruiting period.

In the Uzbekskiy 740 standard variety, 10% seed germination was observed on day 6, and 75% germination on day 9. Field germination amounted to 72%. Blooming of 10% of female flowers was recorded on day 36, and 75% blooming on day 41. The first harvest picking began on day 45, and the last picking was completed on day 76. The fruiting period amounted to 31 days.

For this reason, these indicators were adopted as the standard criteria in evaluating the remaining varieties and hybrids.

Phenological Indicators of Various Cucumber Variety Samples under the Soil and Climate Conditions of Karakalpakstan (2024–2026)

Karakaipakistan (2024-2026)								
Variety/Hybrid samples	10 %	75 %	Field germination of seeds, %	10%	75%	The first	The last	Fruiting period, days
	Time until seed germination, days			Female flower blooming, days		Time elapsed until harvest picking, days		
Uzbekskiy 740 – standard	6	9	72	36	41	45	76	31
Fontina F ₁	5	7	85	32	35	40	77	37
Superina F ₁	5	7	84	32	35	40	76	36
Saturn F ₁	6	8	93	32	34	39	80	41
Koshan F ₁	6	9	89	33	35	41	76	35
Mahalliy serhosil F ₁	5	7	90	33	35	40	71	31
Zena F ₁	5	7	92	32	34	39	81	42
Orzu F ₁	5	7	81	33	34	40	65	25
Majad F ₁	6	8	85	33	35	41	76	35
Samarqand	6	8	74	36	40	44	66	22
Lider F ₁	6	7	84	33	34	41	73	32

In the Fontina F1 hybrid, 10% seed germination was observed on day 5 and 75% germination on day 7, which was 1 and 2 days earlier than the standard, respectively. Blooming of 10% of female flowers was observed on day 32, 4 days earlier than the standard, while 75% blooming occurred on day 35, 6 days earlier. The first harvest picking began on day 40, 5 days earlier

than the standard. The last picking continued until day 77, 1 day longer than the standard.

In the Superina F1 hybrid, 10% and 75% seed germination were observed on days 5 and 7 respectively, 1 and 2 days earlier than the standard. Field germination amounted to 84%, 12% higher than the standard. Blooming of 10% of female flowers was

observed on day 32, and 75% blooming on day 35, which was 4 and 6 days earlier than the standard, respectively. The first harvest began on day 40, 5 days earlier than the standard. The last picking concluded on day 76, the same as the standard. As a result, the fruiting period amounted to 36 days, 5 days longer than the standard.

In the Saturn F1 hybrid, 10% seed germination occurred on day 6, the same as the standard, while 75% germination was observed on day 8, i.e., 1 day earlier than the standard. Field germination amounted to 93%, the highest field germination rate among the samples studied.

Blooming of 10% of female flowers was observed on day 32, 4 days earlier than the standard. 75% blooming was recorded on day 34, 7 days earlier than the standard. The first harvest began on day 39, entering fruiting 6 days earlier than the standard variety. The last picking concluded on day 80, 4 days longer than the standard. The high field germination of the Saturn F1 hybrid, the mass blooming of female flowers 7 days earlier, entry into first harvest 6 days earlier, and the 10-day extension of the fruiting period distinguish it as one of the promising hybrids for the conditions of Karakalpakstan.

In the Koshan F1 hybrid, 10% and 75% seed germination occurred on days 6 and 9, the same as the standard. However, field germination reached 89%, 17% higher than the standard. Blooming of 10% of female flowers was observed 3 days earlier than the standard, and 75% blooming 6 days earlier. The first harvest began on day 41, 4 days earlier than the standard. The last picking concluded at the same time as the standard — on day 76. The fruiting period amounted to 35 days, 4 days longer than the standard.

In the Mahalliy serhosil F1 hybrid, 10% germination was observed on day 5 and 75% germination on day 7, 1 and 2 days earlier than the standard, respectively. Field germination amounted to 90%, 18% higher than the standard. Blooming of 10% of female flowers was observed on day 33, and 75% blooming on day 35, 3 and 6 days earlier than the standard. The first harvest picking began on day 40, 5 days earlier than the standard.

In the Zena F1 hybrid, 10% seed germination was observed on day 5 and 75% germination on day 7, 1 and 2 days earlier than the standard, respectively. Field germination amounted to 92%. Blooming of 10% of female flowers was observed on day 32, and 75% blooming on day 34. These stages were 4 and 7 days earlier than the standard, respectively. The first harvest picking began on day 39, 6 days earlier than the standard.

As a result, the fruiting period amounted to 42 days, 11 days longer than the standard. This is the highest fruiting period indicator among all the varieties and hybrids in the table.

Thus, Zena F1 stood out through its high field germination, early flowering, early entry into fruiting, and the longest fruiting period. In terms of its overall phenological indicators, it is considered one of the most promising among the samples studied.

In the Orzu F1 hybrid, 10% and 75% seed germination were observed on days 5 and 7, 1 and 2 days earlier than the standard. Field germination amounted to 81%. Blooming of 10% of female flowers was observed on day 33, and 75% blooming on day 34, 3 and 7 days earlier than the standard, respectively. The first harvest began on day 40, entering fruiting 5 days earlier than the standard.

However, the last picking concluded on day 65, stopping 11 days earlier than the standard. For this reason, the fruiting period amounted to only 25 days, 6 days shorter than the standard.

In the Majad F1 hybrid, 10% seed germination was observed on day 6, and 75% germination on day 8. Field germination amounted to 85%, higher than the standard. Blooming of 10% of female flowers was observed 3 days earlier than the standard, and 75% blooming 6 days earlier. The first harvest began on day 41, 4 days earlier than the standard. The last picking concluded at the same time as the standard, on day 76. The fruiting period amounted to 35 days, 4 days longer than the standard. In terms of phenological characteristics, Majad F1 showed results close to those of Koshan F1.

In the Samarqand variety, 10% seed germination occurred on day 6, the same as the standard, while 75% germination was observed on day 8, i.e., 1 day earlier than the standard. Field germination amounted to 74%, only 2% higher than the standard. Blooming of 10% of female flowers occurred on day 36, the same as the standard, while 75% blooming was observed on day 40, i.e., 1 day earlier. The first harvest picking began on day 44, only 1 day earlier than the standard. The last picking concluded on day 66, stopping 10 days earlier than the standard. As a result, the fruiting period amounted to 22 days, 9 days shorter than the standard. This is one of the shortest fruiting periods among the samples studied.

In the Lider F1 hybrid, 10% seed germination was observed on day 6, and 75% germination on day 7. Field germination amounted to 84%, higher than the standard. Blooming of 10% of female flowers was observed on day 33, and 75% blooming on day 34, 3 and 7 days earlier than the standard, respectively. The

first harvest began on day 41, i.e., 4 days earlier than the standard. The last harvest was picked on day 73, concluding 3 days earlier than the standard. The fruiting period was 32 days, only 1 day longer than the standard.

CONCLUSION

Significant differences were observed in the phenological indicators of the cucumber varieties and hybrids studied under the conditions of Karakalpakstan. In the Uzbekskiy 740 standard variety, field germination amounted to 72%, entry into first harvest occurred at 45 days, and the fruiting period amounted to 31 days.

In the Saturn F1 hybrid, field germination was 93%, a result 21% higher than the standard. 75% blooming of female flowers was observed 7 days earlier than the standard, and the first harvest picking 6 days earlier. The fruiting period amounted to 41 days, 10 days longer than the standard.

In the Zena F1 hybrid, field germination was 92%, 20% higher than the standard. 75% blooming of female flowers was observed 7 days earlier than the standard, and entry into first harvest 6 days earlier. The last harvest continued until day 81, and the fruiting period amounted to 42 days. This was 11 days longer than the standard and was the highest indicator among the samples studied.

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