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SEED-BREEDING OF PARTHENO-CARPIC “SARDOR” F₁ CUCUMBER HYBRID CREATED FOR GREENHOUSES IN THE CONDITION OF UZBEKISTAN

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ABSTRACT

Creating F₁ cucumber hybrids with complex valuable farm traits and improving seed-breeding are crucial issues of today. Parthenocarpic “Sardor” F₁ hybrid of cucumber has been created recently in experimental station of Andijan scientific-research institute of vegetable, melon and potato growing which was intended to be grown firstly in greenhouses of Uzbekistan condition. Over the past years testing of agricultural crop varieties by state commission was successfully, from 2018 they entered to agricultural crop register and were recommended to be grown throughout the republic of Uzbekistan. In order to meet the demands for the seeds of greenhouse parthenocarpic cucumber and implementing for production, original seeds of “Sardor” F₁ hybrid of 8,2 kgs and 46 kgs of elite seeds have been prepared.

KEYWORDS: cucumber, selection, father, mother, parthenocarpic, plastic film greenhouse, original, elite, hybrid, variety, seed, population nursery.

1. INTRODUCTION

Among the vegetables grown in greenhouses cucumber takes the second place after tomato and it is grown in 4 thousand ha area per year. Cucumber is one of the most widely grown and eaten vegetables not only in Uzbekistan, but also all over the world. The top producers of cucumber in the world are China, Indonesia, Turkey, Russia, Japan, the Ukraine, Iran, the USA, Spain, Egypt and per year this vegetable is produced in 57,8 tons [1].

The origin of cucumber is in tropical center of South Asia, particularly in India. Since today small and round cucumber variety with sour taste can be met in northern parts of Himalaya mountains. In India 3 000 years ago cucumber was grown as a type of crop. Besides, cucumber

was consumed widely in ancient Egypt, Mesopotamia, ancient Greece and Rome [2].

Technical cucumber fruit consists of 95-97% water, 0,5-1,6% protein, calorie makes 59 kJ. According to medical norms, it is recommended that every person should consume 20-25 kg fresh cucumber during a year. Because in 100 gr of cucumber exist 5-18 mg C (ascorbic acid), 0,9-1,2 mg B₁ (thiamine), 0,07 mg B₂ (riboflavin), 0,2 mg PP (niacin), and A (carotene) vitamins. Furthermore, cucumber contains potassium (P), magnesium (Mg), iron (Fe), calcium (Ca), phosphorus (P), natrium salts, fructose, glucose, saccharose and other various valuable biological matters. Besides, sourness of cucumber fruit depends on coumarin (C₉H₆O₂ - алколоид) biochemical matter, and it

is managed by *Bt* gen, hereditary in dominant form. If there is a sour cucumber fruit met among cucumber population varieties, this sample should be immediately removed during selection process. 3 incomplete dominant *Pc* (*P*) regulate parthenocarpic flowers, *pm-1*, *pm-2*, *pm-3* regulate resistance to powdery mildew, *dm* (*P*) controls resistance to artificial powdery mildew, *F* (*Acr*, *acr^F*, *D*, *st*) allele gens control mother flowers in cucumber [3].

In ontogenesis of any variety though the chromosomes passed from parents are similar in the stages of private development, but appearance gets changed regularly. For example, in cucumber plant, reduction of mother flowers of variety year by year, occurrence of differences in fruits by cumulative and uncumulative traits, increasing disease harm with the result of low productivity can be observed [4]. In the first hybrid generation positive state is observed by these traits. Cucumber is an outer-pollinating plant with recessive features of valuable farm traits and that's why it is difficult to create consistency in different morpho-biological and farm traits of the fruit, and requires to make single selection [5]. Single selection limits seed preparation opportunity. It results in reducing of opportunity of supply with qualitative and productive cucumber seeds in big fields. In the first generation preferences of *F₁* hybrids over the variety are fruit similarities by different morphological traits, disease resistance, high productivity and stable keeping of these traits each year. Considering the abovementioned we can say that creating *F₁* cucumber hybrids with complex valuable farm traits and improving seed-breeding are crucial issues of today [6].

Parthenocarpic "Sardor" *F₁* hybrid of cucumber has been created recently in experimental station of Andijan scientific-research institute of vegetable, melon and potato growing which was intended to be grown firstly in greenhouses of Uzbekistan condition. Over the past years testing of agricultural crop varieties by state commission was successfully, from 2018 they entered to agricultural crop register and were recommended to be grown throughout the republic of Uzbekistan. The next task is to produce widely the seeds of this cucumber hybrid and to reduce the quantity of imported seeds in experimental station of Andijan scientific research institute. This task contains not only the population of seeds of "Sardor" *F₁* hybrid, but also to stabilize further farm traits in its parental forms, also increasing its seed quantity [7].

2. MATERIALS AND METHODS

Field experiments have been conducted on the basis of methods of P.F.Sokolom named "Methodological instruction on cucumber selection and seed-breeding in protected area", "Methodic instruction on cucumber selection", B.A. Dospekhov "Methods of conducting field experiments", B.J. Azimov., B.B. Azimov "Methods of conducting experiments in vegetable, melon and potato growing".

3. RESULTS AND DISCUSSION

In Uzbekistan cucumber is cultivated in autumn-winter, winter-spring seasons and in interval rotation periods in winter greenhouses. These rotations differ from each other with the temperature, condition and lightness. Therefore duration of seedling production is not the same in

different repetitions.

In autumn-winter and interval rotations cucumber seed is sown in its permanent place, the seedling is not prepared for rotations. Cucumber seedlings were prepared only for winter-spring sowing, and were planted from January 10 to February 10 when they were of 30-35 days. But, in order to achieve parthenocarpic seed production, the cultivation of cucumber by planting father and mother seedling forms gave effective results.

For winter-spring rotation the seedlings were prepared in heated plastic film greenhouse.

For interval rotation periods the seedlings were cultivated in empty plastic film greenhouse, and in order to prevent entering of insects that may harm with virus the windows of greenhouse were covered with dense net. To produce seedlings for getting seeds in a protected area quarantine and preventative rules were followed to. Seedling nursery greenhouse and its sections were processed with fumigants and formalin. Containers, inventory and seeds were sanitized. Entrance to seedling nursery section from vegetable greenhouse sections was closed, entrance from outside was allowed through temporary door. In front of entrance door a medicinal container was placed for shoes sanitizing.

For seedling producing the seeds were used which were of high quality and suitable for sowing, advanced tested and processed before sowing. High quality of seeds and creating favorable condition for them allowed to reduction in seed quantity to be used. 0,8-1,0 kgs of cucumber seed were enough for 1 ha of greenhouse area for preparing parental seedlings of cucumber. The seeds were processed in two stages for neutralization. Cucumber seeds were heated during three days at 50°C before, then at 6-78°C within a day in thermostat.

The seeds were checked before sowing, hollow and squeezed seeds were removed. The seeds were processed with potassium permanganate of 0,5-1,0% within 15-20 minutes before sowing, then washed with clean water. Cucumber seedling should be cultivated in pots or blocks for obtaining qualitative parthenocarpic seeds. The seedlings were prepared in 10×10×10 cm form for winter-spring rotations, for parthenocarpic hybrids in larger size 12×12×12 cm, and for other rotations in 8×8×8 cm size for winter-spring period. The cucumber plants required wider feeding area due to cultivation of parthenocarpic variety. Pots humidity was kept in 75-80% HB in seedling cultivation. Plants were watered with warm water of 25-28°C temperature. Considering the washing off nitrogen fertilizers in plant watering, the seedlings were fostered with nitrogen fertilizers in solution concentration of 0,5% 1-2 times during seedling growing period. For winter-spring rotation duration of cucumber seedling cultivation made 30-35 days from the time of sowing to prickling in permanent place. In winter-spring period 8-10 thousand seedlings of cucumber with long shaped fruit and about 20 thousand seedlings of short shaped cucumber parthenocarpic hybrids were planted in 1 ha of greenhouse area. It was observed that seed germination was good and 30 thousand seedlings were planted in 1 hectare with considering a stock (or 800-1000 gr seeds were used for 1 ha). For parental seedling cultivation the quality was controlled considerably.

In order to cultivate parthenocarpic hybrid seeds of cucumber that can correspond to standard requirements, the seedlings with 20-25 cm of height and with 5-6 pcs of leaves quantity of father and mother forms of cucumber were planted. The seedlings were planted in two lines in prepared holes of rows. Firstly these holes were irrigated with 22-25°C temperature water. The seedlings were placed in straight form, ¾ part of pots and blocks were inserted to the hole. Longer plants were placed in declining form, but their stalks were not covered with soil. After planting they were watered through irrigation ditches.

Father and mother forms of parthenocarpic cucumber were planted by placing 3 pcs in 1 m². In the greenhouses with 6,4 m width seedlings were placed in 8 rows, and the distance was 40 cm between the plants. They were planted in two rows in furrows by ribbon, furrows were irrigated.

Plant location was as the following: $\frac{80+80}{2} \times 40$ cm or

$\frac{100+60}{2} \times 40$ cm. Mother S-15 line of cucumber was

sown in experimental field on the 10th of March, while, father S-12 line was planted in March 20 ten days later. Because father flowers bloom firstly in cucumber plant. Blooming of father and mother flowers and maturation of dust pieces should occur simultaneously. Father or mother flowers may keep mature dust pieces for a week or less. If the seedlings are planted at the same time, then at the expense of father flowers blooming mother flowers bloom 10-12 days late and may be left inseminated, though it is inseminated the yield is obtained less.

According to the results of phenological observation obtained from field experiments conducted in nursery garden, seedling germination of S-15 mother line occurred in 3-4 days, while in S-12 father line it was within 2-3 days. Father flowers blooming was observed in S-12 line within 51-57 days, and in S-15 line father flowers were not observed. Blooming of mother flowers of S-15 line required 52-59 days. (1-table).

Table 1

The results of phenological observations of S-15 and S-12 lines of cucumber grown in populating nursery garden (2018)

Line	Date of planting seedling	Germination, day		Blooming, day				Biological maturation of fruits, day	
				father		mother			
		10%	75%	10%	75%	10%	75%	10%	75%
S-15 mother	10.03.2018	3	4	-	-	52	59	130	135
S-12 father	20.03.2018	2	3	51	57	70	71	132	136

Because of experiments were conducted for seed-breeding aim, technical maturation period of cucumber fruits were not studied. Biological maturation of seed fruits in S-15 line made 130-135 days, while in S-12 line it was 132-136 days.

As per biometrical measuring results, the length of main stalk in line S-15 varied in convertibility amplitude from 139 cm to 175 cm and average arithmetic value was

157 ± 0,11 cm. In line S-12 the length of main stalk was shorter than in S-15, and convertibility amplitude was from 30 cm to 100 cm.

The mean arithmetic value on the length of main stalk consisted 65±0,53 cm. Side branches of plant were removed in both lines during vegetation phase (table 2).

Table 2

Biometric measure results of S-15 and S-12 lines of cucumber grown in nursery garden (2018)

Line	Plant quantity, pcs	Mean length of main stalk of plant, cm.										Mean arithmetic value, cm
		139	140	141	143	145	150	160	160	165	175	
S-15 mother	10	1	1	1	1	1	1	1	1	1	1	157 ± 0,11
Line	Plant quantity, pcs	Mean length of main stalk of plant, cm.										Mean arithmetic value, cm
		30	45	45	48	50	52	70	75	90	100	
S-12 father	10	1	1	1	1	1	1	1	1	1	1	65 ± 0,53

S-15 and S-12 lines in nursery garden were not affected by harmful diseases, because of their creation under the results of selection conducted on disease resistance of plants in previous years. Seed fruits of lines differed from each other in both lines. In S-15 line seed fruit mass was 180-210 gr, the length was 16-18 cm and the diameter was 6-7 cm.

The colour of the fruit was yellow without nets, 1,8 cm of flesh with 5,0 cm of overy width. In S-12 line seed fruits weight consisted 140-160 gr, the length was 12-14 cm and diameter – 4-5 cm. Fruit colour was light yellow without nets, fruit flesh made 1,3 cm, overy width of 3,5 cm (table 3).

Table 3
Morphological traits of seed fruit of S-15 and S-12 lines of cucumber grown in nursery garden (2018)

Lines	Seed fruit						
	length, cm	diameter, cm	weight, g	colour	nets	flesh, cm	Ovary width, cm
S-15	16-18	6-7	180-210	Yellow	no	1,8	5,0
S-12	12-14	4-5	140-160	Light yellow	no	1,3	3,5

From S-15 line in nursery garden 0,9 kgs of original and 4,2 kgs of eliteseeds, from S-12 line 1,2 kgs of original and 4,6 kgs of elite seeds were prepared. On the results of analysis of received data the following conclusions were achieved.

5. CONCLUSIONS

1. 0,8-1,0 kgs of cucumber seeds were used to 1 ha area of greenhouse for parental seedling preparation.

2. In order to achieve seed germination at the same time and seedling producing of the same size and form, the temperature was kept at 27°C till seed germination, pot humidity was 75-80% degree.

3. For winter-spring period the seedlings of cucumber were prepared in 10×10×10 cm form, for parthenocarpic hybrids in size of 12×12×12 cm, and for interval periods in 8×8×8 cm size.

4. The stalk height of parthenocarpic hybrids of cucumber was 25-30 cm, leaves amount was 5-6, and got a good root system.

5. In future years for increasing the seed production of “Sardor” F1 hybrid of cucumber in nursery gardens, 1,2 kgs of original and 4,6 kgs of elite seeds were prepared from father form of this hybrid S-12 line.

6. From mother form of “Sardor” F1 hybrid of S-15 line of parthenocarpic cucumber 0,9 kgs of original and 4,2 kgs of elite seeds were prepared in nursery garden of.

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