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## **RENEWAL OF MODERN ASSORTMENT OF CUCUMBER FOR DOMESTIC HOTHOUSE VEGETABLE GROWING**

**The purpose.** Creation of competitive bee-pollinated and parthenocarpic hybrids F1 of a cucumber. **Methods.** Field — morpho-biological and economic assessment of selection material, organoleptic — assessment of gustatory qualities, chemical — assessment of chemical composition of fetuses, measuring-weight — record-keeping and determination of structure of yield, experimental, statistical. **Results.** Morphological and economic valuable performance of 3 new competitive hybrids which pass approbation and implementation in protected soil of farms of different patterns of ownership is presented. **Conclusions.** Bee-pollinated hybrid Anet F1 and first domestic parthenocarpic hybrids Nadiya F1 and Kamila F1 are created. They may be recommended for growing in conditions of the protected soil.

**Key words:** cucumber, hybrid, protected soil, early maturity, productivity, marketability, fastness.

One of the vegetable growing main tasks is vegetables assortment enrichment, which are grown and consumed by the population.

Greenhouse vegetable growing remains one of the most labour-intensive and material-intensive sectors of agriculture. Protected ground has undergone big changes in recent years. Due to energy shortage and high prices, costs of winter greenhouses are sharply increasing. These circumstances have caused to use greenhouses covered with polyethylene coating without heating and to create new varieties and hybrids of cucumber for these conditions. It is implementation of hybrids, which have high resistance to specific adverse factors of environment (high humidity, significant temperature changes, the presence of drip-liquid moisture), as well as against diseases such as downy mildew, bacteriosis, which are arising under these conditions [9].

There are 150 hybrids, 35 (23%) of them are Ukrainian selection, in the Plant Varieties Register of Ukraine 2015.

However, in conditions of Ukrainian greenhouse complexes, hybrids of Russian breeding are the most common. Consumers have become accustomed to the fruit of these hybrids, and high yield, good taste, relative resistance to diseases maintain their popularity [2]. Hybrids of cucumber, which are zoned for spring greenhouses still do not meet the requirements of production. Firstly, they are not well adapted to low air and soil temperature in the first half of the vegetation period and overheating of the air at the end of the growing season. Also they are not sufficiently resistant to root rot, white rot, peronosporosis [7,11].

Today, manufacturers require high-yielding, early maturing parthenocarpic hybrids with high taste of fruit and complex resistance to diseases. The greatest demand of consumer is varieties with short fruit and hybrids of cucumber with a lumpy surface. Therefore, one of the most actual referral in the selection of this culture is to create parthenocarpic heterosis hybrids with a shorter fruit. In the presence of a wide range of parthenocarpic cucumber, greenhouses will get stable yields of high-quality products [3, 8, 10].

**The aim of the research** is creation of competitive pollination by bees and parthenocarpic cucumber F1 hybrids for growing in greenhouses in spring and summer period.

**The research methodology.** The research was conducted at the Institute of Vegetables and Melon Growing NAAN during 2000-2014 years in glass and plastic-film greenhouses in spring and summer period. The method of selection work was sexual hybridization in combination with family and individual selection with the following self-pollination. The genotypes that were studied were estimated according to methods [5, 6, 12]. Testing of agronomic characteristics was conducted according to the methodology of the State Variety Testing of Agricultural Crops [4]. The mathematical processing of the results that were obtained was conducted according to B. A. Dosphehova method [1].

**The research results.** Using methods such as hybridization, self-pollination (inbreeding) and individual selection in the process of selection have given the opportunity

not only to identify and retain valuable traits, but also to get new lines on the basis of which we have created new hybrids of cucumber for protected ground.

In 2008 Anet F1 cucumber hybrid was created by crossing female lines F<sub>5</sub>I<sub>3</sub> Fansipak and male F<sub>5</sub>I<sub>4</sub> AX 1050.

Female line of Anet F1 the first generation hybrid comes from hybrid populations (USA). It was obtained by the method of resynthesis and individual selection using a set of desirable features. The line is characterized mainly by female type of flowering - 95%.

Male line of Anet F1 hybrid was obtained from 1050 AX hybrid by the method of resynthesis and fixing the desired characteristics by self-pollination. Inbreeding was conducted in 4 generations of the source material.

Medium ripe pollination by bees Anet F1 cucumber hybrid was obtained by hybridization of male lines. It takes 51-57 days from full germination to fruiting.

Its comparative characteristics with the standards are listed in Table 1.

The fruit is short, its length is 10-12 cm, with a mean diameter, and its mass is 96 – 100 g. The fruits have a blunt basis in technical ripeness without the neck with the sharp end. A form of the fruit is elongate-cylindrical, the surface of the fruit is lumpy, spikes are moderately complex white. The fruits are with the strips of medium length, maculation is absent. The seeds are white-green colour. The hybrid is relatively resistant to downy mildew and root rot.

Total yield of Anet F1 the first generation hybrid is 9.0-13.2 kg/m<sup>2</sup>, with the length of the fruiting period is 35-47 days, which is 15-25 % higher than the standards such as Slobozhansky F1, Souvenir F1, Rodnichok F1.

The potential yield is 18 kg/m<sup>2</sup>. The marketability is 90 % (fruit -70, gherkins - 15 and pickles - 5). The yield of the first month of fruiting is 4.9-6.5 kg/m<sup>2</sup> (46-62%). The fresh fruits tasting score is 4.6 points. Fruits are using for fresh consumption and for

Table 1 - Economic - valuable indicators of pollination by bees cucumber hybrids (average for 2006-2008)

Indicators	Level of characteristics expression		
	Slobozhansky F <sub>1</sub> St <sub>1</sub>	Souvenir F <sub>1</sub> St <sub>2</sub>	Anet F <sub>1</sub>
Yield and its components:			

total yield, kg/m <sup>2</sup>	7,6	9,7	11,1
marketable yield, kg/m <sup>2</sup>	6,7	8,5	9,8
marketability, %	91	87	90
The precocity and the manifestation of the female sex:			
female plants, %	42-85	42-80	87-100
the number of days from mass germination to fruiting	51-66	46-53	51-57
the returns for the first month of fruiting, %	33-55	36-83	46-62
The morphology of the fruits:			
length of marketable fruit, cm	10-12	14-16	10-12
surface of the fruit	large lumpy	large-lumpy	large-lumpy
spikes color	white	white	white
Quality (biochemical composition and technological properties):			
soluble dry matter, %	5,4	4,9	5,2
total sugar, %	2,6	2,5	2,6
ascorbic acid, mg/100g	10,3	10,9	9,8
Testing score:			
fresh fruits, score	4,6	4,6	4,6
canned fruits, score	4,9	4,5	4,8
resistance against downy mildew, score	7	5	5

canning. The canned fruits tasting score is 4.8 points. Fruits are transportable, storage time of fruit colour is 5 days.

Work on creating of parthenocarpic hybrids for protected ground was started in 2000. In research of creating hybrids were used original forms of different geographic origin with sources of agronomic traits and properties. As a result of breeding work parthenocarpic cucumber hybrids Nadia F1 and Kamila F1 were created in 2010 and 2013.

Nadia F1 hybrid was created by sexual hybridization with subsequent multiple individual and family selection, by crossing female lines F<sub>7</sub>I<sub>4</sub> selectable from Parker F1 hybrid for the manifestation of the female sex (70-100%), parthenocarpy (61,5%), resistance against root rot and downy mildew and male F<sub>7</sub>I<sub>3</sub> selectable from Miranda F1 hybrid by inbreeding in 5 generations and selection for the manifestation of parthenocarpy (73,7%) and resistance against root rot and downy mildew.

As a result of breeding work Nadia F1 hybrid was created, it is precocious, from mass germination to fruiting is 45 - 48 days (Table 2), the fruiting period is 39 days, parthenocarpic hybrid (75-85%) female flowering (70-90%), number of flowers per node is from 1 to 3. Fruit is short (8-10cm). Form of fruit is cylindrical, surface of the fruit is lumpy, spikes are dense and white. Bitterness is missing. Seeds are yellow. The hybrid is resistant to root rot and relatively resistant to downy mildew.

The total yield of the hybrid is at the level of the Courage F1 standard, and significantly exceeds the Galite F1 standard for 47%. Marketable yield is 14.1 kg/m<sup>2</sup>, the yield of the first month of fruiting is 10 kg/m<sup>2</sup>. The fresh fruits tasting score is 4.8 points. The canned fruits tasting score is 4.6 points.

All chemical indicators of hybrid are not significantly exceeds standards from 2 to 8%.

The second Kamila F1 cucumber hybrid parthenocarpic was generated by hybridization female line selectable to generation F<sub>7</sub>I<sub>5</sub> from hybrid population number 11 for the enhancement of female flowering (80-100%), the manifestation of parthenocarpy (62-80%) and resistance against root rot and downy mildew and male selectable to generation F<sub>5</sub>I<sub>3</sub> from Kuznechyk F1 hybrid for the manifestation of parthenocarpy (72-90%) and resistance against root rot and downy mildew.

Table 2 - Economic - valuable indicators of parthenocarpic cucumber hybrids (average 2008-2014)

Indicators	Level of characteristics expression			
	Galite F <sub>1</sub> St <sub>1</sub>	Crispin F <sub>1</sub> St <sub>2</sub>	Nadia F <sub>1</sub>	Kamila F <sub>1</sub>
total yield, kg/m <sup>2</sup>	10,2	13,0	15,0	16,1

marketable yield, kg/m <sup>2</sup>	6,5	11,6	14,1	14,7
Marketability, %	64	86	90	93
Parthenocarpy, %	75-85	85-90	75-85	72-90
precocity - the number of days from mass germination to fruiting	45-57	41-43	45-48	38-42
The manifestation of female - female plants, %	57-70	71-93	71-90	80-100
The fruiting period (days)	34-47	41-48	38-40	41-49
The morphology of the fruit: length of marketable fruit, cm	12-14	10-12	8-10	8-10
the surface of the fruit	lumpy	lumpy	lumpy	lumpy
spikes color	black	white	white	white
the content in fruits:				
soluble dry matter, %	4,6	4,6	4,9	5,2
total sugar, %	2,2	1,6	2,3	1,9
ascorbic acid, mg/100g	10,2	10,5	10,6	10,4
<b>Testing score:</b>				
fresh fruits, score	4,6	4,6	4,7	4,9
canned fruits, score	4,7	4,4	4,6	4,5
resistance against downy mildew, score	5	7	7	7
root rot score	7	9	9	9

The hybrid is characterized by precocity (38-42 days), the fruiting period is 41-49 days, the level of parthenocarpy is 72-90%. Plants form predominantly female flowers (80-100%), the number of flowers per node is from 3 to 5 and more. Fruit is short (8-10cm). Form of fruit is cylindrical, surface of the fruit is lumpy, spikes are dense and white. Bitterness is missing. Seeds are light green colour. The hybrid is resistant to root rot and relatively resistant to downy mildew.

The total yield is 15.2-16,9 kg/m<sup>2</sup>, which exceeds the Nadia F1 standard for 7%; and the Crispin F1 standard for 24%. The marketability of hybrid is 89-96%. The fresh fruits tasting score is 4.9 points. The canned fruits tasting score is 4.5 points. Chemical characteristics of fresh fruits are excellent and are at the level of standards.

### **The conclusions**

Based on female and male lines of cucumber are received new competitive cucumber hybrids such as pollination by bees Anet F1 and parthenocarpic Nadia F1 and Kamila F1 which are suitable for growing in greenhouses. Economic efficiency of their cultivation is 5.7-7,8 UAH./m<sup>2</sup>. Anet F1 and Nadia F1 hybrids were entered in the Register of Plant Varieties Suitable for Dissemination in Ukraine, and Kamila F1 hybrid is passing the qualifying examination.

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