



INFLUENCE OF SOWING TERM ON HIGH YIELD OF VEGETABLE SOYBEANS IN UZBEKISTAN

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ABSTRACT

Our experiments have shown the difference in the yield accumulation of early variety Universal, which depends on sowing time. A total harvest in technical ripeness (green beans) was 112 and 107.6 cents per hectare while sowing on April 20 and 30, commodity – 107 and 103 cents per hectare. At the sowing on March 20 and 1 April, what exactly were ? were 88.4 and 84 cents per hectare, respectively. In the control term of April 10, respectively, 105.7 and 97 cents per hectare. The commodity products in all planting terms was 90.2 – 95.7%. The optimal term for seed sowing and getting a high harvest was period from April 1 to 20. The planting time had an impact on the biochemical composition of vegetable soybeans in the phase of technical ripeness. Depending on the earlier to later planting, the content of dry matter, protein, oil, vitamin C, sugar increased, this is due to favorable climatic conditions for growing soybean plant. Implementation of our recommendation will help farmers to expand the range of vegetables and provide the population with products, which rich in protein and other biologically active substances.

KEYWORDS: *vegetable soybeans, seeds, beans, Universal variety, sowing terms, yield, biochemical composition.*

INTRODUCTION

Currently, soybean is one of the most important crop in the world. Vegetable soybean originates from China and cultivated for more than 5,000 years, spreading from China to neighboring countries such as Korea, Japan, India, Indonesia, Malaysia, Nepal, the Philippines, Thailand and Vietnam. The main soybean producing countries are the United States, Brazil, Argentina, China, India, Paraguay, Canada and Indonesia, which together produce 80% of the world's soybean [6, 7].

Vegetable soybean is a new non-traditional culture for our country, which has great potential and interest for introducing it into agriculture. Soybean is a food, technical, oily, forage and cider culture. Using soybean seeds we can produce products for the manufacture of several hundred different products [4, 8].

Currently, the diet of the population is lacking in food rich in easily digestible proteins. One of the way to solve this problem is replacing animal proteins with plant proteins, which can be cheaper and more useful. It

has been proven that soybean effectively reduces blood cholesterol, optimizes glucose content in diabetes, strengthens the bones, prevents the heart and blood vessel diseases, and reduces the risk of kidney stones and liver. Soybean contains a very seldom omega-3 fatty acid, essential for brain development in newborns, reducing the risk of heart and cancer disease [1, 9].

The inclusion of vegetable soybeans in the diet will enrich the food with necessary proteins and other nutrients for the body. Dishes like vegetable soybean soups, puree, fresh soy salads, soy meat, soymilk, chocolate, butter will be much cheaper, not inferior to taste. Now not sale of vegetable soybeans in the markets, but with development farms has been perspectives to increase its area for cultivation mainly (spring) and repeated (summer) crops as the main or combined crop. Cultivation of ultra - and early ripen varieties of vegetable soybeans will allow to get early products and have enough time to use the lands repeatedly. At the same time, the problem of increasing

soil fertility will be solved, as vegetable soybeans contribute to the accumulation of nitrogen in the soil due to activity of nitrogen-fixing bacteria that lives in its roots [3, 5].

In our experiments, the vegetable soybean variety of Universal has been studied, which flowering duration is 20-30 days. The flowers are white. The bush height is 40 - 60 cm, the shrub is average. The beans are formed at the base of the first - second branch and have very short internodes. The leaf is solid, oval-shaped, with a pointed end. The omission is weak. The bean is 5 cm long and 1.1 cm wide, formed 1-3 seeds in each bean. One plant generated from 25 to 65 beans, from which 90% - two-seed. Seeds in the technical phase of ripeness (green beans) has green color shiny, flat-shaped, 1.0 cm long, with a diameter of 0.7 cm. The period from mass flowering to technical ripeness is 20-30 days, biological ripeness period is 55-60 days. The first harvest of green beans in technical ripeness is held on 60-65 days after shoots. Biological ripeness of seeds is on 90-95 days after shoots. The yield of beans in technical ripeness is 11 tons per hectare, and in biological ripeness is 4 tons per hectare. The mass of 1000 green seeds is 690 - 720 g. In biological maturation seeds are solid, yellow color, the mass of 1000 seeds - 255 - 270 g [5].

During growing season, the care of vegetable legumes was 22 watering, 3 cultivations and 3 hand weeds. During vegetation period twice (during flowering and before beginning bearing) the plant is fed with mineral and organic fertilizers, and introduced (nitrogen, potassium, phosphorus) with 50 kg of ammonium sulfate, 50 kg of potassium chloride and 100 kg of nitrogen. These fertilizers and doses are unchanged. They should be used each time, taking into account the composition of the soil, the precursor and weather conditions.

The agrochemical soil analysis at experimental sites was carried out in conjunction with the agrochemical service station.

The preventive measures were carried out to control pests during the mass flowering of the plant and repeated spraying with the tying of beans, the Gaucho preparation at the rate of 5mg/10 liters of water. During experiment period the diseases at the experimental site are not observed.

MATERIALS AND METHODS

The material for the experiment was the vegetable soybean Universal variety. The research was carried out in 2008-2016 in the Scientific Research Institute of Vegetable, Melon Crops and Potato (SRIVMG&P, Uzbekistan). Soil was gray on experimental field. Research was conducted according to protocols in Guidelines "VIR guidelines for the study of the world collection of legume crops"(1975, 1987) and

"Guidelines for the study of vegetable soybean, AVRDC, Taiwan" [2006]. For evaluation of chemical composition, the methods were implemented which are using in the laboratory of the Institute of Biochemistry (A.I. Ermakov et al. 1972). Statistical analysis of experimental data was made by B. Dospekhov [2].

RESULTS AND DISCUSSION

The average daily air temperature in the research years was slightly higher than multi-year average. In January, February and March 2009, the temperature was higher for this period of 2.0...2.5 degrees Celsius compared to the average perennial data on 1.0...1.5 degrees Celsius. According to the graph, the air temperature for the period from 2013 to 2016 in May was 2.2... 4.0 degrees Celsius higher in comparison with average perennial data.

Experiments (2008-2016) in SRIVMG&P have been conducted differences in the accumulation of yield the precocious Universal variety, depending on the sowing time. Five sowing terms were studied: March 20, April 1, April 10, April 20 - control and April 30.

The optimal time for seed sowing and getting a high yield is the period from April 1 - 20. At these two planting terms sowing, the yield of vegetable soybeans legumes is removed in July.

Sowing at the earlier terms during the cold spring delays germination to 15 or more days, which usually leads to the death of part the seeds and significant scuffling of shoots. Similarly, the later terms sowing, in addition to the decline in the harvest, cause significant complications in harvesting and storing yield the increased humidity of the bean and stems mature.

The most important proof in the different terms of sowing is a yield of soybeans legumes in the phase of technical ripeness. The data show that the largest total yield was harvested on April 20 - 112 cents per hectare, which is 106% to control. In comparison, a slight decrease in the yield was observed, both in earlier and later sowing terms. The lowest yield was received in the first term on March 20 - 82 cents per hectare (77% to control), and in the control term April 10 - 105.7 cents per hectare (Figure 1).

The most commodity harvest was obtained at the planting date of April 20 - 107 cents per hectare (110% to control), and the smallest at the time of March 20 - 74 cents per hectare (76% to control), in the control term on April 10, the commodity yield was 97 cents per hectare.

The terms of sowing had some impact on the formation of the number of beans on one plant. The largest number of beans was planted on April 20 - 49 pieces/growth. Both earlier and later of sowing, the number of beans ranged from 38 to 46 pieces/growth.

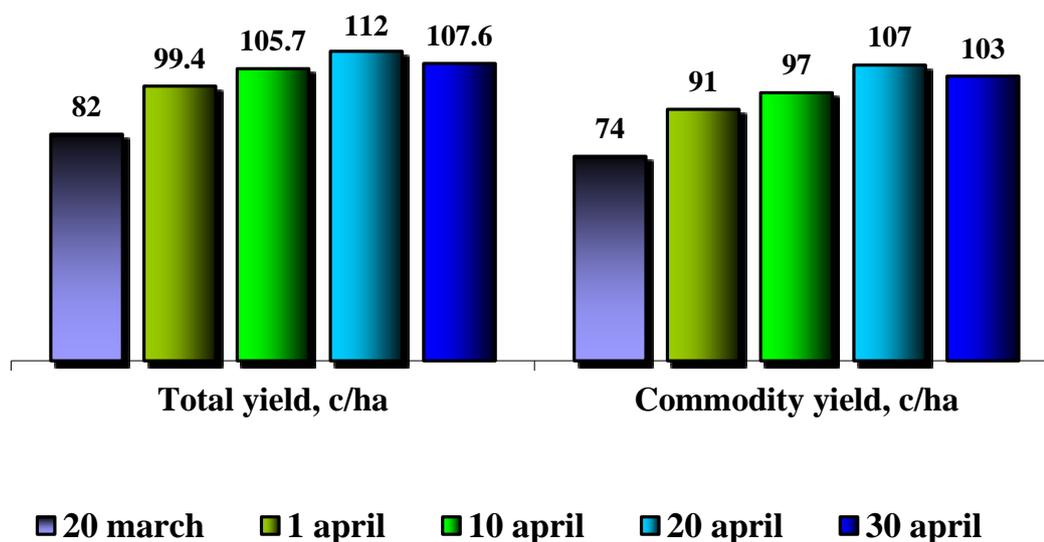


Fig. 1. Total and commodity yield of vegetable soybeans of Universal variety at different sowing terms

The average weight of 1000 pieces. green beans in legumes also depended on the term of sowing. This figure increased slightly during the sowing term of April 20 and amounted to 700 g. At earlier and later sowing terms, the average weight of beans decreased slightly.

It has been established that the highest total and commodity yield was formed during the planting date of April 20. The value of the commodity harvest in relation to control (sowing on April 10) was: the sowing term of March 20-76%, April 1 - 95%, April 20 - 110%, and the sowing term April 30 - 106%.

The different sowing terms, the growing period of vegetable soybean plant at formation from the phase of

technical ripeness occurred at different temperature and light conditions. This had a significant impact on the physiological and biochemical processes, and as a result - on the biochemical indicators of grown products of vegetable soybeans (Table 1).

Biochemical analysis of vegetable soybeans, conducted in the phase of technical ripeness (green beans) showed that with the delay of sowing in later terms, the content of the main components of the chemical composition slightly increases.

Table-1.

The biochemical composition of the vegetable soybeans of Universal variety in technical ripeness (green beans)

Sowing terms	Dry substances,%	Protein, %	Oil, %	Total sugar, %	Starch, %	Vitamin C, mg %	Nitrates, mg/kg
		% on a completely dry substance					
20 March	78,8	43,0	18,8	4,5	2,80	120	90
1 April	79,0	43,5	19,0	4,6	2,84	125	90
10 April (control)	79,2	43,9	19,2	4,7	2,89	130	91
20 April	79,5	44,5	19,5	4,8	2,90	140	92
30 April	80,1	44,1	19,3	4,9	2,96	145	92

The terming of sowing had some effect on the change in protein content. On average, of the experiment, the highest protein content in soybeans was observed at later sowing term on April 20-44.5%, with an early sowing period of March 20 - 43.0%, in the rest of the sowing terms the protein content was between 43.5 and 44.5%.

The high content of vegetable oil was at the sowing on April 20 - 19.5%, at earlier sowing terms of March 20 - 18.8% and at later planting dates on April 20, the vegetable oil content 19.3%.

The terming of sowing had some effect on the change in the total sugar content of beans. This rate increased slightly (from 4.5 to 4.9%), with the transition from early to later sowing terms, which also associated with changes in climatic conditions of cultivation.

In vegetable soybean, as in all vegetables consumed in phase of technical ripeness (green beans) is important content of ascorbic acid (vitamin C). The results have shown that the content of ascorbic acid increases slightly from early March 20 (120 mg/%) to later sowing term April 30 (145 mg/%). Pattern was

observed for the accumulation of starch in the early sowing term on 20 March (2.8%) by the later sowing term (2,96 %). Consequently, all biochemical indicators increase slightly at later sowing terms compared to the early planting on March 20. We have established that in terms of yield and commerciality of green beans, the best term of sowing is the second decade of April. This is confirmed by the experimental data and obtained on the number of beans and seeds on a single plant.

If necessary to vacate the field for re-culture before the end of June and beginning of July, it is possible under favorable weather and climatic conditions to plant at an earlier time from March 20 to April 1. In this case, a lower crop of vegetable soybeans will be compensated by the crop of re-culture. This makes it possible to free the field for repeated cultures.

When sowing from March 20 to April 1, the field is released in the first decade of June and as a re-culture can plant potatoes, cucumber, carrots, radish, watermelon, corn on green food, onions. When sowing from April 10 to April 20, the field is released at the end of June and can be planted potatoes as a re-culture (table 2).

We recommend the optimal sowing term on the typical serozems of Uzbekistan on April 10-20. It is permissible to use crops until April 30. The economically not feasible to plant crops at a later date, as the onset of the technical ripeness phase of soybean vegetable beans is delayed until the end of August, leading to belated soil preparation and sowing or planting for re-crops.

Table 2. The effect of spring sowing term of vegetable soybeans of the Universal variety on sowing terms of re-crops

March			April			May			June			July		
I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
Sowing 20 March									potato, cucumber, carrots, radish, watermelon, corn on green food, onion					
Sowing 1 April						potato, cucumber, watermelon								
Sowing 10 April									potato, onion					
Sowing 20 April												onion		
Sowing 30 April														

It should be noted that in both early and later terms, the soybean yield was 20.03 - 33.2 cents per hectare, 1.04 - 35.6 cents per hectare, 30.04 - 36.1 cents per hectare. The highest yield was recorded at the planting of 20.04 - 38.5 cents per hectare. In the control version 10.04 - 37.7 cents per hectare.

CONCLUSION

1. In the later sowing terms on plants of vegetable soybean form more beans, and size of legumes are increasing. During harvesting, the average weight of 1000 green beans was: at the sowing term of April 20 - 700 g, at term March 20 - 605 g.

2. On sowing term 20 and 30 April, the total yield in technical ripeness (green beans) was 112 and 107.6 cents per hectare of commercial yield - 107 and 103 cents per hectare. At the sowing on March 20, was 88.4 and 84 cents per hectare, respectively. The output of commercial yield products in all planting terms was 90.2-95.7%.

3. The sowing terms had an impact on the biochemical composition of vegetable soybeans in the phase of technical ripeness. It was established that the dry substance in the green beans of vegetable soybeans varied depending on the terms of sowing. In the sowing on March 20, the dry substance content was 78.8%, and increased in the last sowing term on April 30 - 80.1%. The highest protein content accumulated at later sowing terms on April 30 - 44.1%, at in earlier sowing term on March 20 - 43%. The same pattern was noted in the fat content, respectively, (18.8 and 19.5%), total sugar (4.5 and 4.9%), ascorbic acid (vitamin C) (120 and 145 mg),

starch (2.8-2.96%). It established that in vegetable soybeans the nitrate content was 90-92 mg/kg, which is lower than LPC (200 mg/kg).

4. Account the yield and nutrient content of beans of vegetable soybeans on the Universal variety, we recommend the optimal sowing term of April 10-20. If it not impossible of sowing in this term to spring rains, we will allow sowing until April 30.

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