TECHNOLOGY OF APPLICATION OF BIOSTIMULATOR (MICROZYM-2) IN THE CULTIVATION OF PEANUT VARIETIES IN THE CONDITIONS OF UZBEKISTAN

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https://doi.org/10.5281/zenodo.10325680

Abstract. *This study was conducted in experiment fields in the Plant Science department of Tashkent State Agrarian University in 2014-2016. The experiment was performed in split-plot design with 4 replications. Based technology for the use of biostimulator Microzym-2 under peanut cultivation, determined the economic efficiency of the studied peanut varieties depending on the agro technological elements in obtaining a high and quality yield. When using the biostimulator Microzym-2 with a rate of 30 l/t before sowing peanut seeds, the yield of pods of the "Salomat" variety was higher by 0,14 t/ha, and the "Mumtoz" variety by 0,11 t/ha compared to the control (0,12 t/ha). When using mineral fertilizers with a rate of* $N_{150}P_{150}K_{100}$ *kg/ha with the introduction of the biostimulator Microzym-2 before sowing seeds, as well as in the phase of flowering-pods formation, the grain yield of the Salomat variety was 2,93 t/ha, and that of the Mumtoz variety was 3,32 t/ha.*

Keywords: *peanut (Arachis hypogaea L.), experiment, Microzym-2 biostimulator, design, replication, statistic, flowering, maturity, seed weight, pods, yield.*

Introduction

Arachis hypogaea L., commonly known as peanut, groundnut, monkey nut, goober, or earth nut because the seed develop underground, is in the division Papiolionaceae of the family Leguminoceae [1;3]. The peanut is only one of a few hundred species of legumes that produces flowers above ground but develops the fruit below ground. Peanuts are native to South America and were cultivated in pre-Columbian native societies of Peru as early as 3000 bc. Peanuts probably originated in the region of eastern South America, where a large number of species are found growing wild [4;5]

In 2018, world production of peanuts (reported as groundnuts in shells) was 46 million tonnes, led by China with 38% of the global total, followed by India (15%). Other significant producers were Nigeria, Sudan, and the United States [1;2;].

At present, to meet the needs of the world population with food, it is important to increase the yield and quality of oilseeds, including peanuts. Globally, peanuts are sown in 117 countries of the world on an area of 27.66 million hectares, the total yield is 43.98 million tons, and the average yield is 1.59 t / ha.

This crop on the Asian continent is cultivated on 56% of the area, in Africa on 40% of the area, where these continents account for 68 and 25% of the total production. Uzbekistan ranks 51st in the world for the cultivation of peanuts. To date, the scientific substantiation of the technology of cultivating varieties of peanuts and providing the population with food by increasing the gross yield is an urgent issue.

In the countries of the world that cultivate peanuts, special attention is paid to increasing the yield and quality of seeds due to soil conditions, varietal characteristics and advanced methods of agricultural cultivation technologies.

Proceeding from this, scientific research on the creation of new high-yielding peanut varieties with high grain quality and suitable for processing, improving the cultivation technologies inherent in agricultural technologies, increasing the yield and quality of seeds of peanut varieties by optimizing the timing of sowing seeds, irrigation regimes, norms of mineral fertilizers, accelerating growth, development, due to the use of growth stimulants, meeting the requirements of the country's population with oilseeds and confectionery products, providing livestock with nutritious feed are relevant.

For the intensive development of agriculture, an increase in the volume of cultivation of exportable products, as well as ensuring food security and preserving soil fertility, an urgent task is to conduct scientific research on the optimal timing of sowing new varieties of peanuts, the irrigation regime, on the effective use of mineral fertilizers and biostimulants in conditions of irrigated typical serozem soil.

Extensive research work on environmental testing and selection, increasing the yield and quality of seeds, as well as improving the technology of cultivation in different soil and climatic conditions of varieties of peanuts with high and high-quality yield indicators were carried out by leading international scientific centers and higher educational institutions, such as American Peanut Research and Education Society, UF-University of Florida IFAS Research (USA), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Center for Agricultural Research in the Dry Areas (ICARDA), Shandong Peanut Research Institute (China), KOPIA (Koreaat the Krasnodar State Agrarian University (Russia), the Research Institute of Crop Production, the Tashkent State Agrarian University (Uzbekistan).

Materials and methods. Field studies were carried out at the experimental station of Tashkent State Agrarian University. The experimental station is located near Tashkent, in the upper part of the Chirchik river, Kibray district of the Tashkent region, at an altitude of 481 m above sea level, 41^0 11^{II} northern latitude and 38^0 31^{II} east longitude. The terrain of the site is uneven, slightly wavy, with a general slope to the Salar canal. Irrigation water was pumped from the Bozsu channel.

Table 1. The soil characteristics of the experimental area

№	Depth (sm)	Gross content, %				Mobile forms, mg/kg		
		humus	nitrogen	phosphorus	potassium	$N\text{-}NO_3$	P_2O_5	K_2O
1	0-30	0,925	0,083	0,152	1,33	4,8	47,1	180,7
2	30-50	0,715	0,070	0,134	1,30	3,2	40,3	162,0

The soil of the experimental site is long-irrigated sierozem, non-saline, with a low content of humus 0,9-0,7%, nitrogen 0,082-0,066%, phosphorus 0,153-0,139%, potassium 1,33-1,30%.

Field and laboratory methods of research, developed by the Uzbek Research Institute of Plant Production, were used. Phonological observations were conducted according to the Methodology of the State Variety Testing of Agricultural Crops. Statistical processing of data was carried out according to B.Dospekhov [6]. Application of organic and mineral fertilizers and necessary agro technics on these soils, enable to obtain the high yields of field crops.

Climatic conditions. The climate of Tashkent region, as well as of Uzbekistan in general, has a sharply continental character. Spring comes early: at the beginning of March, the air temperature rises noticeably, although sometimes a sharp cooling occurs. During this period a significant part of the annual precipitation falls. Summer is long, hot and dry.

Table 2. The climatic conditions during the growing season and long years mean (LEM=1960-2016)

Month	Mean temperature (^{0}C)				Total rainfall (mm)			
	Long years mean	2014	2015	2016	Long years mean	2014	2015	2016
January	0,2	2,6	2,4	6,1	62,3	92,4	98,2	95,9
February	2,4	-3,4	5,9	7,7	74,5	38,7	103,6	7,5
March	8,0	8,9	7,6	12,9	87,8	100,4	91,4	115,4
April	14,8	13,7	17,1	15,3	71,8	70,4	65,5	31,5
May	20,1	23,1	22,1	20,7	39,9	15,2	85,5	54,6
June	25,4	26,8	27,6	26,5	12,1	7	24,9	14,9
July	27,2	26,3	29,1	27,9	4,0	0	0	1,6
August	25,4	26,6	26,4	27,3	2,5	0	3,6	0
September	20	20,7	20,1	23,8	4,8	1,0	4,8	5,8
October	13,7	12,7	14,4	11,6	33,4	61,4	104,8	38,2
November	7,4	5,2	7,4	5,7	55,2	76,4	98,3	57,3
December	2,5	3,1	7,0	5,0	70,2	35,4	65,8	88,6
Average	**13,9**	**13,9**	**15,6**	**15,9**	**518,5**	**498,3**	**746,4**	**511,3**

Sometimes precipitation falls in the month of June in the form of rains, but then comes hot and dry weather, usually continuing until late autumn. The maximum air temperature reaches 43 °C in July, sometimes in August.

Results. It was observed that in the years of the experiment, depending on the climatic conditions, field germination period and duration of the field germination of the peanut variety seeds were different. It was established that peanuts are a thermophilic crop. The optimal temperature for the growth and development of this culture is 25-30 °C. At temperatures below 12 °C, no fruit is produced. Usually sprouting of peanuts seeds begins at a temperature of 14-15 °C.

The aim of the study is to scientifically substantiate the technology of using a biostimulant for morpho-biological characteristics, photosynthetic activity, oil content and the formation of crop elements of local varieties of peanuts.

The technology of using biostimulant in the cultivation of peanuts - the technology of using the biostimulant Microzym-2 in the cultivation of varieties of peanuts before sowing seeds, as well as in the phases of flowering and bean formation, has been analyzed, which contains data on field germination of seeds, development phase, stem height, leaf area and yield peanuts.

When treating the seeds before sowing with the biostimulator Microzym-2 (30 l/t), seedlings were obtained 3-4 days earlier and full seedlings were obtained. The field germination capacity of the Salomat variety was 90%, and that of the Mumtoz variety was 92%. The real density of the "Salomat" variety was equal to 120.0 thousand pieces / ha, and the "Mumtoz" variety was 122.8 thousand pieces / ha. The data obtained show that when processing peanut seeds before

sowing with the biostimulant Microzym-2, the germination of seeds is accelerated and an optimal plant density is ensured.

The experience revealed the following patterns of the effect of the biostimulant Microzym-2 on the phases of development of peanuts. For example, in the "Salomat" variety on the control variant without mineral fertilizers, the beginning of flowering phase was noted on June 2, when mineral fertilizers were applied at a rate of $N_{150}P_{150}K_{100}$ kg/ha on June 6, and in the "Mumtoz" variety, these indicators fall on June 13-15, respectively. When treated with the biostimulant Microzym-2, the shoots of the Salomat variety began on June 2-4, and the "Mumtoz" variety on June 12-15, where the flowering phase also differed by 2 days.

Similar cases are observed when processing the biostimulant Microzyme-2 before sowing seeds and in the phases of flowering - the formation of beans, where the phase of bean formation and ripening differs from 1-3 days to 7-8 days, which creates optimal conditions for the full ripening of the beans due to lengthening the developmental phase.

In particular, against the background of mineral fertilizers, the period from sowing seeds to ripening was 130 days for the Salomat variety, and 147 days for the Mumtoz variety; The Salomat variety was 138 days, and the Mumtoz variety was 154 days.

The use of the biostimulant Microzym-2 together with mineral fertilizers influenced the intensive growth, development and obtaining of a bountiful harvest. The experience determined the significant influence of the studied factors on the height of the peanut stalk.

The existence of a high positive correlation between the yield of beans and the oil content of seeds of peanut varieties under the influence of the biostimulator Microzyme-2 was revealed *(r=0.675)*.

When processing seeds before sowing, in the phases of flowering and bean formation, the stem height of the Salomat variety was 45 sm, and that of the Mumtoz variety was 40.9 sm, which is 10.3 and 9.2 sm higher compared to the control variant. Experimentally, when treating seeds before sowing with a biostimulator Microzim-2, the leaf surface area of the Salomat variety was 27.8 thousand m^2 / ha, and the Mumtoz variety was 26.9 thousand m^2 / ha, which is 1.6-1.9 thousand m^2 / ha is higher compared to the control.

It is necessary to note the increase in the effectiveness of the biostimulator Microzyme-2 against the background of mineral fertilizers. At an annual rate of mineral fertilizers $N_{150}P_{150}K_{100}$ kg / ha with the use of a biostimulator Microzym-2 before sowing seeds, as well as in the phases of flowering and bean formation, the leaf surface area of peanuts of the Salomat variety was 40.3 thousand m^2 / ha, and the Mumtoz variety 43.4 thousand m^2 / ha.

The studies have determined the significant effect of the biostimulant Microzyme-2 on the yield of peanut beans.

Conclusions. When using the biostimulator Microzym-2 with a rate of 30 l/t before sowing peanut seeds, the yield of pods of the "Salomat" variety was higher by 0,14 t/ha, and the "Mumtoz" variety by 0,11 t/ha compared to the control (0,12 t/ha). When using mineral fertilizers with a rate of $N_{150}P_{150}K_{100}$ kg/ha with the introduction of the biostimulator Microzym-2 before sowing seeds, as well as in the phase of flowering-pods formation, the grain yield of the Salomat variety was 2,93 t/ha, and that of the Mumtoz variety was 3,32 t/ha.

The economic efficiency of the use of the biostimulator Microzym-2 in the cultivation of peanuts has been determined. When processing seeds before sowing at a rate of 30 l / t, and in the flowering phase - the formation of beans at a rate of 40 l / ha with a biostimulator Microzym-2

with fertilizing with mineral fertilizers at a rate of $N_{150}P_{150}K_{100}$ kg / ha, the net income was 9236.8 thousand sum / ha, the level profitability 70.4%.

Table 3. Influence of biostimulator Microzym-2 on the development phases of peanut varieties

№	Experience options	Timing of application			Seed germination	The beginning of flowering	Pods formation (grains)	Ripening phase	Vegetation period
		application rate before sowing, l/t	application rate in flowering phase	the rate of use of mineral fertilizers, kg / ha					
	Salomat variety								
1	Control	-	-	-	6.05	2.06	11.06	2.09	119
2	Control	-	-	$N_{150}P_{150}K_{100}$	6.05	6.06	18.06	8.09	130
3	Microzym-2	30	-	-	4.05	2.06	12.06	5.09	124
4	Microzym-2	30	40	-	4.05	4.06	15.06	10.09	129
5	Microzym-2+NPK	30	-	$N_{150}P_{150}K_{100}$	4.05	6.06	19.06	15.09	134
6	Microzym-2 +NPK	30	40	$N_{150}P_{150}K_{100}$	4.05	6.06	21.06	19.09	138
	Mumtoz variety								
7	Control	-	-	-	8.05	13.06	24.06	16.09	131
8	Control	-	-	$N_{150}P_{150}K_{100}$	8.05	15.06	01.07	02.09	147
9	Microzym-2	30	-	-	6.05	12.06	25.06	21.09	138
10	Microzym-2	30	40	-	6.05	13.06	29.06	28.09	145
11	Microzym-2+NPK	30	-	$N_{150}P_{150}K_{100}$	6.05	15.06	02.07	04.09	151
12	Microzym-2+NPK	30	40	$N_{150}P_{150}K_{100}$	6.05	15.06	04.07	07.10	154

To obtain a high and high-quality yield of peanut grain in the conditions of irrigated typical serozem soils of the Tashkent region, it is recommended to treat with a biostimulator Microzym-2 before sowing seeds with a rate of 30 l/t, in the phases of flowering and formation of beans with a rate of 40 l/ha.

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