Effect of phosphorus fertilizers used in different doses on cauliflower productivity

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Abstract. Research has established that in order to obtain a high and stable yield with good taste qualities of cauliflower, it is recommended to use phosphorus of 175 kg/ha P_2O_5 against the background of N200 K100. At the same rates of application, ammophos is more effective than nitrocalcium phosphate fertilizer. In the article, the positive aspects of using Ammafos, Superfos, fertilizers at the rate of 175 kg per hectare in the cultivation of Cauliflower Casper F1 hybrid in the conditions of irrigated meadow-gray soil of Samarkand region, and the most optimal phosphorus nutrition norm is N200 K10 0 background Determined to be P175. From this, it was determined that the length of cauliflower heads is 14-16 cm, and the mass of cauliflower heads is 800-1100 grams.The effect of new type of phosphorus-retaining fertilizers on the growth and development, productivity and quality of the Cauliflower Casper F1 hybrid in the conditions of irrigated meadow-gray soils of Samarkand region, the effect of the phosphate component of these fertilizers on the amount of mobile phosphorus in the soil, the fractional composition of soil phosphates, and the intensity of phosphates is the first study of the researcher's research.

1 Introduction

Cauliflower is a new crop that will be grown and consumed by the population in Uzbekistan in the next 15-20 years (1). Among all types of cabbage, it is the most easily absorbed and extremely useful vegetable (2). Nowadays, the need of our people for this vegetable is increasing in all seasons of the year. That's why cauliflower is widely grown in vegetable farms and private farms (3). Based on the consumption requirements of the population, we considered it necessary to study the system of phosphorus fertilization in order to obtain an ecologically clean quality crop from cauliflower (4). So, even if phosphorus is absorbed by plants in a small amount, phosphorus is usually used in high doses due to the low efficiency of phosphorus fertilization. This is low efficiency (5).

Phosphorus is explained by the high ability to form stable components with colloidal soil particles, in the soil - the positive charges of iron and aluminum oxide attract and bind phosphorus, thus reducing its availability for plants. its importance in physiological processes

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makes it the second most important nutrient limiting productivity in typical soils (6). Thus, proper phosphorus management is essential for crop yield and productivity.

Phosphorus accumulation on farms has increased soil P to levels that often exceed crop needs (7). A major problem with excess P is that it is transported by erosion, leading to eutrophication and depletion of dissolved oxygen (8). Soils showing an excess of phosphorus are usually found in areas of horticultural crops - most of these species have a short cycle, which allows them to be grown two or three times a year, with high doses of fertilizers applied in each cycle (9). although there is little information about fertilizing cauliflower with P-fertilizer doses (10). For different levels of f in the soil (low, medium and high), the recommendations given in the literature should be used (11). In addition, new varieties of cauliflower are more effective than old ones, justifying the use of high doses of fertilizers. [1-35]

2 Research methods

To achieve this goal, field experiments were conducted in the conditions of carbonate meadow gray soils of Samarkand region. The experiment was conducted in 8 variants and 4 repetitions. The location of the solders was in a systematic layer. The following table shows the structure of the experiment (Table 1).

Table 1. Experimental structure

№	Scheme of the experiment	Fertilizer kg/ha		
		N	***P***	***K***
1	Control (no fertilizer)	0	0	0
2	NK – fon	200		100
3	NK + Ammophos	200	175	100
4	NK +Superphos	200	175	100
5	Fon + Ps-Agro 1st dose	200	125	100
6	Fon + Ps-Agro 2st dose	200	150	100
7	Fon + Ps-Agro 3st dose	200	175	100
8	Fon + Ps-Agro 4st dose	200	200	100

Experimental object - ammophos from phosphorus-retaining fertilizers as a research object (Рам) 11-12 % N, 46 % - P_2O_5, Ps-agro (PPs-agro) 4-6 % N, 41-44 %, P_2O_5, 5-7 % CO_3 keeps As a nitrogen fertilizer NH_4NO_3 (N – 34,5) and as potassium fertilizer KCl(K_2O – 40 %) is used. It was carried out in conditions of gray soils of meadows of Jomboy district, Samarkand region. The Casper-F1 hybrid of cauliflower was planted in the experiment.

Before starting the field experiment, soil samples were taken from the upper (0-30 cm) and lower (0-60 cm) layers of the soil, the total amount of humus in it was determined by I.V. Tyurin, the total amount of nitrogen and phosphorus by A.P. Grisenko, I.M. Malseva, content of nitrate nitrogen Gronwald-Lyaju, mobile phosphorus B.P. Machigin was determined by the methods of P.V. Protasov in a flame photometer. [36-45]

Table 2. Agrochemical description of experimental field soils.

Soil deep, cm	Hummus, %	Relative to the soil mass, %			active, mg/kg	
		Gross				
		N	P	K	P_2O_5	K_2O
0-30	1.24	0.098	0.22	2.2	20.5	250

The soil layer of the field experiment (0-30 cm) has the following agrochemical properties: humus - 1.24%, total nitrogen - 0.09%, total phosphorus - 0.22%, total potassium

- 2.2%. Field experiment The soils are moderately supplied by the amount of mobile phosphorus, but by the amount of exchangeable potassium, which is low. The amount of cations absorbed in 100 g of soil is 16.4 mg/equiv. The mechanical composition of the soil is medium loam. (Table 2) The depth of groundwater is 6-8 m.

All technological processes were carried out according to the agrotechnical recommendations adopted for the region, biometric measurements, soil and plant analysis in the standard methods adopted in agrochemistry and plant science.

3 Results and discussion

Getting abundant and high-quality crops from crops is related to the formation of an optimal nutrient regime in the soil. This depends on the type of fertilizer used and its rate. The effectiveness of phosphorus-retaining fertilizers depends on a number of soil properties, including the reaction of the soil environment, the amount of humus and the level of carbonates. According to the analysis of the results of the research, increasing the rate of Ps-agro fertilizer from 125 kg/ha to 200 kg/ha P_2O_5, the amount of mobile phosphorus in the soil in the first period after transplanting cauliflower seedlings to the field is 35.6 mg /kg to 77.6 mg/kg was observed.

Ammophos and Ps-agro fertilizers were used at the rate of 100 kg per hectare in the phase of the head harvest of cauliflower, respectively 33.0; The amount of P2O5 was 32.0 and 31.8 mg/kg. Cauliflower's demand for phosphates corresponds to the initial part of its growth period, and during this period, these mineral fertilizers create a sufficient nutritional regime.

The applied fertilizers had a positive effect on the growth and development of the cauliflower plant. In the non-fertilizer control variant, the plant height of cauliflower in the leaf collection phase was 60.6 cm, the number of leaves was 29 pieces, and in the maturation phase of cauliflower heads, these indicators were 81.2 cm and the number of leaves was 38 pieces, respectively. [46-57]

In the phase of cauliflower and cabbage harvesting, it was noted that the plant height was 56.1 cm in the Ps-agro 125 kg/ha variant and 82.9 cm in the Ps-agro 200 kg variant. (Table 3) Carbonate meadow is a typical It was found that the influence of phosphorus-retaining fertilizers on the yield of Casper-F1 hybrid in these soils is different when the rate of phosphorus-saving fertilizers is increased and when they are used in different forms. While the yield was 145.5 s/ha in the control, 112.9 s additional yield was obtained in the NK variant compared to the control.

Table 3. Effect of phosphorus-retaining fertilizers on cauliflower productivity and crop quality

№	Options	Productivity s/ga	Dry matter %	Total sugar content %	vitamin“C” mg %	Nitrates mg/kg	Bioenergetic efficiency of phosphorus-retaining fertilizers
	Control (no fertilizer)	270.5	7,3	6,3	22.3	194	-
	NK – fon	438.6	12.80	10.3	33.1	268	1.34
	NK + Ammophos	475.4	14.50	10.6	34.4	249	1.27
	NK +Superphos	449.6	13.60	10.2	34.4	252	1.22
	Fon + Ps-Agro 1st dose	473.5	14.30	10.6	34.3	249	1.26
	Fon + Ps-Agro 2st dose	480.7	14.50	10.3	34.6	256	1.19
	Fon + Ps-Agro 3st dose	486.6	14.90	10.4	34.7	259	1.14

	Fon + Ps-Agro 4st dose	476.7	14.50	10.6	34.5	248	1.28

The smallest plausible difference 7,8 S_x 3,8%

Application of Ps-agro fertilizer at the rate of 125-200 kg/ha provided an additional yield of 163.0-180.1 kg/ha compared to the control.

The dependence of the phosphorus rate on the productivity of cauliflower has a linear character, it obeys the equation y=ax+b,a and the correlation coefficient is equal to R=0.99, so the relationship is close. Phosphorous fertilizers have a positive effect on the quality of cauliflower. The coefficient of use of phosphorus-retaining fertilizers, the balance of phosphorus in the soil depends on the type and standards of fertilizers.

Ammofos, Ps-agro fertilizers from the soil when applied in a uniform rate, 33.7; Absorbing 32.9 and 33.4 kg of phosphorus, the use coefficient is 12.1, respectively; It was 11.3 and 11.8 (Table 4).

Table 4. Economic efficiency of using various phosphorus-retaining fertilizers in cauliflower cultivation

№	Options	Additional product compared to background, s/ha	Additional income from the sale of additional crops, soum/ha	The expenses for the application of phosphorus fertilizers are soum/ha	1 s product cost soum/s	Conditional income from phosphorus fertilizers is soum/ha	Conditional profitability %
1	Control (no fertilizer)	0	0	0	0	0	0
2	NK – fon	36.8	5520000	1515000	41168.5	4005000	72.6
3	NK + Ammophos	11.0	1650000	1060600	96418.2	589400	35.7
4	NK +Superphos	34.9	5235000	1474600	42252.1	3760400	71.8
5	Fon + Ps-Agro 1st dose	42.1	6315000	2058600	48897.9	4256400	67.4
6	Fon + Ps-Agro 2st dose	48.0	7200000	2642600	55054.2	4557400	63.3
7	Fon + Ps-Agro 3st dose	38.1	5715000	1565500	41089.2	4149500	72.6
8	Fon + Ps-Agro 4st dose	39.3	5817000	1575500	42080.2	4249500	73.2

The relationship between fertilizer standards and the coefficient of use has an inverse characteristic linear form and is subject to the regression equation y= –ax + b, a slight decrease in density was observed in cauliflower, R = –0, 9%, which confirmed the tendency of increasing the fertilizer rate to decrease the use coefficient.

The economic efficiency of studied phosphorus-retaining fertilizers depends on the rate of fertilizer, and it was found that ammofos Ps-agro 2-dose is effective compared to Ps-agro when used at the same raten (Fig 1).

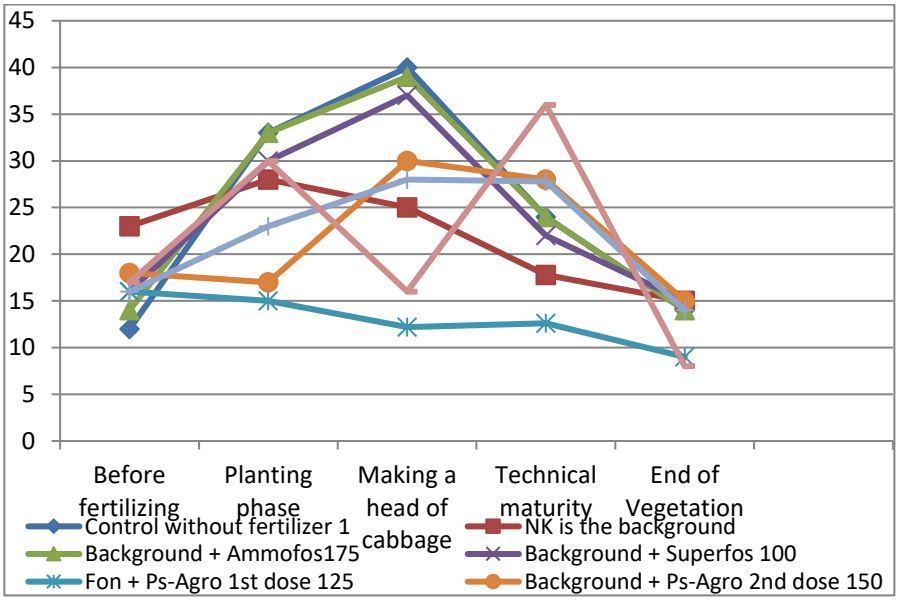

Fig. 1. The effect of different phosphorus-retaining fertilizers on the amount of nitrogen in the nitrate form in the soil, mg/kg 2023

4 Conclusion

It is recommended to apply 175 kg of R_2O_5 per hectare in the background of N200 K100 to obtain abundant and high-quality cauliflower harvest in the conditions of the carbonated saline meadow gray soils of the Zarafshan Valley. The effects of phosphorous fertilizers were observed in the average number of leaves, days of flowering, weight of flour, root length and productivity. The results of this study showed that the types and types of phosphorous fertilizers application to the soil had a significant effect on cauliflower weight, root length and productivity.

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