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Productivity of seed potatoes with local application of phosphorous and potassium fertilisers

Abstract. Ukraine occupies a leading position in potato production, being one of the top three producing countries and ranks second in the world in terms of potato consumption per capita, second only to Belarus – 139 kg per year per 1 person, with a global average of approximately 33 kg/person/year. According to the UCAB, in recent years, the area under potatoes has increased by 2.7% to 1,325 thousand hectares. However, the average yield over the past three years was at the level of 15.8 t/ha. In some advanced farms in Ukraine, the yield reaches 30-40 t/ha due to the introduction of scientific findings into production. However, in general, in Ukraine, the potential for the economic productivity of potatoes now remains unused to the full extent. Potato plants are demanding in terms of the availability of nutrients in the soil. They should be in an accessible form and in sufficient quantity. This is largely due to the biological characteristics of potatoes. The effectiveness of mineral fertilisers depends on the methods and quality of their application. The conventional method of fertilisation involves spreading fertilisers on the surface and then covering them with soil. As a result of the uneven placement of fertiliser granules in the soil layer, nutrients transition to a form inaccessible to plants, which leads to uneven development and maturation of tubers. Therefore, one of the ways to improve potato nutrition, reduce nutrient losses, and obtain high, stable crop yields is to apply mineral fertilisers locally to the root system of plants. Local application of phosphorus leads to its better availability throughout the growing season, which ensures accelerated growth and development of roots and shoots, and the formation of an optimal number of tubers. Local

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placement of potassium improves its availability and provides enhanced synthesis and transport of carbohydrates in plants, increases the absorption of moisture and nutrients by roots, strengthens their resistance to diseases, and improves the quality of tubers. The purpose was to examine the efficiency of using phosphorus and potassium in various methods and norms of fertiliser application and to establish the effect on the productivity of seed potatoes. The studies were conducted in the field experiment by the Department of Agricultural Chemistry and Quality of Plant Products named in honour of O.I. Dushechkin of the National University of Life and Environmental Sciences of Ukraine on the territory of Biotech Ltd. (Boryspil district, Kyiv region) during 2019-2020. An early-maturing Tyras variety was chosen for the research. The area of the sown plot was 495 m^2, accounting plot – 312 m^2. The experiment is repeated four times. The placement of options was systematic. As a result of the experiment, it was identified that local application of phosphorous and potassium fertilisers provided such a level of the yield of potatoes of the Tyras variety, which was not inferior to the option with a spreading method. The yield increase in variants with local application ranged from 0.6 t/ha to 2.9 t/ha, depending on the norm. Application of local fertiliser with the P60K135 norm caused the highest yield of seed potatoes among the variants (33.4 t/ha), and the highest yield of the seed fraction – 31.6 t/ha

Keywords: potatoes, phosphorus, potassium, local application, fertilisers, yield

RELEVANCE

Ukraine occupies a leading position in potato production, being one of the top three producing countries. In recent years, China has the highest potato production volumes (93 million tonnes), India (51 million tonnes), and Ukraine (23 million tonnes), which together accounts for approximately 45% of global production. Countries such as the United States, Russia, Bangladesh, Germany, Poland, The Netherlands, Canada, and Belarus are increasing their production volumes, which together produce approximately 23% (Indexbox, 2021; Lomovskykh L., 2021). Ukraine ranks second in the world in terms of potato consumption per capita, second only to Belarus – 139 kg per year per 1 person, with a global average of approximately 33 kg/person/year. These data allow understanding the importance of potatoes for Ukrainians (Agroportal, 2021).

According to the UCAB, in recent years, the area under potatoes has increased by 2.7% or 35 thousand hectares, to 1,325 thousand hectares. However, the yield, for example, in 2018 was at the level of 16.8 t/ha, in 2019 – 15.2 t/ha, and in 2020 – 15.6 t/ha. In the leading countries of the world, such as the United States, this figure reached the level of 49 t/ha, Canada – 43 t/ha, Holland – 40 t/ha, France – 39 t/ha, Germany – 36 t/ha. In some advanced farms in Ukraine, the yield reaches 30-40 t/ha due to the introduction of scientific findings into production. However, in general, in Ukraine, the potential for the economic productivity of potatoes now remains unused to the full extent (Kolodiazhnyi I., 2020; Grados D. *et al.*, 2020).

Problem statement. Obtaining high potato yields involves the use of substantial standards of nutrients. According to the conventional method of application, fertilisers are spread on the surface of the field and mixed with the soil. This method is very common but simultaneously has many disadvantages. One of them is the uneven distribution of fertilisers, especially

with a problematic granulometric composition, which causes variegation of fields, and, consequently, uneven germination, growth, and development of potato plants. It is also important to understand that mixing fertiliser pellets with a large volume of soil activates the process of their dissolution, absorption, and binding of nutrients by the soil.

The optimisation of the fertiliser application method is required. One of the ways that contribute to this is the local application of phosphorous and potassium fertilisers. With this arrangement, food elements become more accessible, which allows plants to fully receive nutrients during the growing season and leads to a high yield with good quality indicators.

ANALYSIS OF RECENT RESEARCH AND PUBLICATIONS

Long-term studies conducted in many countries convincingly prove the importance of the proper use of mineral fertilisers, which provide a substantial increase in yield (Bykin A.V. *et al.*, 2021; Hnatiuk T.O., 2018).

Potato plants are demanding in terms of the availability of nutrients. They should be in the soil in an accessible form and in sufficient quantities. This is largely due to the biological characteristics of potatoes, and, above all, an underdeveloped root system located mainly in the upper layer of the soil (Ostrenko M.V. *et al.*, 2020).

The effectiveness of mineral fertilisers directly depends on the methods and quality of their application. According to the conventional method, fertilisers are distributed over the soil surface using spreaders. About 50% of fertiliser pellets are placed in a soil layer of 0-15 cm and a substantial part of them may be poorly accessible to plants. The reason for this is that the root system of potatoes during the growing season in search of moisture and nutrients develops and is located deeper than this layer. In addition, no less important is the fact that the climatic conditions in Ukraine are changing, and a fairly frequent meteorological phenomenon is drought, which provokes drying out of the top layer of soil in which fertilisers are placed. This increases the proportion of inaccessible nutrients for the root system mainly due to improper granulometric composition. Quite often, when spreading fertilisers, there is an uneven distribution of their distribution. In production conditions, it is even more difficult to maintain the necessary intervals between the spreader passes without using special equipment, so the quality of fertiliser application is sharply reduced. Uneven distribution of nutrients in the soil causes uneven germination of plants, their development and maturation, and as a result, a shortage of yield and deterioration of their quality. During the spreading of fertilisers, the soil is compacted with equipment, which further causes a negative impact on the growth and development of potato plants. It is established that up to 50% of the total area is compacted (Sergeyev N.S., Zapevalov M.V., 2012).

An important technological technique is the introduction of fertilisers into the soil. The time interval between fertiliser spreading and covering should not exceed 6 hours. Late mixing of fertilisers with the soil leads to high nutrient losses and environmental pollution. It is worth noting that the intensive mixing of fertilisers with a large volume of soil activates the processes of binding nutrients and their transition to hard-to-reach forms (Sergeyev N.S., Zapevalov M.V., 2012).

Increasing the availability of nutrients and reducing costs is possible only through fertiliser optimisation. Therefore, one of the ways to improve potato nutrition and reduce nutrient losses, eliminate the negative impact of fertilisers on the environment, and obtain high, stable crop yields is the local application of mineral fertilisers in the area of the root system of plants (Ponomarenko N.O. *et al.*, 2016)

Local fertilisation has a positive effect on potato plants, their nutrition, development, and yield formation. According to the local method, the development of roots in the fertiliser application area increases, but the total mass may vary slightly. It was identified that the root system is mainly concentrated in nutrient-rich areas. With this method of application, there is an increase in the utilisation rates of nutrients compared to the spreading one. The high content of nutrients in the soil in a state accessible to plants with local fertilisation persists for a long time, providing more substantial yield increases. This method enables the creation of favourable conditions for the mineral nutrition of plants and makes better use of nutrients. However, the effectiveness of this method of application is influenced by a number of factors: fertiliser properties, soil fertility, its granulometric composition, moisture supply of plants, and varieties (Abdulnatipov M.G., 2019; Lichman G.I. *et al.*, 2018)

The placement of fertilisers in this way has a positive effect on the ability of agricultural crops to withstand stressful conditions, improves the synthesis of storage substances, and reduces the use of nutrients by weeds. Water consumption of plants per unit of production is reduced by 10-15%. According to generalised data, the increase in potato yield from local fertiliser placement is on average 3-4 t/ha (Paskal' V.N., Zubovich D.G., 2020; Zubovich D.G., Tymoshenko V.YA., 2017).

Local application of phosphorus provides accelerated growth and development of roots and shoots, energy supply for such processes as ion absorption and transportation. Due to their local placement, phosphorus compounds become more accessible during the growing season. This leads to the formation of the optimal number of tubers. Applying potassium fertilisers locally increases the supply of potassium to plants. Optimal potassium nutrition ensures the synthesis and transport of carbohydrates in plants, improves the absorption of moisture and nutrients by the roots. Potassium regulates water metabolism in plants, strengthens their resistance to diseases, and improves the quality of tubers(Rosen,C.J.*etal.*,2014;Kelling,K.A.*etal.*,2020).

Thus, the development of a technology for the local application of phosphorous and potassium fertilisers is justified since it is able to optimise the nutrition of potatoes and provide a substantial increase in the yield of high quality.

The purpose of the study. Investigate the effectiveness of using phosphorus and potassium in various methods and norms of fertiliser application and establish the impact on the productivity of seed potatoes.

MATERIALS AND METHODS

The studies were conducted in the field experiment by the Department of Agricultural Chemistry and Quality of Plant Products named in honour of O.I. Dushechkin of the National University of Life and Environmental Sciences of Ukraine on the territory of Biotech Ltd. (Boryspil district, Kyiv region) during 2019-2020 according to the developed experiment scheme (Table 1).

An early-maturing Tyras variety was chosen for the research. The area of the sown plot was 495 m^2, the registered area was 312 m^2, and the repetition rate of the experiment is fourfold. The placement of options was systematic. The soil of the experimental site is dark grey podzolic coarse–dusty light loamy. It was characterised by a slightly acidic reaction of the soil solution (5.48), a high degree of provision of mobile compounds of phosphorus (246 mg/kg) and exchange potassium (224 mg/kg), increased content of exchange magnesium (2.64 mg/100 g), an average content of calcium (7.93 mg/100 g), a low content of mobile sulfur (3.64 mg/kg) and mineral nitrogen (14.5 mg/kg).

Table 1. Scheme of a field experiment to examine the effectiveness of various methods of fertiliser application, 2019-2020

No.	Method and rate of fertiliser application	
	spreading	local
1	$N_{150} P_{80} K_{180}$	-
2	N_{150}	$P_{80} K_{180}$
3	N_{150}	$P_{60} K_{135}$
4	N_{150}	$P_{40} K_{90}$

The following fertilisers were used in the studies: UAN-25: N – 25%, S – 2.4% (TU U 24.1-00203826.024-2002); LCF 8: 24: N – 8% P_2O_5 – 24% (TU 2186-627-00209438-01), potassium chloride: K_2O – 60% (TU 2184-042-00209527-97), magnesium sulfate: MgO – 16% (TU 2141-073-00206457-2007), calcium nitrate – N – 15.5% Ca – 19% (TU U6-13441912.004-99). Pre-planting treatment of tubers with growth stimulants was conducted: Gros Rootgrowth (1.5 l/t), Ecoline phosphite (K) (1 l/t) using an applicator on the inspection table.

Nitrogen fertilisers in the form of UAN-25 were applied as a background in all variants in the N_{150} norm on the surface of the soil with their subsequent covering. In the version with the spreading method, the LCF was applied with a John Deere 6195M unit with a mounted JAR-MET sprayer (Lechler nozzles), potassium chloride using John Deere 6195M and an MVD 1000 spreader, followed by their covering with a Vanderstad Carrier CR 400 discator to a depth of 10-15 cm. Local fertilisation was conducted by JohnDeere 8300 and the Peliper multifunctional unit with the application of phosphorous fertilisers to a depth of 15 cm, and potassium fertilisers to 18-20 cm with a strip width of 10-12 cm. Samples of soil and potato plants were taken during the following growth and development phases: germination, budding, flowering, "green berry", and technical ripeness.

Selection and preparation of soil samples for analysis were conducted in accordance with DSTU ISO 10381-2:2004 and DSTU ISO 11464-2001. Harvesting was conducted mechanically from the entire experimental site in the phase of technical ripeness according to generally accepted methods. Mathematical processing of research results was performed using statistical (variance and correlation) analysis using the MS Excel computer programme.

RESULTS

The research established that in the control, where the use of fertilisers was conducted in a spreading way in the $N_{150}P_{80}K_{180}$ norm, the yield was 30.5 t/ha. Local introduction of the full $P_{80}K_{180}$ norm on the background of N_{150} led to an increase in this indicator to the level of 31.1 t/ha, which exceeds the above option by 0.6 t/ha (Fig. 1).

Reduction of the norm of phosphorous and potassium fertilisers to $P_{60} K_{135}$ and their placement locally provided an increase in yield to 33.4 t/ha, which is 2.3 t/ha more than in variants with a similar method of application in the full norm of $P_{80}K_{180}$.

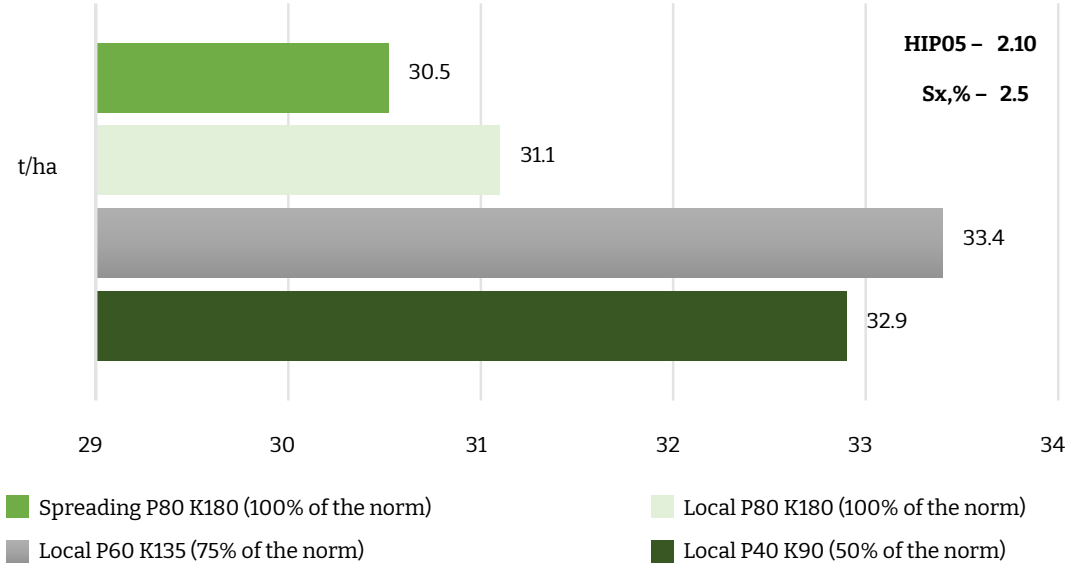

Figure 1. Yield of seed potatoes (t/ha) by various methods of fertilisation, 2019-2020

Local application of phosphorous and potassium fertilisers in the $P_{40}K_{90}$ norm led to an increase in yield to the level of 32.9 t/ha, which is 1.8 t/ha more than the full norm of phosphorous and potassium fertilisers in the same way.

The structure of the yield is one of the components that determine its value. The resulting yield must meet the requirements of DSTU in terms of size and must not deviate from the established indicators. The uniformity and size of potato seed material are important for the correct establishment of the rate and quality of planting, and also affect the cost per hectare of seeds.

In the conditions of this experiment, in the variant with spreading of $N_{150}P_{80}K_{180}$, the yield of standard tubers was 22.6 t/ha, and the non-standard part – 7.89 t/ha (Table 2).

Local application of the same rate of phosphorous and potassium fertilisers contributed to an increase in the share of seed fraction in the yield compared to the spread application by 6.5 t/ha to the level of 29.1 t/ha. The non-standard part of the yield under these conditions was smaller compared to the option where fertilisers were applied in a spreading method and amounted to 2.01 t/ha. Simultaneous reduction of the norm of phosphorus and potassium to $P_{60}K_{135}$ and their introduction locally allowed obtaining the highest yield of the seed fraction in the experiment – 36.1 t/ha. The non-standard part of the yield was at the level of 1.85 t/ha. Local application contributed to a better supply of phosphorus and potassium to plants during the growing season, which had a positive effect on tuber formation. Further reduction of the norm for local application to $P_{40}K_{90}$ caused the production of 26.3 t/ha of standard tubers, which is 9.8 t/ha less compared to the local introduction of phosphorus and potassium in $P_{60}K_{135}$ norm.

Thus, the use of a local method of applying phosphorous and potassium fertilisers in the $P_{60}K_{135}$ norm, on the background of N_{150} is advisable since it causes a substantial increase in the productivity of seed potatoes.

Table 2. Structure of the seed potato yield using different fertiliser application methods, 2019-2020

Fertiliser application method	Application rate, kg/ha a.s.	Tuber fraction, mm													
		standard								non-standard					
		28-35		35-45		45-55		t/ha	%	<28		>55		t/ha	%
		t/ha	%	t/ha	%	t/ha	%			t/ha	%	t/ha	%		
Spreading	$P_{80}K_{180}$*	3.99	17.6	11.2	49.5	7.44	32.9	22.6	74.1	1.50	19.1	6.39	80.9	7.89	25.9
Local	$P_{80}K_{180}$*	2.72	9.34	14.3	49.1	12.1	41.6	29.1	93.5	1.11	55.3	0.90	44.7	2.01	6.50
	$P_{60}K_{135}$*	2.66	8.43	15.8	50.1	13.1	41.5	31.6	94.5	0.82	44.3	1.03	55.7	1.85	5.50
	$P_{40}K_{90}$*	3.45	13.1	13.0	49.5	9.86	37.4	26.3	80.0	1.19	18.0	5.41	82.0	6.60	20.0
HIP_{05}		0.17		0.9		1.17		1.9		0.14	2.9	0.49			
Sx.%		0.8		0.9		1.4									

Note: * – against the background of introduction of N_{150}

CONCLUSIONS

Local application of phosphorous and potassium fertilisers provided such a level of the yield of potatoes of the Tyras variety, which was not inferior to the option with a spreading method. The yield increase in variants with local application ranged from 0.6 t/ha to 2.9 t/ha, depending on the norm. Application of local fertiliser with the $P_{60}K_{135}$ norm caused the highest yield of seed potatoes among the variants (33.4 t/ha), and the highest yield of the seed fraction – 31.6 t/ha.

In the conditions of intensive farming, the introduction of local fertilisation in the technology of growing agricultural crops has great prospects.

REFERENCES

[1] Abdulnatipov, M.G. (2019). The influence of the methods of applying mineral fertilizers on the growth and development of plants. Izvestiya Dagestanskogo GAU, 4, 65-67. [In Russian]

[2] Bykin, A.V., Bordyuzha, I.P., Bordyuzha, N.P., & Bykina, N.M. (2021). Economic efficiency of balanced schemes of table potato fertilization with macro- and mesoelements on dark gray podzolic soil using liquid phosphorus-containing fertilizers. Scientific journal «Plant and Soil Science», 12(1), 50-58. doi: 10.31548/agr2021.01.050.

[3] Grados, D., García, S., & Schrevens, E. (2020). Assessing the potato yield gap in the Peruvian Central Andes. Agricultural Systems, 181. doi: 10.1016/j.agsy.2020.102817.

[4] Hnatiuk, T.O. (2018). Growing potatoes in short-rotation crop rotation with different fertilizer systems. Scientific reports of the National University of Life and Environmental Sciences of Ukraine, (5). doi: 10.31548/dopovidi2018.05.016.

[5] Kelling, K.A., Wolkowski, R.P., Speth, P.E., & Andraski, T.W. (2020). Interaction of Fertilizer Phosphorus Rate and Placement/Timing on Potatoes. American Journal of Potato Research, 97(4), 420-431. doi: 10.1007/s12230-020-09784-2.

[6] Kolodiazhnyi, I. (2020, November 25). The sown area for potatoes is growing, yields are falling. Retrieved May 20, 2021, from https://ucab.ua/ua/pres_sluzhba/novosti/posivna_ploscha_pid_kartoplyu_zrostae_vrozhaynist_padae/.

[7] Lichman, G.I., Belykh, S.A., & Marchenko, A.N. (2018). Fertilization Methods in Precision Farming System. Sel'skokhozyaystvenn·yye mashiny i tekhnologii, 12(4), 4-9. doi: 10.22314/2073-7599-2018-12-4-4-9.

[8] Lomovskykh, L. (2021) The place of Ukrainian agriculture in the world in the context of industrialization 4.0. Materialy II Mizhnarodnoi naukovo-praktychnoi konferentsii "Stalyi rozvytok ahrarnoi sfery: inzhenerno-ekonomichne zabezpechennia". Berezhany [in Ukrainian].

[9] Ostrenko, M.V., Pravdyva, L.A., Fedoruk, Y.V., Hrabovskyi, M.B., & Pravdyvyi, S.P. (2020). Productivity of potatoes depending on varietal characteristics for cultivation in the right-bank forest-steppe of Ukraine. Founder, editor, publisher and manufacturer: Bila Tserkva National Agrarian University (BTNAU), 120. doi: 10.33245/2310-9270-2020-157-1-120-127.

[10] Paskal', V.N., & Zubovich, D.G. (2020). An integrated approach to increasing yields when growing potatoes. «Gorinskiye chteniya. Innovatsionn·yye resheniya dlya APK» (18-19 mart.), 49.

[11] Ponomarenko, N.O., Yaropud, V.M., & Zozuliak, O.V. (2016). Methods of local application of fertilizers. All-Ukrainian scientific and technical journal «Vibrations in Engineering and Technology, 59-62.

[12] Potato market of Ukraine and the world in infographics. (2021, February 20). Retrieved May 21, 2021, from https://agroportal.ua/ua/publishing/infografika/kartofelnyi-rynok-ukrainy-i-mira-v-infografike/.

[13] Rosen, C.J., Kelling, K.A., Stark, J.C., & Porter, G.A. (2014). Optimizing phosphorus fertilizer management in potato production. American Journal of Potato Research, 91(2), 145-160. doi: 10.1007/s12230-014-9371-2.

[14] Sergeyev, N.S., & Zapevalov, M.V. (2012). Tape intra-soil application of organomineral fertilizer. Agrarnyy vestnik Urala, (11-2 (106)).

[15] The global potato market hits record highs. (2021, May 17). Retrieved May 23, 2021, from https://www.indexbox.io/blog/global-potato-market-2020-key-insights/?mc_cid=dd864416e6&mc_eid=894d5eeaaa.
[16] Zubovich, D.G., & Timoshenko, V.YA. (2017). Features of soil preparation for potatoes, 481-483.

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Продуктивність насіннєвої картоплі за локального внесення фосфорних і калійних добрив

Анотація. Україна займає провідні позиції у виробництві картоплі, входячи до трійки країн-виробників та посідає друге місце у світі за рівнем споживання картоплі на душу населення, поступаючись лише Білорусі – 139 кг на рік на 1 особу, при середньосвітовому показнику близько 33 кг/особу/рік. За даними УКАБ, за останні роки посівні площі під картоплею збільшилися на 2,7% до 1 325 тис. га. Однак середня врожайність за останні три роки була на рівні 15,8 т/га. У деяких передових господарствах України врожайність досягає 30-40 т/га завдяки впровадженню наукових розробок у виробництво. Однак, в цілому, в Україні потенціал економічної продуктивності картоплі зараз залишається невикористаним повною мірою. Рослини картоплі вимогливі до наявності поживних речовин у ґрунті. Вони повинні бути в доступній формі і в достатній кількості. Це значною мірою пов'язано з біологічними особливостями картоплі. Ефективність мінеральних добрив залежить від способів та якості їх внесення. Традиційний спосіб внесення добрив полягає в розкиданні добрив по поверхні і подальшому засипанні їх ґрунтом. В результаті нерівномірного розміщення гранул добрив у шарі ґрунту поживні речовини переходять у недоступну для рослин форму, що призводить до нерівномірного розвитку і дозрівання бульб. Тому одним із шляхів покращення живлення картоплі, зменшення втрат поживних речовин та отримання високих, стабільних врожаїв є локальне внесення мінеральних добрив під кореневу систему рослин. Локальне внесення фосфору призводить до кращої його доступності протягом усього вегетаційного періоду, що забезпечує прискорений ріст і розвиток коренів та пагонів, формування оптимальної кількості бульб. Локальне внесення калію покращує його доступність та забезпечує посилений синтез і транспорт вуглеводів у рослинах, підвищує поглинання вологи та поживних речовин

корінням, посилює їх стійкість до хвороб, покращує якість бульб. Метою досліджень було вивчити ефективність використання фосфору і калію за різних способів і норм внесення добрив та встановити вплив на продуктивність насіннєвої картоплі. Дослідження проводили в польовому досліді кафедри агрохімії та якості продукції рослинництва ім. О.І. Душечкіна Національного університету біоресурсів і природокористування України на території ТОВ «Біотех» (Бориспільський р-н, Київська обл., м. Бориспіль). (Бориспільський район, Київська область) протягом 2019-2020 років. Для досліджень було обрано ранньостиглий сорт Тирас. Площа посівної ділянки становила 495 м^2, облікової – 312 м^2. Повторність досліду чотириразова. Розміщення варіантів було систематичним. У результаті досліду встановлено, що локальне внесення фосфорних і калійних добрив забезпечило такий рівень урожайності картоплі сорту Тирас, який не поступався варіанту з розкидним способом. Прибавка врожаю у варіантах з локальним внесенням становила від 0,6 т/га до 2,9 т/га залежно від норми. Застосування локального внесення добрива в нормі Р60К135 забезпечило найвищу серед варіантів врожайність насіннєвої картоплі (33,4 т/га), а також найвищу врожайність насіннєвої фракції – 31,6 т/га

Ключові слова: картопля, фосфор, калій, локальне внесення, добрива, урожайність