

**TRIALS OF POTATO VARIETIES OF DIFFERENT MATURITY GROUPS  
IN THE CONDITIONS OF THE NORTHERN STEPPE OF UKRAINE**

**Sokolovska Iryna Mykolaivna,**

PhD in Agricultural Sciences, Associate Professor  
Kherson State agrarian and economic University  
Kropyvnytskyi, Ukraine

**Abstract:** The increase in crop productivity of crops in global agricultural practice is ensured not only through innovative methods and techniques of agrotechnology, but also through the introduction of new, high-yielding varieties and hybrids. Today, it is extremely difficult for producers to navigate the vast variety of domestic and foreign selection of varieties and hybrids, the seeds and planting material of which are actively offered on the agricultural market. Therefore, testing potato varieties of different ripening groups in specific growing conditions for their further implementation in production is a relevant issue

Our research has shown that the weather conditions during the years of the study had the greatest impact on the yield of potato varieties. The mid-maturing variety Myroslava was the most productive over the two years of the study, with a yield of 21.4 t/ha, and in 2022 it had the highest yield at 26.5 t/ha. Among the mid-early varieties, the highest yield was in the Aria variety, with 20.4 t/ha, and in the dry 2023, this indicator was the highest at 17.2 t/ha. The early-maturing variety Riviera had the highest yield among the varieties in this group at 18.1 t/ha.

Early-maturing varieties were more resistant to adverse growing conditions. In the dry 2023, their yield decreased by 5.8 t/ha, while the mid-early maturing varieties formed 10.0 t/ha fewer tubers than in favorable conditions in 2022. The yield of mid-early maturing varieties decreased by 6.6 t/ha, but under optimal conditions, they formed the largest tuber yield.

**Key words:** potato, yield, maturity groups of potato varieties, weather conditions.

**Introductions.** In recent years, the role of varieties in agriculture has been growing as a source of increased productivity and efficiency of production. Increasing crop productivity in global agricultural practice is ensured not only through innovative methods and techniques of agrotechnology, but also through the introduction of new, high-yielding varieties and hybrids. Today, it is extremely difficult for producers to navigate the vast variety of domestic and foreign selection of varieties and hybrids, the seeds and planting material of which are actively offered on the agricultural market. Therefore, testing potato varieties of different ripening groups in specific growing conditions for their further implementation in production is a relevant issue.

Potatoes have universal application as they serve as a food product, raw material for industrial use, an important component of animal feed, and a source of income for agricultural enterprises and households. Due to its wide prevalence and large consumption volumes, potatoes in Ukraine occupy one of the leading positions among food products.

In addition, potatoes are of great importance as an industrial crop used for starch and alcohol production. Products obtained from potato processing are used in various industries, especially in the food, chemical, textile, leather, and paint industries.

In modern agricultural management methods, potatoes play an important role and are an effective predecessor for numerous agricultural crops, especially for cereals. It holds a significant share in household sown areas.

**Aim.** Testing potato varieties of different maturing groups in terms of yield level and productivity in the conditions of the northern steppe of Ukraine.

**Materials and methods.** The testing of potato varieties of different maturing groups was carried out in field trials on the lands of FG «Nesterenko O. S.» The experiments were conducted during 2022-2023.

The soils of the farm are represented by deep medium-humus black soils. The pure humus content in these soils is 5-9 %, and the depth of humus deposition ranges from 0.7 to 1.2 m.

The weather conditions during the years of research differed in terms of precipitation and air temperatures. In 2022, during the potato vegetation period, there were 265.2 mm of precipitation, which was only 4.2 mm less than the multi-year average. In the first half of the potato vegetation period, there were 141.1 mm of precipitation, providing favorable conditions for the growth and development of potato.

The growing conditions for potatoes in 2023 significantly differed from the previous year. During the period from April to September, the precipitation was half the average long-term norm – 139.5 mm. During the critical phases of development for potatoes, when the soil moisture requirements are highest – May-June, there were only 16.5 mm and 41.0 mm of precipitation.

The testing of potato varieties of different ripening groups was conducted by setting up field trials in a short crop rotation with a list of crops: winter wheat, fallow, soybeans, potatoes, and corn. The predecessor of the potatoes was soybeans. The agronomic practices for growing potatoes were generally accepted for this area.

**Results and discussion.** Potato yield, like any other agricultural crop, is an important indicator that determines its production efficiency. In addition, the characteristics of the harvested produce, the difference in tuber sizes and their weight, also affect potato yield formation.

According to the results of our research, it was established that weather conditions had the greatest impact on the processes of growth and development of potato plants and, as a result, their physiological activity – yield. The weather and climatic conditions of the northern steppe of Ukraine are favorable for growing crops such as potatoes.

However, significant changes in the complex of factors – air temperature, precipitation, etc., during the years of research significantly influenced the level of potato yield. In unfavorable conditions, the morphological characteristics of the varieties and their vegetation duration somewhat compensated for the effects of these factors.

In this year, the even distribution of precipitation throughout the crop's

vegetation particularly contributed to utilizing the biological potential of mid-early maturing group potato varieties. The highest yield was observed in the variety Myroslava not only within this group but also in the study – 26.5 t/ha. However, it should be noted that the yield of Picasso and Arsenal varieties was significantly lower than the average indicator – 23.5 t/ha and 22.2 t/ha respectively (LSD<sub>05</sub> by factor B = 1.38 t/ha). The yield fluctuations in this group maturing were the highest in the study at 4.3 t/ha (Table 1).

**Table 1**

**Potato yield of varieties of different maturing groups in 2022, t/ha**

Maturity groups (factor A)	Varieties of potatoes (factor B)	Yield	Average, factor A	Difference, factor A
Early-maturing	Riviera	21,1	19,2	
	Impala	17,2		
	Udacha	19,2		
Mid-early maturing	Evora	19,3	21,5	2,3
	Aria	23,5		
	Gracia	21,6		
Mid-maturing	Picasso	23,5	24,1	4,9
	Arsenal	22,2		
	Myroslava	26,5		
LSD <sub>05</sub> : Factor A –1,53; Factor B – 1,38; Factors AB – 3,01				

The average yield in the mid-early group maturing was 21.5 t/ha, with the highest indicator being the Aria variety at 23.5 t/ha. The yield fluctuations within this group were within 1.9 t/ha; for example, the Gratia variety produced 21.6 tons/ha of tubers, while the Evora variety yielded 19.3 t/ha, showing a significant difference.

The early maturing group varieties had the lowest yield at 19.2 t/ha. The Riviera variety had the highest yield in this group at 21.1 t/ha. The Impala and Udacha varieties significantly lagged behind the Riviera variety, yielding 17.2 t/ha and 19.2 t/ha respectively (LSD<sub>05</sub> = 1.38 tons/ha). Additionally, the Impala variety had the lowest yield in our study in the conditions of 2022.

The most significant difference in yield based on the maturing group factor was between the early-ripening and mid-early varieties, at 4.9 t/ha (LSD<sub>05</sub> = 1.53 t/ha). The mid-early varieties exceeded the early-maturing ones by 2.3 /ha, while they were

surpassed by the mid-early varieties by 2.6 t/ha.

Therefore, in 2022, potato yields ranged from 17.2 to 26.5 t/ha. Weather conditions favored the formation of the highest yields in the mid-early group maturing of varieties at 24.1 t/ha, with the Myroslava variety having the highest yield at 26.5 t/ha. The weather conditions in 2023 were unfavorable for the crop. Absence of precipitation during critical development phases – after emergence and during flowering – combined with high average daily air temperatures (especially during and after flowering) had a negative impact on the yield of the potato varieties grown in our study. In 2023, yields ranged from 12.1 to 17.2 t/ha. Compared to the yields in 2022, we observed a decrease of 5.1-9.3 t/ha. Furthermore, the highest yield among the varieties in 2023 was characterized as the lowest under the conditions of 2022.

Potato varieties of different ripening groups utilized their potential differently in the dry conditions of 2023. The varieties mid-early group maturing turned out to be the most productive at 14.9 t/ha, whereas in the previous year, mid-maturing varieties had a significant advantage. Considering the least significant difference based on the ripening group factor in 2023 at 1.05 t/ha, mid-maturing varieties did not significantly lag behind these mentioned varieties at 14.4 t/ha, with a difference of 0.5 t/ha. However, the difference between early-maturing and mid-maturing varieties was 1.0 t/ha, which can be considered insignificant (Table 2).

**Table 1**

**Potato yield of varieties of different maturing groups in 2023, t/ha**

Maturity groups (factor A)	Varieties of potatoes (factor B)	Yield	Average, factor A	Difference, factor A
Early-maturing	Riviera	15,1	13,4	
	Impala	12,2		
	Udacha	12,8		
Mid-early maturing	Evora	12,1	14,9	1,6
	Aria	17,2		
	Gracia	15,5		
Mid-maturing	Picasso	12,8	14,4	1,0
	Arsenal	14,1		
	Myroslava	16,2		
LSD <sub>05</sub> : Factor A = 1,05; Factor B = 0,91; Factors AB = 2,04				

The most significant difference in yield was observed between early-maturing and mid-early varieties, with a difference of 1.6 t/ha. The average yield of early-maturing varieties was 13.4 t/ha. In this group, the Riviera variety significantly outperformed others with a yield of 15.1 t/ha. The yields of the Impala and Udacha varieties was within a significant difference - 12.2 t/ha and 12.8 t/ha respectively, based on  $LSD_{05}$  for the varieties in 2023 at 0.91 t/ha.

In the mid-early group, the best performance was observed in the Aria variety at 17.2 t/ha, and it was the highest yield among all the varieties we grew in 2023. However, the lowest yield of 12.1 t/ha was produced by the Evora variety, also from this group. It is worth noting that the yield of the mid-early Evora variety and the early-maturing Impala (12.2 t/ha) was almost the same, with a  $LSD_{05}$  of 0.91 t/ha.

The potato variety Myroslava, which was the yield leader in the previous year, lagged behind the mid-early Aria variety, which had the best performance this year, with a yield of 16.2 t/ha in 2023. However, within its group, it remained in the first place, surpassing the Arsenal variety by 2.1 tons/ha (yield of 14.1 t/ha) and the Picasso variety by 3.4 t/ha (12.8 t/ha).

Thus, in the unfavorable conditions of 2023 for the formation of high potato yields, varieties mid-early maturing group had the highest yield at 14.9 t/ha, with early-maturing varieties slightly behind at 14.4 t/ha, and significantly lower yields for early-maturing varieties at 13.4 tons/ha. The mid-early Aria variety had the highest yield this year at 17.2 t/ha, while the lowest was the Evora variety from the same group at 12.1 t/ha.

Based on the results of two years of research, varieties of mid-early maturing group had an average yield of 19.2 t/ha, despite slightly lagging behind mid-early varieties ones by 0.5 tons/ha within a  $LSD_{05}$  of 1.05 t/ha.

The average yield in the mid-early group maturing was 18.2 t/ha, while in the early maturing group, it decreased to 16.2 tons/ha.

It is important to note that early-maturing group varieties exhibited greater resistance to adverse growing conditions, and under the stressful conditions of 2023, their yield decreased by 5.8 t/ha. Mid-early maturing varieties formed an average of

10.0 t/ha fewer tubers than under favorable conditions in 2022, indicating that they were the least adapted to rapid climate changes.

In unfavorable growing conditions, mid-early varieties saw a decrease in yield by 6.6 t/ha, but under optimal conditions, they produced the highest tuber yield.

Considering differences in yield by variety, over the years 2022-2023, the mid-maturing variety Myroslava had the highest yield at 21.4 t/ha. Among mid-early varieties, Aria had high yield at 20.4 t/ha, while the average yield for the Riviera variety was within 18.1 t/ha, which was better than early-maturing varieties.

**Conclusions.** Thus, it can be concluded that weather conditions during the study years had the greatest impact on potato variety yields. Under favorable conditions in 2022, potato yields ranged from 17.2 to 26.5 t/ha. The varieties of mid-early maturing group had the highest yield at 24.1 t/ha. Under unfavorable conditions in 2023, potato yields ranged from 12.1 to 16.2 t/ha, with varieties of mid-early group maturing showing higher yields at 14.9 t/ha and early-maturing varieties exhibiting significantly lower yields at 13.4 t/ha.

The most productive variety over two years of research was the mid-maturing Myroslava variety at 21.4 t/ha, with the highest yield in 2022 at 26.5 t/ha. The mid-early Aria variety had the highest yield at 20.4 t/ha in dry 2023 conditions. The early-maturing Riviera variety produced higher yields within this group at 18.1 t/ha.

Early-maturing group varieties showed greater resistance to adverse growing conditions; their yield decreased by 5.8 t/ha in dry 2023 conditions, while mid-early varieties formed an average of 10.0 t/ha fewer tubers than under favorable conditions in 2022. Mid-early varieties saw a decrease in yield by 6.6 t/ha under unfavorable conditions but produced the highest tuber yield under optimal conditions.

## REFERENCES

1. Podhaietskyi A. A. (2017). Norma reaktsii henotypiv serednostyhlykh sortiv kartopli na umovy vyroshchuvannia v pivnichno-skhidnomu Lisostepu Ukrainy za produktyvnistiu ta yii skladovymy. [The norm of the reaction of genotypes of medium-ripening potato varieties to growing conditions in the North-Eastern Forest

Steppe of Ukraine in terms of productivity and its components]. *Visnyk Sumskoho natsionalnoho ahrarnoho universytetu*. Serii: Ahronomiia i biolohiia. 2017. Vyp. 2. S. 155-160. [http://nbuv.gov.ua/UJRN/Vsna\\_agro\\_2017\\_2\\_33](http://nbuv.gov.ua/UJRN/Vsna_agro_2017_2_33)

2. Mialkovskiy R. O., Bezvikonnyi P. V., Kravchenko V. S., Yatsenko A. O. (2020). Adaptivni vlastyvoli riznykh sortiv kartopli v umovakh lisostepu zakhidnoho. [Adaptive properties of different potato varieties in the conditions of the western forest-steppe]. *Visnyk umanskoho natsionalnoho universytetu sadivnytstva* 38 № 2, 2020. 38-41. <https://doi.org/10.31395/2310-0478-2020-2-38-41>.

3. Kozhushko N. S. (2011). Novi sorty kartopli sumskoi selektsii. [New potato varieties of Sumy selection]. *Visnyk Sumskoho natsionalnoho ahrarnoho un-tu: nauk. zhurn.* Ser. «Ahronomiia i biolohiia». Sumskiy NAU. Sumy, 2011. Vyp. 11(22). S. 109-112.

4. Knap N. V.(2012). Rol sortu u formuvanni urozhainosti kartopli v Zakarpatti. [The role of the variety in shaping the yield of potatoes in Transcarpathia]. *Zb. nauk. pr. In-t bioenerhetychnykh kultur i tsukrovykh buriakiv*. 2012. № 15. S. 111-117.

5. Sokolovska I. M. (2022). Formation of the leave's surface square if seeding potato of different groups of ripeness depending on conditions of growing. *Modern engineering and innovative technologies*. Issue № 24. Part 1. December 2022. *Published by: Sergeieva&Co Karlsruhe, Germany.* 125–131. <https://doi.org/10.30890/2567-5273.2022-24-01-015>

6. Sokolovska I. M., Hryhorieva O. M. Almaieva T. M. (2022). Produktyvni sorty kartopli v ekolohichnomu vyprobuvanni v umovakh pravoberezhnoho stepu Ukrainy. [Productivity of potato varieties in an ecological test in the conditions of the right-bank steppe of Ukraine]. *Tavriiskiyi naukovyi visnyk. Serii: Silskohospodarski nauky. Khersonskiyi derzhavnyi ahrarno-ekonomichnyi universytet*. Odesa. Vydavnychiy dim «Helvetyka», 2022. Vyp. 128. 204–209. <https://doi.org/10.32851/2226-0099.2022.128.28>