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TWO NEW POTATO VARIETIES AND THEIR GROWTH PARAMETERS, DISEASES RESISTANCE, ADAPTABILITY AND YIELD

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ABSTRACT

In this study, two new potato varieties, namely Amural and Postavaru, along with standard variety Brasovia were evaluated for their adaptability, agronomic traits and other parameters including tuber yield. Varieties Amural and Brasovia showed a higher level of tolerance to tuber diseases. Regarding tuber yield, Amural variety, achieve significantly higher yield of 22.86 t/ha. Regarding the quality parameters, the dry matter content varied between 21.21 % (Brasovia) and 26.28 % (Amural), starch content between 13.50 % (Brasovia) and 15.92 % (Postavaru) and the culinary quality of tubers were from classes B (Brasovia and Amural) and B/C (Postavaru), showing the suitability for multiple uses. Our findings argue for the strategic selection of high-performance potato varieties as a key lever for increasing yield and adaptability to specific climatic conditions.

INTRODUCTION

Today, more than three thousand potato cultivars are widely distributed in more than 125 countries, particularly under temperate, subtropical and tropical regions covering a major economic share in the global agricultural market (Birch et al., 2012).

In terms of nutrition, potato is a complex source of nutrients (vitamins, carotenoids, anti-oxidant phenolics, proteins, magnesium etc.), and some anti-nutrients (primarily glycoalkaloids). On average, potato tubers contain 77 % water, 20 % carbohydrates, and less than 3 % of proteins, dietary fiber, minerals, vitamins and other compounds (Karpukhin, and Keita, 2020; Okache et al., 2025). Chemical composition of tubers depends on the variety, growing conditions (climatic, weather, type of soil, fertilizers used, cultivation agrotechnics), maturity of tubers, terms and conditions of storage, etc. (Gasparyan and Gasparyan, 2017). It can provide more carbohydrates, proteins, minerals, and vitamins per unit area of land and time as compared to other potential food crops (Zaheer and Akhtar, 2016, Burgos et al., 2020).

In general cultivation, varieties with higher overall yield are typically preferred by growers, unless specific traits such as disease resistance, stress tolerance, or industrial applications like starch extraction are prioritized (Kaur et al., 2025). The growth of production will depend on the scientific organisation of production, including the quality of planted tubers and the availability of zoned potato varieties that are most resistant to specific climatic conditions.

Studies to determine the cause of poor yield of heat-susceptible potato genotypes grown at high temperature suggest it is related to inhibited photosynthesis and insufficient availability of the transportable sugar, sucrose (Basu and Minhas, 1991; Chen and Setter, 2021). In addition, warm temperature can have direct effects that inhibit tuber initiation and growth (Singh et al, 2020), thereby diverting photosynthate from tubers to shoots.

Potatoes are prone to factors such as biotic, including nematodes, fungi, bacteria, pathogens, pests and diseases damages and abiotic including sunlight, drought, humidity, precipitation, frost, salinity and temperature changes and intense weather variation (Adekanmbi et al., 2023; Handayani et al., 2019).

The breeding cycle is usually 10–12 years and breeding often involves sophisticated selection procedures. Governments in many countries have organized an elaborate varietal assessment system to make sure that only cultivars of satisfactory quality are being released. In addition, many sophisticated research centres make available to breeder new genetic variation, new breeding methods and improved selection techniques.

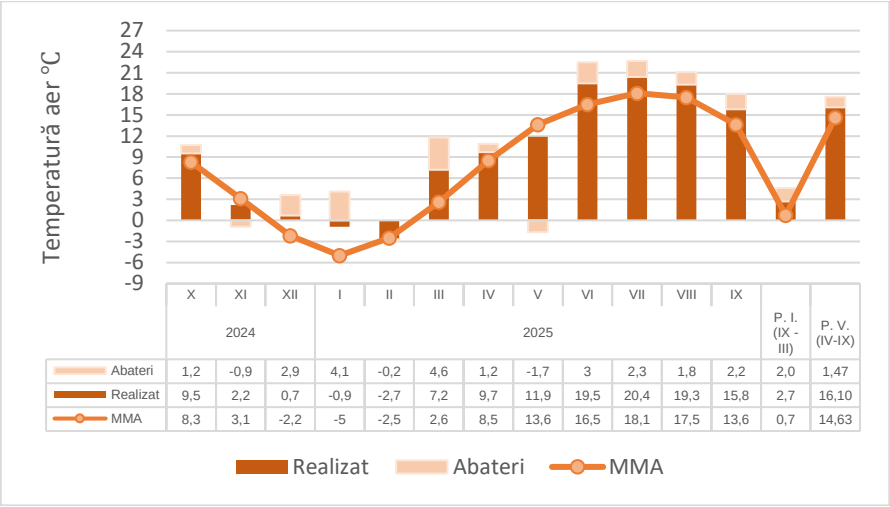
MATERIAL AND METHODS

Trial was performed in the experimental field of the Technologies and Good Agricultural Practice Laboratory to the National Institute for Research and Development for Potato and Sugar Beet Brasov.

The experimental design was a randomized complete block with factorial arrangement. The plot size was 3 m × 8.4 m with 0.75 m and 0.3 m between rows and plants respectively. Planting was done manually in April 24th, 2025. Treatments for weed control (pre- and post-emergent), for Colorado beetle and for late blight control (alternating systemic products with contact) were applied in accordance with Good Agricultural Practice(GAP) and specific climatic conditions. No irrigation was used.

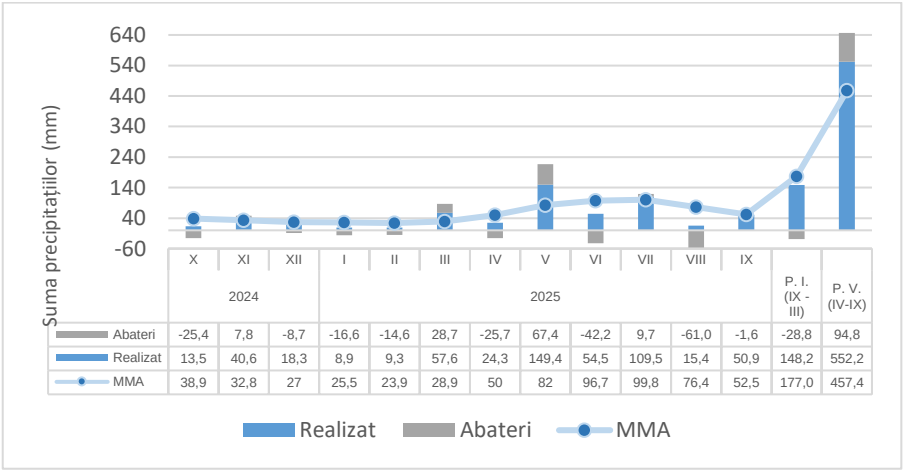
Data on quantitative traits (plant height, number of stems per plant, number and weight of tubers per plant) were collected on July 1st and July 25th, respectively, sacrificing two plants from each replicate of each variety and analyzed in the laboratory.

Climatic conditions during 2025. The thermal values from October to March recorded larger positive deviations in December (+2.9 °C), January (+4.1 °C) and March (+4.6 °C). As for the level of recorded precipitation, it was lower by 28.8 mm/sq m. The month of April, in terms of precipitation, was deficient (-25.7 mm/sq m), and temperatures were slightly higher (9.7 °C) compared to the multiannual average (8.5 °C). In May, temperatures were recorded lower by 1.7 °C compared to the multiannual average (13.6 °C) and a very high amount of precipitation (149.4 l/sq m), making access to the field difficult. During the summer, in June and July, temperatures were higher by +3 °C and +2.3 °C, respectively, compared to the multiannual average, but lower by -1.8°C in August, while the precipitation regime was deficient in June (42.2mm/m2) and August (-61.0 mm/m2), which negatively influenced the potato crop (Figures 1 and 2).



	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX	P. I. (IX - III)	P. V. (IV-IX)
	2024			2025										
Abateri	1,2	-0,9	2,9	4,1	-0,2	4,6	1,2	-1,7	3	2,3	1,8	2,2	2,0	1,47
Realizat	9,5	2,2	0,7	-0,9	-2,7	7,2	9,7	11,9	19,5	20,4	19,3	15,8	2,7	16,10
MMA	8,3	3,1	-2,2	-5	-2,5	2,6	8,5	13,6	16,5	18,1	17,5	13,6	0,7	14,63

Figure 1. Monthly average air temperature in Brașov
(October 1, 2024 -September 30, 2025)



	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX	P. I. (IX - III)	P. V. (IV-IX)
	2024			2025										
Abateri	-25,4	7,8	-8,7	-16,6	-14,6	28,7	-25,7	67,4	-42,2	9,7	-61,0	-1,6	-28,8	94,8
Realizat	13,5	40,6	18,3	8,9	9,3	57,6	24,3	149,4	54,5	109,5	15,4	50,9	148,2	552,2
MMA	38,9	32,8	27	25,5	23,9	28,9	50	82	96,7	99,8	76,4	52,5	177,0	457,4

Figure 2. Monthly precipitation amount in Brașov
(October 1, 2024 -September 30, 2025)

Description of the varieties.

All the varieties were created by breeders from the NIRDPSB Brasov.

Brasovia variety is medium early with upright growth habit, white flowers and round-oval tubers with yellow skin and white-yellow flesh.



Figure 3-4. Flower, leaf and tubers of the variety Brasovia

Amural variety is also medium early variety with a very well developed foliage. The tuber shape is oval with medium-red skin and light yellow flesh.



Figure 5-6. Flower, leaf and tubers of the variety Amural

Postavaru is an early variety with a very well developed foliage. The shape of tuber is short-oval, the depth of the eyes is shallow, the color of the skin is yellow and the flesh color is cream.



Figure 7-8. Flower, leaf and tubers of the variety Postavaru

Harvest observations (19 September 2025) mentioned the number and the weight of tubers with blight and the yield . 100 tubers were hand picked and stored at a temperature around 10^0C for five month to allow different diseases symptoms to

develop. The tubers was graded into the following grades: < 35 mm, 35-45 mm, > 45 mm, and after grading were weighed and the yields expressed in tonnes per hectare.

Evaluation of the culinary quality of potatoes were made using samples of 6 tubers whole peeled and placed in the steamed for 60 minutes to be boiled. Culinary qualities were determined by the method of Lugt and Goodijk (1959) using the scheme for the Appreciation of the potato culinary qualities (Mureșan, 1999).

RESULTS AND DISCUSSIONS

Table 1 indicates the number of days it took for each potato variety in the trial to emerge after it was planted (24th April 2025), as well as the days each of the potato varieties took to reach full canopy after emergence. Emerged earliest (25th day) Postăvaru variety, followed by Brașovia (29th day) and the last Amural (31st day) and regarding the full canopy Postavaru variety reached it after sixteen days followed by Amural variety in twenty-one days and Brasovia variety in twenty-five days.

Table 1

Days from planting to emergence and days from emergence to reaching full canopy cover

Potato variety	Planting (24.04) to emergence (days)	Emergence to reaching full canopy cover (days)
Brasovia (control)	29 (19.5)	25 (13.06)
Amural	31 (23.05)	21 (13.06)
Postavaru	25 (26.05)	16 (11.06)

To the first assessment, Amural variety produced the tallest plants (41.17 cm), followed by Postăvaru (33.5 cm). Brasovia produced the shortest plants (32.67 cm). These differences in plant height among the varieties may be caused by plant genetics and the quality of the plant material. No statistical differences in plant height were found. Numerically maximum number of main stems per hill was produced in Brasovia and Amural varieties (both 5.17). Lowest number of stems per hill (3.6) was found in Postăvaru variety.

Amural variety, generating the greatest number of tubers per hill (13.17 tubers/hill), significantly different from the other varieties: Brasovia (10.77) and Postăvaru (7.17).

To the second assessment the number of main stems per hill varied between Brasovia 4.76, Amural 4.33 and Postăvaru 2.67.

Amural produced the tallest plants (66.83 cm), statistically assured difference, followed by Postăvaru (33.5 cm) and Brasovia (39 cm).

Amural, generating the greatest number of tubers per hill (11.83 tubers/hill), followed by Brasovia (7.83 tubers/hill) and Postăvaru (4.67) (Table 2).

Table 2

Canopy and tuber development during vegetation process

Variety	Plant height (cm)		No. stems /plant		Tub. no/hill		Tub. Weight g/hill	
	I asses.	II asses.	I asses.	II asses.	I asses.	II asses.	I asses.	II asses.
Brasovia	32.67	39.00	5.17	4.67	10.17	7.83	216.67	234.67
Amural	41.17	66.83	5.17	4.33	13.17	11.83	170.00	326.17
Postavaru	33.50	43.33	3.00	2.67	7.17	4.67	90.33	115.33

Pests and diseases

Diseases are the most important component of biological constraint to potato production as they affect both above and below ground parts. Once in the tubers, the disease continues to develop and multiply even when the products are in stores meaning 100 % yield loss is possible depending on the period and conditions of storage, type of disease and multiplication rate (Otieno, 2019).

Silver scurf *(Helminthosporium solani)* can worsen in storage, beginning three to four months following storage, and ultimately result in substantial infection with longer storage. Humidity above 90 % favors this disease.

Potato common scab is a major disease caused by the *Streptomyces* species, the symptoms are variable and can range from surface russeting to deep pits, reducing the marketability of affected tubers.

Tubers affected by black scurf (*Rhizoctonia solani*) may have dark brown to black sclerotia on the surface, and they are not easily removed. While it does not affect eating quality, it severely impacts marketability and can cause stem cankers that reduce yields.

Fusarium tuber rot (*Fusarium* sp.) usually does not occur unless the tuber is injured during harvest. Wounds provide a way for the fungus to enter the tuber. Dry rot is one of the most common storage and seed piece diseases. Fusarium dry rot leads to secondary infections by soft rot bacteria.

Wireworms are the larvae of wireworms (*Agriotes* spp.), which live in the soil and cause significant damage to potato tubers by boring narrow tunnels into the flesh, often rendering them unmarketable. They represent a long-term threat, with larval stages lasting up to 5 years, preferring moist soils.

Table 3

Damage of potato tubers by different pathogens after storage

Variety		Tubers with different diseases symptoms (%)						Average damage %
	Total tubers no.	Silver scurf (%)	Common scab (%)	Black scurf (%)	Late blight (%)	Fusarium (%)	Wireworms (%)	
Brasovia	100	0.8	1.3	0	0	3.6	2.0	5.7
Amural	100	1.2	3.2	0	0	3.0	0.7	5.1
Postăvaru	100	0	4.6	0	0	4.3	10.9	19.8

An analysis of the data in Table 3 shows that among 100 tubers of the Brasovia variety, 0.8 % showed symptoms of attack by silver scurf, 1.3 % of common scab, 3.6 % of fusarium and 2.0 % by wireworms. In the 100 tubers of the Amural variety, 1.2 % showed symptoms of attack by silver scurf, 3.2 % of common scab, 3.0 % of fusarium and 0.7 % by wireworms and in the 100 tubers of the Postăvaru variety 4.6 % of common scab, 4.3 % of fusarium and 10.9 % by wireworms and no tubers with silver scurf symptoms. The climatic conditions, with the presence of warmer days without precipitation at planting time (April month), contributed to the lack of black scurf attack.

The use of fungicides to control potato late blight was very effective and reduced the disease pressure so that after storage no tubers showing symptoms were found. Potato late blight caused by *P. infestans* remain the most important fungus disease among potatoes worldwide. At present, the major cultivars do not have resistance to *P. infestans*. For this reason, late blight can almost be controlled at present by constant application of fungicides for this disease during the cultivation period.

Potato tubers number and yield

The highest number of tubers in the >45 mm fraction was obtained in the Amural variety (20.28 thousand tubers), followed by Postavaru variety (1.67 thousand tubers) and with the mention that no tubers in the large fraction were obtained in the Brașovia variety. The tubers in the 35-45 mm fraction, which can represent the seed material, varied between 94.44 thousand in the Postăvaru variety and 240 thousand in the Amural variety, and the tubers in the <35 mm fraction varied between 83.33 in the Postavaru variety and 200.83 thousand in the Amural variety. The number of tubers does not define the production obtained, due to the obviously different fractions and then the production obtained per hectare is calculated. Amural variety had the highest yield (22.86 tons/ha), followed by Brasovia variety (10.96 tons/ha) and the last, Postavaru variety (7.11 tons/ha).

It was observed that among the analyzed varieties, the Amural variety recorded the highest number of tubers in the large fraction, significantly differentiating itself from the other varieties, which leads us to believe that the earliness elements it possesses contributed to the faster accumulation of nutrients and implicitly to the increase in tuber volume. Regarding the number of tubers in the 35-45 fraction (seed), the Amural variety differed significantly from the other two varieties, which also reflects the ability to produce sufficient seed material (Table 4). All these aspects help to form opinions regarding the yield of varieties in adverse growing conditions.

Table 4 indicates the number of tubers and the yield obtained from each variety. The yields are expressed in terms of the number of tubers greater than 45 mm (the marketable size), the number of tubers between 45-35 mm (considered seed potato), the number of tubers less than 35mm (non-marketable size), the total number of tubers harvested, weight (tons) of tubers greater than 45 mm, weight of tubers between 45-35 mm, weight (kg) of tubers less than 35 mm, and total weight of tubers harvested from each variety. Ultimately, the average yields in tons are presented per variety.

Table 4.

Yield (t/ha) and number of potatoes on different varieties

Parameter	Brasovia	Amural	Postavaru
No of tubers greater than 45 mm (thousand)	0	20.28	1.67
No of tubers between 35-45 mm (thousand)	135.56	240.00	94.44
No of tubers less than 35 mm (thousand)	108.89	200.83	83.33
Tons of tubers greater than 45 mm	0	2.94	0.28
Tons of tubers between 35-45 mm	5.86	15.36	4.83
Tons of tubers less than 35 mm	1.89	4.56	2.00
Estimated Total yield (tons) per ha	10.96	22.86	7.11

Quality parameters

To determine the dry matter content of the potatoes harvested for each variety, a tuber weighing at least 50 g per variety was used. Potato tubers are homogenised by cutting the sample into smaller pieces and shortly blending. A fifty (50) gram sample is then weighed into a dish. The weight recorded dish and sample are dried in a 104 °C oven for 4 hours.

Most of the dry matter is starch, and the specific gravity of potatoes is influenced by the variation in starch content. The higher the starch content of potatoes, the higher their specific gravity will be, and vice versa (Table 5). Determination of starch content was done using Polikeit balance and is based on the positive between the specific weight (density) of the tubers and their dry matter content.

Table 5.

Evaluation of tuber dry matter, starch content and boiling colored

Variety	Dry matter (%)	Starch mean (%)	Peeling efficacy (%)	Raw coloring	Boiled coloring
Brașovia	21.21	13.50	82.64	1.5	2.2
Amural	26.28	14.83	82.74	1.3	1.7
Postavaru	24.84	15.92	81.52	1.2	1.3

Culinary quality of varieties is determined by mealiness, consistency, pulp color, moisture and flavor. Mealiness is closely linked to consistency and is determined by the easier cells decomposing after cooking. Cracking tubers to boil depends on the tissue turgor. There is a correlation between mealiness, specific weight and starch content (Hermeziu et al., 2017). Generally a mealy texture corresponds to high dry matter content, whereas a waxy texture is associated with lower one (Table 6).

Table 6.

Appreciation notes for the culinary value of boiled potatoes

Variety	Appreciation notes for the culinary value of boiled potatoes (mean)								Class
	Appearance	Taste	Color	Crushing on boiling	Consistency	Mealiness	Moisture	Starch structure	
Brașovia	2.25	2.25	2.50	2.25	2.13	3.13	2.13	2.25	B
Amural	1.25	2.63	4.75	1.25	2.25	2.50	2.75	2.50	B
Postavaru	2.75	2.25	4.75	2.63	2.38	3.00	2.50	2.38	B/C

On average the Amural variety obtained the best notes for appearance (1.25), crushing boiling (1.25), and mealiness (2.50). All these notes indicate a variety with a very pleasing overall appearance with tubers that remain whole after boiling and less mealiness. Instead, Postavaru variety obtained the highest notes for the overall appearance (2.75) and crushing on boiling (2.63) that indicate a variety with an overal appearance less pleasing caused by a higher level of crushing on boiling.

The tubers from classes B and B/C are firm enough, at boiling the tubers crush a little, they are a little wet and have a fine structure. Potatoes of this type are suitable for multiple uses (soups and stews, boiling, mashing, and pan-frying).

CONCLUSIONS

For all the characters studied (plant height, stems number, number and weight of tubers) the Amural variety presented the highest values, followed by the Brasovia and Postavaru varieties.

Regarding the attack of diseases and pests, their degree of attack overall was between 5.1 % for the Amural variety and 19.8 % for the Postavaru variety.

Yield (t/ha) was between a maximum of 22.86 t/ha for the Amural variety and a minimum of 7.11 t/ha for the Postavaru variety. Strach content varied between 13.50 % for the Brasovia variety and to 15.92 % for the Postavaru variey and the dry matter content between 21.21 % for the Brasovia variety and 26.28 % for the Amuaral variety.

The analyzed varieties are recommended to be cultivated in favorable and very favorable areas for potato. In the thermohydric stress areas is recommended to use irrigation to obtain satisfying production.

It is important to have adapted varieties to the climatic conditions to avoid stress and physiological injuries.

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