

A NEW ROMANIAN POTATO VARIETY, CEZARINA AND ITS SPECIFIC TECHNOLOGY

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Abstract: National Institute of Research and Development for Potato and Sugar Beet Brasov is working to create potato varieties align to international demand. The new created variety Cezarina have a very good yield capacity, is very well adapted to soil and climate condition of Romania on the base of testing activity on the network of the State National Institute for Testing and Registration of Varieties (ISTIS) before homologation. The research was carried out between 2016 – 2018 using the classical breeding scheme for potato and applying a specific technology. The starch content and the processing quality were determinated in a specialized laboratory and late blight (*Phytophthora infestans*) resistance and viruses resistance were determinated in fields. The resistance to black wart (*Schynchitrium endobioticum*) was determinated to National Station of Testing Pojorâta. Variety resistance to diseases, especially late blight, helps to reduce the number of treatment which is cost saving and enviromental protection.

Keywords: potato variety, Cezarina, technology, consumption, processing

INTRODUCTION

The development of new and better potato varieties is one of the key elements for a solid and profitable potato crop. Potato plant is extremely demanding, difficult as cultivated plant, being extremely sensitive to application of technology and at the same time resistant as weed, appearing often as volunteers when harvest was done improperly, being a possible source of infection with different pests and diseses (Colorado beetle, late blight) (Hermeziu and Hermeziu,2016). Generally potato is a sensitive crop both to biotic and abiotic stresses (van Loon, 1981). It has many pathogens and pest and a weak root system. Stress sensitivity may manifests in yield decrease (lower tuber number and weight/plant) and quality loss (tuber malformations, internal defects, higher sugar or alkaloid content etc.) (Levy and Veilleux, 2007, Polgar et al., 2016). Among biotic stresses viruses and potato late blight has the highest influence on yield (Salazar, 1996).

Although the potato is a plant with high ecological plasticity that does not mean that the same variety can improve all the technological elements in specific conditions (Cattely, 1975, Saninoiu, 1996). Some research should be resumed and reinterpreted according to new biological conditions, technical, economic and even social (Ianosi, 1997). The National Institute of Research and Development for Potato and Sugar Beet Brasov is working to breed potato varieties align to international demand, to correspond in terms of yield capacity as well as resistance to pests and diseases, culinary quality and suitability for processing.

MATERIAL AND METHOD

To obtain a new potato variety its apply a classical breeding scheme (Chiru et al., 1992, Bozesan, 2002) where sexual hybridization is followed by individual clonal selection. The method consist in the parents choosing, paying attention to the physiological and technological qualities of tubers. The main steps continue with hybridization including seedlings, vegetative populations, descendants and yield trials in different enviromental conditions (3 or 2 years in State Institute for Variety Testing and Registration network - ISTIS). A final step is represented by the obtaining of the patent and national registration in the official catalog of varieties (Hermeziu et al., 2015).

RESULTS AND DISCUSSIONS

Description of potato variety **Cezarina**

Genealogy: Angela x Dalida

Morphological characters:

- the plant is of medium tall, with intermediate semi-upright vine
- the leaves have a medium size with green color and a medium number of leafleats
- the flowers are dark red with medium corolla while flowering is mid-level
- the tubers have a oval shape with shallow eyes, skin color is yellow and the color of flesh is light yellow

Culinary characteristics were determined in NIRDPSB Laboratory, using Goodijk and Lugt method (1959) (Table 1), an assessment key of potato culinary qualities (Constantinescu and al.,1969, Muresan, 1999).

Table 1.

Culinary quality of Cezarina variety compared with standard varieties Rustic and Roclas (2017)

Character	Cezarina	Rustic	Roclas	Observations
Aspect	1.13	2.38	2.13	1-very showy; 4-unshowy
Taste	1.13	2.13	1.88	1-excelent; 4-less good
Color	4.75	4.25	4.25	1-white; 6-intense yellow
Disintegration	1.13	2.13	2.0	1-remain whole; 4 hard crush
Consistency	2.25	2.13	2.5	1-firm hearty; 4-unhearty
Mealiness	1.75	3.13	2.13	1-unmealy; 4-very mealy
Moistness	1.38	3.13	2.13	1-moist; 4-dry
Granulation	1.75	2.88	2.13	1-fine; 4-very coarse
Cooking type	A/B	B/C	B	
Starch content	11.75	17.5	15.58	

Potato varieties differ in their dry matter content. Generally, late maturing varieties contain high dry matter as compared to early maturing varieties. Level and type of fertilizers also have an effect on the dry matter content of potatoes. Application of higher doses of nitrogenous fertilizers to crop results in lower dry matter containing potatoes.

Specific technology

Preparation of the germinative bed: in autumn a deep tillage (30-35 cm) followed in spring by soil leveling. In carrying out the work will take into account of the optimal humidity of the soil.

After a deep tillage (35 cm) in autumn, in spring ...Hilling is the only tillage operation necessary in the production of potatoes. The objective of hilling is to cover the daughter tubers with sufficient soil to prevent greening, minimize infection with late blight, minimize frost damage, and improves drainage in the area of tuber formation and to facilitate harvest.

Fertilisation: Rational use of fertilizers allow application of an agriculture "friendly" with the environment, knowing that plants can absorb some amounts of fertilizers and the rest remain in the soil or are washed (if leached) and end up in rivers, lakes or groundwater. Potato is a plant with high requirements to nutrients due to its high productivity and poorly developed root system compared to other crops and has a low solubilizing power of the chemical compounds in soil (Morar, 1999).

To achieve an average yield of 35-40 t/ha is necessary a fertilizer complex administration (N:P:K) at least 800 kg/ha.

NIRDPSB Braşov recommendations regarding the doses applied to potato culture depending on N:P:K values determined in soil and estimated yield level and can be adapted with some corrections of 10-20 kg/ha by decreasing nitrogen doses, when potato follows an annual pulse, with 30-40 kg/ha when fertilization is made with manure or with mild elevations of 10-20 kg N:P:K where potatoes following sugar beets or corn

Planting will begin when soil temperature reaches 6°C, the planting depth is 3-6 cm, depending on the size of the planting material. The recommended planting distance is 75/30 cm and a medium size ridge, with a height of 12-15 cm.

Maintenance: Potatoes emerge approximately 3-4 weeks after planting. In that time, a significant number of weeds can germinate. Pre-emergent herbicides are most effective when applied to weeds just after emergence and through the cotyledon stage of growth. The choice of an herbicide depends on weed species present, soil type, cultural practices and cultivar grown.

A very used herbicide in Romania has active ingredient metribuzin. This sort of herbicide require moisture to be activated. If isn't a possibility to irrigate, a minimum level of 10 mm volume of precipitations is necessary.

Potato variety Cezarina have no problems (any kind of chlorosis, necrosis or deformation) regarding the use of this kind of herbicides.

Sometimes is necessary to apply a post-emergent herbicide, after the potato emergence, which control the weeds with late germination (products based on propaquizalop, haloxifop-R-methyl, fluazifop-P-butyl, quizalofop).

It is highly recommended to applied in autumn a total herbicide on the stubble to reduce the degree of infection with weed seeds and to control perennial weeds (*Setaria glauca*, *Agropyron repens*, *Echinochloa crus-galli*).

Carefully follow all herbicide label recommendations for use rates on various types of soil.

Pests and diseases control

Colorado beetle: Field rotation is the most important cultural method to control Colorado beetle. Usually Colorado beetles overwinter close to last year potato field and are very vulnerable when they emerge in the spring if no food plants are close. A distance of minimum 200 m between the last season field and actual one is necessary because the Colorado beetles walking and tend to stop after encountering the first plants. In our country conditions we recommend 2-3 treatments with insecticide from different chemical classes.

Diseases: Potato plants are susceptible to a wide variety of diseases that can reduce yield, quality and storability of tubers. Diseases can occur in the field or in storage and are caused by fungi, bacteria and viruses. Most diseases can be controlled using certified seed, proper sanitary practices, crop rotation, and pesticides.

Potato late blight: The most serious disease with high impact on the farmers' budget is the late blight (*Phytophthora infestans*). If there is not developed a forecast and warning system we strongly recommend to start the spraying when plants have 10-15 cm and/or there are climatic conditions favourable to disease. Now the farmers have available lot of fungicides. The products must be choose according to the mode of action, the infection pressure, the evolution of the field so as to capitalize the strengths of each active substance while keeping a reasonable cost of treatments (Hermeziu, 2017).

Resistance to potato late blight has a high priority in most potato breeding programmes (Colon et al., 1995; Rasmussen et al., 1998). International reports show that quantitative resistance in foliage may be used to complement fungicide applications to allow savings of fungicide by reduced application doses or extended intervals between applications (Grünwald et al., 2000).

Fortunately potato variety Cezarina has a high level of resistance on foliage and tubers that may be exploited, can be reduced the number of treatments. Also using translaminar or systemic fungicides it is possible to expand the interval between the treatments

The foliar resistance test was in close accordance with the European Association for Potato Research guidelines for foliar-blight-resistance field tests (Dowley et al., 1999). The calculation of resistance values in foliage and tubers was based on comparison with infection levels in standard cultivars of known resistance (Table 2).

Table 2.

**Evaluation of leaf roll viruses, PVY and late blight resistance
(NIRDPSB Brasov fields 2018)**

Variety	PVY	Leaf roll virus	Late blight	
			to leaf	to tuber
Cezarina	7	7	8	8
Rustic (control)	7	7	9	8
Roclas (control)	8	7	6	7

Marks: 1- sensitive

9 – very resistant

Irrigation: The potato is a very demanding crop to water. The plants incur no drought or excess water. All the season, especially during the formation and growth of the tubers, the field requires a continuous water supply. Too much water or too little water will affect tuber number, size and quality. As a method of watering is recommended sprinkler irrigation. Due to wet of the leaves, which create favorable conditions for diseases attack, it is necessary to pay more attention to the control methods.

Haulm destruction: Mechanized harvest is hampered by haulms and weeds debris. It is recommended their destruction with different machines, ensuring ridge and tubers protection during work. Research undertaken by Ianoși (2002) showed that of the total tubers injuries 35-40% are produced by machinery in the harvest process.

So 10 -15 days before the start of harvest the vines must be killed mechanically in consumption field and chemically in the seed field, moment when the weeds are destroyed too. By this procedure is followed the tubers suberisation to become more resistant to injuries caused by harvesting, transporting and handling.

Harvest: Choose of harvest is up to the financial possibilities of the farmers. It is recommended to harvest ends and marginal rows to create free zones for machinery movement.

To Cezarina variety will take account of the fact that in general the tubers are large and very large size and seed material obtained is limited.

Table 3.
Yielding capacity in State Institute for Testing and Registration of Varieties network (2016-2017)

ISTIS station	Year 2016			Year 2017		
	Cezarina (kg/ha)	Roclas (kg/ha)	Rustic (kg/ha)	Cezarina (kg/ha)	Roclas (kg/ha)	Christian (kg/ha)
Tg. Secuiesc	60328	56191	49650	63096	56174	63096
Sibiu	54322	46426	41989	45798	38528	38129
Satu Mare	36063	35155	28322	34783	32466	32014
Rădăuți	39629	33437	36570	42490	37218	37764
Luduș	41109	33821	32927	18370	18769	22496
Hărman	49650	43911	41909	67023	47921	45857
Bacău	54863	43617	36748	30616	25721	23622
Average	47994	41794	38302	43168	36685	37568

Yielding capacity: Potato variety Cezarina proved a good yield capacity, being adapted to Romanian climatic and soil conditions as shown in tests carried out in State National Institute for Testing and Registration of Varieties (ISTIS) network, were it was tested prior approval (Table 3). Cezarina variety exceeded the control varieties in both years and from these data may be deducted the yielding capacity in different environmental conditions and also the ecological plasticity of the variety. Evaluation

was done in six centers from different country regions: Târgu Secuiesc, Sibiu, Satu Mare, Rădăuți, Luduș, Hărman, Bacău.

CONCLUSIONS

The potato variety Cezarina was bred at the National Institute of Research and Development for Potato and Sugar Beet Brsaov. The patent was obtained in 28.02.2019 and the variety is registered in the Official Catalogue of new varieties of plants for culture in Romania

Cezarina variety have a very good capacity of yield, is very well adapted to soil and climate condition of Romania on the base of testing activity on the network of the State National Institute for Testing and Registration of Varieties (ISTIS) before homologation.

Variety resistance to diseases, especially late blight, helps to reduce the number of treatment which is cost saving and enviromental protection.

Harnessing the natural resources available to our agriculture will increasingly depend on the cultivation of some genotypes more resistant to hydric deficit and thermal variations, technologies that lead to the most efficient use of available water precipitation.

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