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Results regarding the behavior of new potato lines created under the experimental conditions of S.C.D.C. Targu Secuiesc

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Abstract The potato, viewed from the point of view of breeding, presents the following biological and physiological features: vegetative propagation, heterogeneity of offspring at self-fertilization, high plasticity, sterility and incompatibility in inbreeding, excessive sensitivity to diseases. The first three features greatly enhance the process of breeding, unlike the last two that complicate the works and constitute important impediments in achieving success. The potato breeding has as permanent objective the creation of new varieties with high yield capacity, resistant to diseases and pests and with superior quality properties, that satisfy the demands of the processors. The creation of potato varieties is a continuous process, which must keep up with the changing ecological conditions, the increasing aggression and the increasing pathogenicity of pathogens - due to the emergence of new varieties, strains, biotypes and pathotypes, as well as the ever-increasing demands of producers and consumers. The evaluation of the 12 potato lines was carried out over three years (2017 – 2019) in the experimental field and in the quality laboratory at S.C.D.C. Targu Secuiesc. The climatic and soil conditions in which the potato lines were cultivated were analyzed and the following were recorded: the vegetation period, the uniformity, the virotic infection, the potato blight attack on the foliar apparatus and the tubers, the yield on size fractions, the starch content, the culinary and technological quality. Following the determinations made, each line is described according to field and laboratory results.

Key words

breeding, potato, variety

The breeding, a science and art at the same time, must occupy a predominant place in the combined efforts of agricultural researchers, in order to ensure higher level yields and temporal and spatial constants [6, 11, 16].
The current requirements to create new varieties with high yield capacity [13], with resistance to diseases and pests [10], adaptable to climate change, suitable for industrial machining and processing, obliges the breeder to set major goals: genetic yield potential (80 t/ha), starch content of 20 – 22%, superior resistance to potato blight and nematodes, superior culinary properties [14, 15].
The behavior of the newly created lines is very carefully monitored by the breeder in microcultures, comparative orientation cultures and comparative competition cultures [12] in terms of climate and soil requirements, physical characteristics and tolerance to diseases and pests, but also of the industrial processing yields according to the chemical composition of the tubers etc. [1, 5].
Depending on the results recorded, the lines selected for homologation are characterized according to the UPOV guide and tested in the ISTIS network for another three years, in the following centers: Sibiu, Harman, Targu Secuiesc, Bacau, Radauti, Satu-Mare and Ludus.

Material and Method

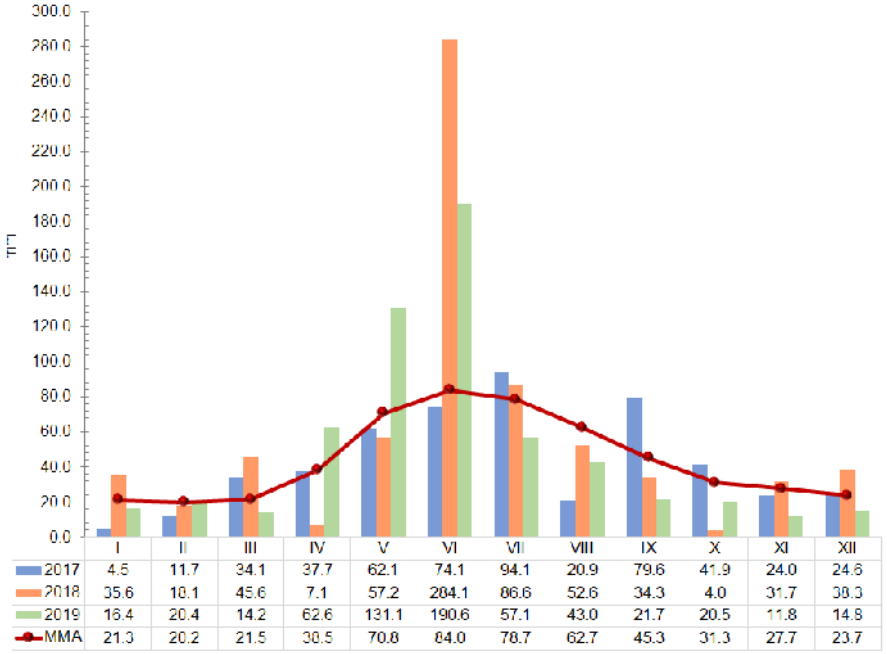
All varieties are obtained by sexuat hybridization followed by individual clonal selection, according to the classical scheme of potato breeding – 12 years [4, 7].
The main steps of working method were:

- established of genitors according to physiological and technological qualities [9] of tubers with destination for processing [2, 3];
- sexuat hybridization [8], followed by all steps: seedlings, vegetative populations, descendants, comparative crops for completion (3 years in the network of research units and 3 years in the network of National Institute for testing and Registration of Varieties / ISTIS) and selection for maintaining in the field of clonal selection on over 1000 m a.s.l. (Apa Rosie);
- homologation, obtaining license and registration in the National List of Cultivated Varieties.

Nemere variety has a high yield capacity, have a starch content over 18%, are resisting to potato cyst nematodes (*Globodera rostochiensis*), and black wart (*Synchitrium endobioticum*) and viruses. The starch content and processing quality were determined in the laboratories of S.C.D.C. Targu Secuiesc, resistance to black wart at Pojorata Centre Suceava and resistance to viruses at virology Laboratory (I.N.C.D.C.S.Z. Brasov).
The yield capacity of the analyzed varieties was determined by weighing the potato tubers harvested from the field. The starch content was determined gravimetrically.

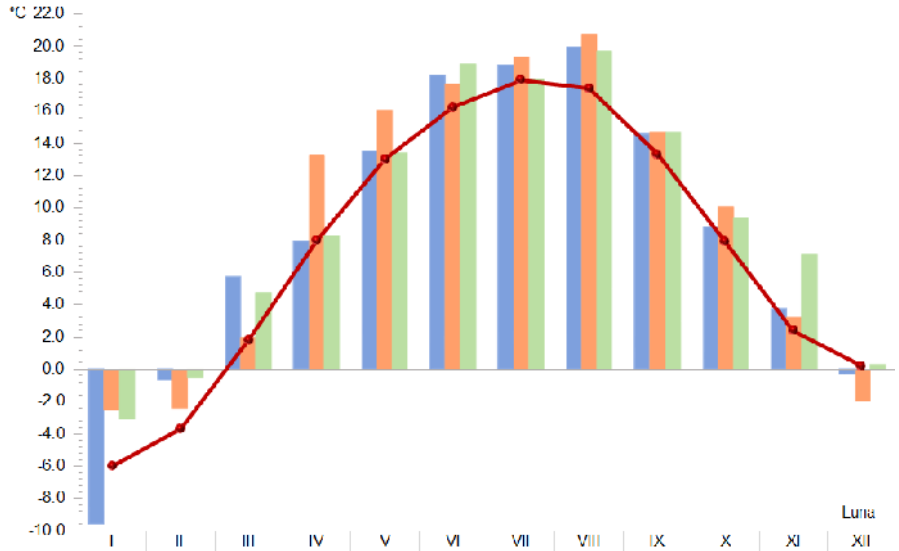
Results and Discussions

The Targu Secuiesc depression extends into the eastern compartment of the Brasov depression, with a width (east-west) of approx. 20 km and a length (north-south) of about 40 km.
The Targu Secuiesc depression is characterized by an accentuated continental climate, with hot and dry summers and cold and long winters.
Regarding the water regime, we can say that the rainfall is below the normal average with uneven distribution.
In 2017, the amount of rainfall recorded at the Targu Secuiesc Meteorological Station was 509.3 mm, lower compared to the MMA 525.7 mm, the difference being d = -16.4 mm, the year 2017 being considered a favorable year for the potato crop, although the precipitations were distributed unevenly. During the growth period of the tubers there was drought (Table 1).
As can be seen from the weather data presented in the winter period of 2017, there were no accumulations of water in the soil, the rainfall recorded having values near or lower than the multiannual average.
During the January - June 2017 period only in March was recorded a higher amount of precipitation compared to MMA, the difference being d = +12.6 mm, this difference not covering the deficit of d = -44.7 mm from the other months.
During the July - October 2017 period the precipitation level was above the multiannual average with a positive difference of d = +18.5 mm and there were also good conditions for the development of the already established crops and with good humidity for the development of potato plants. The lower precipitation amount compared to the multiannual average recorded in August (the difference compared to the MMA being d = - 41.8 mm) and the high temperatures d = + 2.5°C did not cause stress on the plants.
Higher precipitation quantities compared to MMA were recorded in March, July, September and October, the biggest difference being recorded in September with a difference from MMA of + 34.3 mm when part of the water shortage was recovered.
In 2018 the winter period was carried out under the conditions of a rainfall regime close to the MMA, in which there were 147.9 mm, with 33.5 mm above the multiannual average and with a thermal regime 1.15°C higher than the multiannual average of the five winter months (Fig. 1).
The rainfall recorded in 2018 is above the multi-annual average with +145.1 mm and in 2019 with +169.5 mm, with uneven distribution in both years.
In 2019 the winter period was conducted under the conditions of a rainfall regime close to the MMA, in which there were 51 mm, with 12 mm below the multiannual average and with a thermal regime 3°C higher than the multiannual average of the three winter months (Fig. 1).
During the April - June 2019 period the amount of precipitation recorded was 191 mm above the multiannual average, in May-June the differences from MMA were d = + 60.3 mm, respectively d = + 106.6 mm. From July to December, the amount of precipitation recorded was below the annual average of 100.5 mm.
In the years 2018 and 2019 very large amounts of precipitation are observed in May and June, which led to the early onset of potato blight infections (*Phytophthora infestans*) and the excessive soil settling which led to a more difficult mechanized harvest.



	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2017	4.5	11.7	34.1	37.7	62.1	74.1	94.1	20.9	79.6	41.9	24.0	24.6
2018	35.6	18.1	45.6	7.1	57.2	264.1	86.6	52.6	34.3	4.0	31.7	38.3
2019	16.4	20.4	14.2	62.6	131.1	190.6	57.1	43.0	21.7	20.5	11.8	14.8
MMA	21.3	20.2	21.5	38.5	70.8	84.0	78.7	62.7	45.3	31.3	27.7	23.7

Fig. 1 Rainfall variation during 2017/2019- recorded at the meteorological station Targu Secuiesc compared to long-term average



	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2017	-9.6	-0.7	5.7	7.9	13.5	18.2	18.8	19.9	14.5	8.8	3.7	-0.3
2018	-2.5	-2.4	2.0	13.2	16.1	17.7	19.3	20.7	14.7	10.1	3.2	-2.0
2019	-3.1	-0.5	4.8	8.3	13.4	16.9	18.0	19.7	14.7	9.4	7.1	0.3
MMA	-6.0	-3.7	1.8	8.0	13.0	16.2	17.9	17.4	13.3	7.9	2.4	0.2

Fig. 2 The air temperature changes during 2017/2019 recorded at the Targu Secuiesc meteorological station compared to the long-term average

In 2017 the recorded temperatures were above the multiannual average for the entire period analyzed, the differences being +3.9°C - +3.0°C in March - February, +2.0°C - +2.5°C in August and June respectively, with the exception of January and April when the difference from the MMA was -3.6°C and -0.1°C respectively (Fig. 2).

From a thermal point of view, in 2018 values were registered with +2.04°C above the multiannual average. Of the 12 months analyzed, monthly temperatures lower than the multiannual average were recorded only in December 2018 when the difference from the MMA was -0.5°C and higher during the rest of the period, the biggest difference from the MMA being recorded in April with +5.2°C and August with +3.3°C (Fig. 2).

In 2019 values were recorded with +1.88°C above the multiannual average. In the 12 months analyzed, the

average monthly temperatures were higher than the multiannual average, the biggest differences being recorded between January and March 2019 (d = +3.2°C in February and d = +2.95°C in March) and in November with d = +4.7°C (Fig. 2).

From the data presented in table 1 it can be observed that all the breeding lines have a high uniformity (Fig. 3), they fall within the precocity group of the semi-early varieties (90 – 110 days), the resistance to viruses is very high and the starch content is between 14,25% – 17,69% (varieties for consumption).

Table 1

Presentation of the morphological characters on the lines created at S.C.D.C. Târgu Secuiesc

Breeding line	Color of the flower	Uniformity	Vegetation period (days)	Total viruses (%)	Starch content (%)	Tuber classification			
						Tub. shape	Color		Depth of eyes
							Skin	Pulp	
TS 16-1507-1828	white	10	92	0,44	14.44	3	1	3	3
TS 16-1508-1828	white / mauve	9	94	-	14.24	2	1	3	3
TS 16-1509-1828	white	9	90	-	14.25	3	1	4	3
TS 16-1513-1828	white	9	90	0,85	14.24	2	1	3	3
TS 16-1515-1856	whithe	10	90	-	17.69	3	1	3	3
TS 16-1516-1856	mauve + white	10	90	1,28	14.52	3	1	4	3
TS 16-1517-1831	white	10	92	-	14.88	3	1	4	3
TS 16-1525-1851	mauve	10	94	-	17.26	3	1	4	3
TS 16-1526-1883	mauve	9	92	0,44	17.11	4	1	4	3
TS 16-1527-1867	mauve	9	90	-	15.75	3	2	4	3
TS 16-1528-1883	mauve	10	91	-	14.75	4	1	4	3
NEMERE (Control)	**white**	**10**	**96**	**-**	**18.25**	**3**	**1**	**3**	**5**

Note: Shape: 1 – round
2 – round oval
3 – oval
4 – elongated oval
5 – long

Skin color: 1 – white
2 – red

Pulp color: 1 – white
2 – cream-colored
3 – light yellow
4 – medium yellow

Depth of eyes: 1 – on the surface
3 – little deeper
5 – medium
7 – deep
9 – very deep

Fig. 3 Aspects of the experimental field

The study consisted of a bifactorial experience (3x12) on 3 repetitions.

Experimental factor A: the year of the crop, with **3 graduations:**

-a_1 – year 2017;
-a_2 – year 2018;
-a_3 – year 2019.

Experimental factor B: genotypes analyzed with **12 graduations**

-b_1 – TS 16-1507-1828;
-b_2 – TS 16-1508-1828;
-b_3 – TS 16-1509-1828;
-b_4 – TS 16-1513-1828;
-b_5 – TS 16-1515-1856;
-b_6 – TS 16-1516-1856;
-b_7 – TS 16-1517-1831;
-b_8 – NEMERE – CONTROL;
-b_9 – TS 16-1525-1851;
-b_{10} – TS 16-1526-1883;
-b_{11} – TS 16-1527-1867;
-b_{12} – TS 16-1528-1883.

Table 2

The influence of the crop years on the total yield (t/ha)

Year	Total yield (t/ha)	Difference (t/ha)	Significance
2017	41.67	-4,59	ns
2018	48.74	2,48	ns
2019	48.37	2,11	ns
Average (Control)	46.26	-	-

$LSD_{5\%}$ = 4.92 t/ha; $LSD_{1\%}$ = 11.37 t/ha; $LSD_{0.1\%}$ = 36.21 t/ha

The statistical analysis of the influence of the crop years on the total yield shows that the years 2018 and 2019 have resulted in higher yields (d = +2.48 t/ha and d = +2.11 t/ha respectively) compared to the control - the average of the crop years (46.26 t/ha) - the differences being insignificant and not statistically insured for the years studied (table 2).

From the analysis of the influence of the breeding lines on the total yield we notice a distinctly significant and very significant positive difference for 8 out of the 11 analyzed lines and a significant negative decrease of the total yield for the breeding line TS 16-1515-1856 (d = - 6.05 t/ha), compared to the control – the *Nemere* variety (table 3).

Thus, for the potato lines TS 16-1516-1856, TS 16-1517-1831, TS 16-1526-1883, TS 16-1528-1883 total average yields were recorded with very significant positive differences from the control variety (*Nemere*) of between +8.03 t/ha and +12.98 t/ha, the distinctly significant differences recorded were between +6.41 t/ha and +7.77 t/ha.

Table 3

The influence of breeding lines on total yield (t/ha)

Breeding line	Total yield (t/ha)	Difference (t/ha)	Significance
TS 16-1507-1828	48.27	7.77	**
TS 16-1508-1828	44.19	3.69	ns
TS 16-1509-1828	44.90	4.41	ns
TS 16-1513-1828	47.44	6.94	**
TS 16-1515-1856	34.45	-6.05	o
TS 16-1516-1856	53.48	12.98	***
TS 16-1517-1831	48.53	8.03	***
TS 16-1525-1851	46.91	6.41	**
TS 16-1526-1883	49.88	9.38	***
TS 16-1527-1867	48.00	7.50	**
TS 16-1528-1883	48.57	8.07	***
NEMERE (Control)	40.50	-	-

$LSD_{5\%}$ = 4.64 t/ha; $LSD_{1\%}$ = 6.18 t/ha; $LSD_{0.1\%}$ = 8.00 t/ha.

Table 4

The combined influence of crop years and breeding lines used in planting on the total yield (t/ha)

Breeding line	2017 a1	Diff. (t/ha)	Signif.	2018 a2	Diff. (t/ha)	Signif.	2019 a3	Diff. (t/ha)	Signif.	Diff. (a2-a1) (t/ha)	Signif.	Diff. (a3-a1) (t/ha)	Signif.
TS 16-1507-1828	43,22	13,24	**	51,56	7,33	*	50,02	2,73	ns	8,34	ns	6,80	ns
TS 16-1508-1828	40,02	10,04	*	54,64	10,42	*	37,91	-9,38	o	14,62	**	-2,11	ns
TS 16-1509-1828	46,29	16,31	***	42,87	-12,07	oo	45,56	-1,73	ns	-3,42	ns	-0,73	ns
TS 16-1513-1828	49,98	20,00	***	45,55	1,33	ns	46,78	-0,51	ns	-4,43	ns	-3,20	ns
TS 16-1515-1856	29,18	-0,80	ns	34,02	-10,20	o	40,16	-7,13	ns	4,85	ns	10,98	*
TS 16-1516-1856	51,02	21,04	***	53,38	9,16	*	56,04	8,75	*	2,36	ns	5,02	ns
TS 16-1517-1831	39,98	10,00	*	52,78	8,55	*	52,82	5,53	ns	12,80	*	12,84	*
TS 16-1525-1851	42,44	12,46	**	49,22	5,00	ns	49,06	1,77	ns	6,78	ns	6,62	ns
TS 16-1526-1883	43,36	13,38	**	50,79	6,57	ns	55,49	8,20	*	7,43	ns	12,13	*
TS 16-1527-1867	43,62	13,64	**	50,86	6,64	ns	49,51	2,22	ns	7,24	ns	5,89	ns
TS 16-1528-1883	40,96	10,98	**	54,93	10,71	**	49,82	2,53	ns	13,97	**	8,86	*
NEMERE (Control)	29,98	-	-	44,22	-	-	47,29	-	-	-		-	-

LSD $_{5\%}$ = 8,04 t/ha; LSD $_{1\%}$ = 10,70 t/ha; LSD $_{0,1\%}$ = 13,85 t/ha.
LSD $_{5\%}$ = 8,78 t/ha; LSD $_{1\%}$ = 13,05 t/ha; LSD $_{0,1\%}$ = 23,00 t/ha.

From the combined interaction of the crop years and the breeding lines (table) on the total yield, the good behavior of the breeding lines TS 16-1516-1856, TS 16-1513-1828 and TS 16-1509-1828 is highlighted in 2017, which showed significant positive differences (d = +21.04 t/ha, d= +20.00 t/ha and d = +16.31 t/ha) compared to the control, the *Nemere* variety (29.98 t/ha). From the comparison of the crop years, in 2018 as compared to 2017 the breeding lines TS 16-1528-1883 and TS 16-1508-1828 are highlighted, with distinctly significant positive differences (d = + 13.97 t/ha and d = +14.62 t/ha respectively), compared to the average yield of the control variety *Nemere*; in 2019 as compared to 2017 the lines TS 16-1528-1883, TS 16-1515-1856, TS 16-1526-1883 and TS 16-1517-1831 are highlighted with significant positive differences of between d = + 8.86 t/ha and d = + 12.84 t/ha.

Table 5

The influence of the breeding lines on the yield for the fraction > 55 mm (t/ha)

Breeding line	Yield (t/ha)	Difference (t/ha)	Significance
TS 16-1507-1828	19.36	6.84	**
TS 16-1508-1828	24.95	12.44	***
TS 16-1509-1828	20.34	7.83	**
TS 16-1513-1828	19.56	7.04	**
TS 16-1515-1856	7.53	-4.98	o
TS 16-1516-1856	24.42	11.90	***
TS 16-1517-1831	23.71	11.20	***
TS 16-1525-1851	14.29	1.78	ns
TS 16-1526-1883	21.36	8.85	***
TS 16-1527-1867	24.13	11.62	***
TS 16-1528-1883	28.13	15.62	***
NEMERE (Control)	**12.51**	**-**	**-**

LSD $_{5\%}$ = 4.60 t/ha; LSD $_{1\%}$ = 6.13 t/ha; LSD $_{0.1\%}$ = 7.94 t/ha.

Examination of the results obtained regarding the yield for the size fraction > 55 mm, depending on genotypes, shows that the breeding line TS 16-1528-1883 has presented the best results (28.13 t/ha) with a very significant positive difference (d = +15.62 t/ha) compared to the control variety *Nemere* (12.51 t/ha). This line was followed by the line's TS 16-1508-1828 and TS 16-1527-1867 with a yield of over 24 t/ha and very significant positive differences (d = +11.62 t/ha and d = +12.44 t/ha respectively). A significant decrease in yield with d = -4.98 t/ha tubers fraction > 55 mm compared to the *Nemere* variety was recorded for the line TS 16-1515-1856 (Table 5).

In the case of the combined influence of the crop years and the biological material used in the planting on the yield for the fraction > 55 mm (Table 6) the first place for the determination of the yield was taken by the genotype TS 16-1528-1883 with significant positive differences in the years 2017 – 2018 (d = +16.16 t/ha and d = +17.02 t/ha respectively).

In 2019 the TS 16-1509-1828, TS 16-1516-1856, TS 16-1517-1831 and TS 16-1527-1867 lines were noticed with significant positive differences of between d =

+15.85 t/ha and 19.67 t/ha, compared to the control (11.36 t/ha). In 2018 as compared to 2017 it is observed that only the potato breeding line TS 16-1528-1883 recorded a significant positive difference (d = +11.12 t/ha), and in 2019 as compared to 2017, when evaluating the behavior of genotypes in comparison with the *Nemere* control variety, only the breeding line TS 16-1517-1831 is superior, with a significant positive difference of d = +15,20 t/ha.

Table 6

The combined influence of crop years and breeding lines on the yield for the fraction > 55 mm (t/ha)

Breeding line	2017 a1	Diff. (t/ha)	Signif.	2018 a2	Diff. (t/ha)	Signif.	2019 a3	Diff. (t/ha)	Signif.	Diff. (a2-a1) (t/ha)	Signif.	Diff. (a3-a1) (t/ha)	Signif.
TS 16-1507-1828	23.49	15.53	***	15.02	-3.20	ns	19.56	8.20	*	-8.46	ns	-3.93	ns
TS 16-1508-1828	25.40	17.44	***	27.80	9.58	*	21.64	10.29	*	2.40	ns	-3.76	ns
TS 16-1509-1828	20.56	12.60	**	12.84	-5.38	ns	27.62	16.26	***	-7.71	ns	7.06	ns
TS 16-1513-1828	21.73	13.78	**	15,29	-2.93	ns	21.64	10.29	*	-6.44	ns	-0.09	ns
TS 16-1515-1856	8.29	0.33	ns	1.67	-16.55	ooo	12.62	1.27	ns	-6.62	ns	4.33	ns
TS 16-1516-1856	22.87	14.91	***	23.18	4.96	ns	27.20	15.85	***	0.31	ns	4.34	ns
TS 16-1517-1831	15.82	7.87	ns	24.29	6.07	ns	31.02	19.67	***	8.47	ns	15.20	**
TS 16-1525-1851	20.89	12.93	**	10.96	-7.26	ns	11.02	-0.33	ns	-9.93	o	-9.86	o
TS 16-1526-1883	24.57	16.61	***	27.31	9.09	o	12.20	0.84	ns	2.74	ns	-12.37	o
TS 16-1527-1867	23.27	15.31	***	23.82	5.60	ns	25.29	13.93	***	0.56	ns	2.02	ns
TS 16-1528-1883	24.12	16.16	***	35.24	17.02	***	25.02	13.67	**	11.12	*	0.90	ns
NEMERE (Control)	**7.96**	-	-	**18.22**	-	-	**11.36**	-	-	-	-	-	-

LSD $_{5\%}$ = 8.04 t/ha; LSD $_{1\%}$ = 10.70 t/ha; LSD $_{0.1\%}$ = 13.85 t/ha.
LSD $_{5\%}$ = 9.55 t/ha; LSD $_{1\%}$ = 15.13 t/ha; LSD $_{0.1\%}$ = 30.33 t/ha.

Table 7

The influence of the crop years on the yield for the fraction of 35-55 mm (t/ha)

Year	Yield (t/ha)	Difference (t/ha)	Significance
2017	20.04	-3.34	ns
2018	26.95	3.57	ns
2019	23.15	-0.23	ns
Average (Control)	23.38	-	-

LSD $_{5\%}$ = 10.79 t/ha; LSD $_{1\%}$ = 24.91 t/ha; LSD $_{0.1\%}$ = 79.33 t/ha.

From the examination of the results of the values obtained regarding the yield for the 35-55 mm fraction (Table 7) it is observed that in 2018 (26.95 t / ha) the determined yield was higher than the control (23.38t / ha) (the average for the three years of study), but with an insignificant difference.

Table 8

The influence of the breeding lines on the yield for the fraction of 35-55 mm (t/ha)

Breeding line	Yield (t/ha)	Difference (t/ha)	Significance
TS 16-1507-1828	25.98	1.01	ns
TS 16-1508-1828	16.76	-8.21	ooo
TS 16-1509-1828	22.34	-2.62	ns
TS 16-1513-1828	25.71	0.75	ns
TS 16-1515-1856	25.25	0.29	ns
TS 16-1516-1856	26.58	1.62	ns
TS 16-1517-1831	21.78	-3.18	ns
TS 16-1525-1851	29.76	4.80	*
TS 16-1526-1883	21.06	-3.91	o
TS 16-1527-1867	21.80	-3.16	ns
TS 16-1528-1883	18.57	-6.39	oo
NEMERE (Control)	**24.96**	-	-

LSD $_{5\%}$ = 3.87 t/ha; LSD $_{1\%}$ = 5.15 t/ha; LSD $_{0,1\%}$ = 6.67 t/ha.

The influence of genotypes on the yield for the 35-55 mm fraction (Table 8) indicates the superiority of the potato breeding line TS 16-1525-1851 (29.76 t/ha), with a significant positive difference (d = +4.80 t/ha).

Table 9

The combined influence of crop years and breeding lines on yield for the fraction of 35-55 mm (t/ha)

Breeding line	2017 a1	Diff. (t/ha)	Signif.	2018 a2	Diff. (t/ha)	Signif.	2019 a3	Diff. (t/ha)	Signif.	Diff. (a2-a1) (t/ha)	Signif.	Diff. (a3-a1) (t/ha)	Signif.
TS 16-1507-1828	18.93	-1,13	ns	35.33	12.42	***	23.66	-8.25	o	16.397	*	4.73	ns
TS 16-1508-1828	13.42	-6,65	ns	25.11	2.20	ns	11.73	-20.18	ooo	11.693	*	-1.69	ns
TS 16-1509-1828	23.67	3,60	ns	28.42	5.51	ns	14.93	-16.98	ooo	4.757	ns	-8.73	ns
TS 16-1513-1828	26.58	6,51	ns	27.96	5.05	ns	22.60	-9.31	oo	1.377	ns	-3.98	ns
TS 16-1515-1856	19.38	-0,69	ns	29.09	6.18	ns	27.29	-4.62	ns	9.710	ns	7.91	ns
TS 16-1516-1856	25.91	5,84	ns	28.20	5.29	ns	25.62	-6.29	ns	2.290	ns	-0.29	ns
TS 16-1517-1831	19.73	-0,33	ns	25.55	2.64	ns	20.05	-11.86	ooo	5.820	ns	0.31	ns
TS 16-1525-1851	19.44	-0,62	ns	37.20	14.29	***	32.64	0.73	ns	17.753	*	13.20	*
TS 16-1526-1883	17.73	-2,34	ns	21.31	-1.60	ns	24.13	-7.78	o	3.580	ns	6.40	ns
TS 16-1527-1867	19.38	-0,69	ns	24.20	1.29	ns	21.82	-10.09	oo	4.820	ns	2.45	ns
TS 16-1528-1883	16.24	-3,82	ns	18.11	-4.80	ns	21.36	-10.55	oo	1.867	ns	5.11	ns
NEMERE (Control)	**20.07**	-	-	**22.91**	-	-	**31.91**	-	-	-	--		-

LSD $_{5\%}$ = 6.70 t/ha; LSD $_{1\%}$ = 8.93 t/ha; LSD $_{0.1\%}$ = 11.55 t/ha.
LSD $_{5\%}$ = 11.69 t/ha; LSD $_{1\%}$ = 22.04 t/ha; LSD $_{0.1\%}$ = 57.44 t/ha.

The statistical interpretation regarding the combined influence of the two analyzed factors (Table 9) on the yield for the fraction of 35-55 mm, shows that the differences from the control variety are significant positive (d = +12.42 t/ha and d = 14.29 t/ha) for the breeding lines TS 16-1507-1828 and TS 16-1525-1851 respectively.

In 2019 there were distinctly significant negative differences of between d = -11.86 t/ha and d = -20.18 t/ha for the breeding lines TS 16-1508-1828, TS 16-1509-1828 and TS 16-1517-1831.

In the case of 2018 compared to 2017 the yield for the 35-55 mm fraction showed significant positive differences for the following breeding lines: TS 16-1525-1851 (d = +17.753 t/ha), TS 16-1507-1828 (d = +16.397 t/ha) and TS 16-1508-1828 (d = +11.693 t/ha) and in 2019 compared to 2017 significant positive differences are observed only in the breeding line TS 16-1525-1851 (d = +13.20 t/ha).

Conclusions

In the three years studied, by analyzing the behavior of the genotype through the prism of the yield/ha and depending on the planted material, its fluctuations emerge.

The genotype TS 16-1516-1856 recorded the highest total average yield over the three years of study (53,48 t/ha).

In 2018 high total yields were obtained for the genotypes: TS 16-1528-1883 (54,93 t/ha) and TS 16-1508-1828 (54.64 t/ha).

The breeding line TS 16-1516-1856 determined the attainment of a superior total yield compared to the other lines, in 2019 (56,04 t/ha), being followed by the genotype TS 16-1526-1883 (55,49 t/ha), in the same study.

Regarding the average yield for the fraction of size > 55 mm, during the three years of research the potato breeding line TS 16-1528-1883 (28,13 t/ha) was highlighted. In 2018, the breeding line TS 16-1528-1883 (35.24 t/ha) was highlighted followed by the breeding line TS 16-1508-1828 (27.80 t/ha), and in 2019 the highest yield was of 31.02 t/ha obtained by the genotype TS 16-1517-1831.

The line TS 16-1525-1851 from the size fraction 35-55 mm is distinguished by a high average production of the three studied years (29.76 t/ha).In the yield analysis for the size fraction of 35-55 mm high yields were obtained in 2018 for the breeding lines TS 16-1525-1851 (37.20 t/ha) and TS 16-1507-1828 (35.33 t/ha). In 2019 the line TS 16-1525-1851 registers a high yield (32,64 t/ha), but lower compared to 2018.

Following the results recorded in the comparative orientation cultures and the comparative competition cultures, in the fall of 2019 the breeding line TS 16-1528-1883 was sent for testing in the ISTIS network under the name PERLA.

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