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EVALUATION AND CONSERVATION OF GERMPLASM RESOURCES OF *SOLANUM MELONGENA* L. OWNED BY PLANT GENETIC RESOURCES BANK BUZĂU

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Abstract

Plant Genetic Resources Bank (PGRB) Buzau holds a valuable collection of eggplant (Solanum melongena L.) genotypes consisting of 286 genotypes. Of these, 62 genotypes are genetically stabilized, 86 genotypes are in an advanced stage of breeding, and 138 genotypes are in the segregating or recently introduced category, which are not sufficiently known in terms of character expression and stability in the lineage. In the present work, 62 genetically stabilized lines, mainly composed of local populations and old traditional varieties, were studied. During the growing period phenological, biometric observations and laboratory analyses were made using UPOV and IGPRI guidelines. Regarding productivity and resistance to the main pathogens, especially Verticillium wilt, it was found that the old local populations were the most vigorous and productive.
The research was completed with the recording of data regarding the genotypic and phenotypic expressivity specific to each cultivar, regeneration of the seed stock that will be directed to controlled atmosphere storage cells, and a part will be directed to research units, education, gene banks and farmers, for multiplication and technological transfer.

Key words: *eggplants, local population, variety, cultivar, genotype, phenotype.*

INTRODUCTION

The common or brinjal eggplant (*Solanum melongena* L.) belongs to the Leptostemonum Clade (the "spiny" solanums) of the species-rich genus *Solanum* (Solanaceae) (Knapp et al., 2013). Eggplants (*Solanum melongena* L.) are an important solanaceous crop, which is phenotypically very diverse but genotypically moderate. Eggplant (*Solanum melongena* L.), also known as brinjal in Southern Asia and aubergine in France and Britain, is the fifth economically most important vegetable in the Solanaceae family after tomato (*Solanum lycopersicum* L.), potato (*Solanum tuberosum* L.), chili (*Capsicum annuum* L.), and tobacco (*Nicotiana tabacum* L.) (Oladosu et al., 2021).Worldwide, the largest producer of eggplants is China, with a production of 36,593,224 tons, followed by India with a production of 12,777,000 tons, Egypt 1,341,312 tons, Turkey 835,422 tons and Indonesia 618,202 tons. Eggplant (*Solanum melongena* L., Solanaceae; 2n = 2× = 24) ranks third in the genus *Solanum*, after potato and tomato, in total production and economic importance and is the most important Solanaceae crop native to the Old World (Daunay et al., 2001). At the European level, Italy and Spain are in first place for aubergine production with 304,690 tons and 282,200 tons, respectively (Figure 1).

Figure 1. Eggplant producing countries

Eggplant cultivation and consumption have spread to almost all parts of the world. It is ranked among the top 10 vegetables for high content of phenolic acids and antioxidant

properties. Eggplants differ widely in size, shape, colour, and compositional traits. The purple-coloured eggplant is preferred by the consumers over the white and green ones (Mahanta & Dipankar 2020).

According to research carried out over the years, the cultivation of eggplant has been widespread on many continents, and is considered to have its origins in Africa, Asia and Europe.

Eggplant is the fifth economically most important vegetable in the Solanaceae family after tomato, potato, chili, and tobacco. Apart from the well-cultivated brinjal or aubergine eggplant (*Solanum melongena* L.), two other underutilized eggplant species, the African eggplant (*S. macrocarpon* L.) and the scarlet eggplant (*S. aethiopicum* L.), were also cultivated with local importance where the leaves and fruits are used for food and medicinal purposes (Oladosu et al., 2021). In the world ranking, Romania ranks 25th, with a production of 74,040 tons (FAO 2020).

Several traditional plant-breeding practices have been carried out for producing new varieties that can withstand with such changing climatic conditions besides increasing the productivity. These time-consuming practices could make considerable progress in crop improvement using selective germplasm, however, resulted in loss of biodiversity in the process (Chhapekar et al., 2016). The principal aim of the research on evaluation and conservation of genetic resources is to obtain genotypes with high fruit quality, to increase fruit/plant yield and to find genotypes with increased resistance to diseases and pests that are specific to vegetable growing regions of Romania. Eggplant is susceptible to numerous diseases viz., bacterial wilt; fusarium wilt; verticillium wilt, early blight, leaf spot, potato virus-Y (PVY), tobacco ring spot virus, tomato spotted wilt virus (TSWV), phytoplasma, and root-knot nematode. Due to these diseases, quality and quantity of eggplant production is adversely affected (Singh et al., 2019). Agronomic properties such as fruit uniformity, increased yield, and resistance to biotic and abiotic stress has been the primary objective of traditional plant breeders. An increase in the global population, degradation of soil nutrients, and climate change have contributed to the declining quality and quantity of cultivated arable land; hence, disease resistance and improved fruit yield have been the major breeding priorities (Oladosu et al., 2021) Therefore, the theme of the presented work focuses on the evaluation of the diversity of genetic resources available in the germplasm collection of BRGV Buzau, to allow the continuation of the breeding work on this species. Over the last 50 years, dependence upon commercial hybrids and advanced cultivars, as well as the neglect of traditional landraces, has led to a vast reduction in horticultural and agricultural biodiversity within the most popular species (Samuels, 2015). The need to evaluate eggplant genotypes for their inclusion in the bank's breeding and conservation programs arises in response to the action of various stressors that disrupt and require changes in agriculture. In this context we include abiotic stress caused by increased salinity levels in the soil, increasing periods of drought, seasonal lag, rising average annual temperatures, and flooding. Due to global climate changes and various anthropogenic activities, the occurrence of environmental stresses that limit yield is frequent in major eggplant producing areas (Alam & Salimullah, 2021). In the category of biotic stress, we are talking about increasingly aggressive attacks by specific diseases and pests. Together, these factors are forcing farmers to use increasing amounts of preventive and control substances, with a strong impact on both consumer health and the environment.

MATERIALS AND METHODS

In present, PGRB Buzau holds a valuable collection of eggplant (*Solanum melongena* L.) genotypes consisting of 286 genotypes. Of these, 62 genotypes are genetically stabilized, 86 genotypes are in an advanced stage of breeding and 138 genotypes are in the segregating or recently introduced category, which are not sufficiently known in terms of character expression and stability in the progeny. In the present work, 62 genetically stabilized lines were studied, mainly composed of local populations and old traditional varieties (Figure 2).

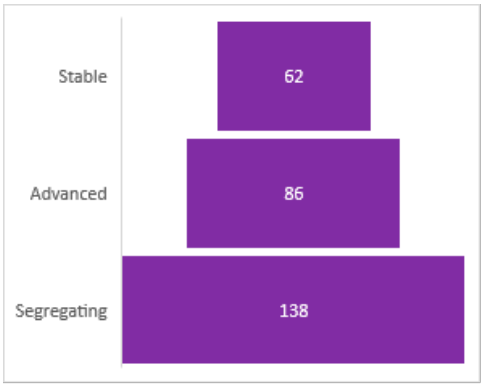

Figure 2. PGRB Buzau eggplant germplasm collection

The eggplant crop was established in the open field. The crop technology applied was the standard one for this species, i.e., the crop was established by seedling, obtained by direct seeding into 70-hole trays. The age of the seedlings at the time of planting was 60 days from sowing. The cropping pattern used was 70 cm between rows and 35-40 cm between plants per row (Figure 3).

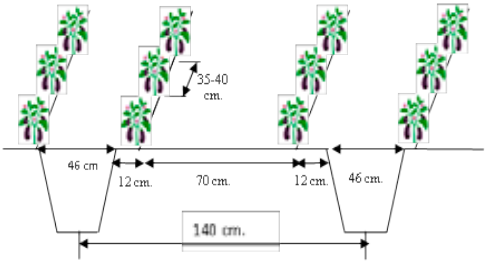

Figure 3. Eggplant crop establishment scheme

During the growing season, phenological observations and biometric determinations were carried out for each genotype under study using observation sheets conforming to the descriptors recommended by UPOV and IGPRI (Figure 4). Fruit measurements were taken at approximately 60-80 days from planting, meaning July-August, depending on the variety. Statistical analyses were performed using SPSS software.

1	Length(cm)	
2	Diameter (cm)	Basal /Median /Apical
3	Shape	Globular ovoid obovate piriform club ellipsoid cylindric
4	Fruit curvature	Weak medium strong very strong
5	Pistil point shape	
6	Pistil point dimension (cm)	
7	Fruit apex	Indented flattened rounded sharp
8	Exocarp color at harvest maturity	
9	Fruit color intensity at harvest	Very light / light/ medium/ dark/ very dark
10	Patches	Absent / Present
11	Stripes	Absent / Present
12	The prominence of streaks/fruit	weak / medium / absent
13	Density of streaks/fruit	rare / medium / dens
14	Fruit glossiness	weak / medium / strong
15	Ribs	Absent or very weak / weak/median/strong/very strong
16	Anthocyanin. Col. under calyx	Absent / present
17	Calyx anthocyanin coloration	Absent / present
18	Anthocyanin color intensity	weak / medium / strong
19	Calyx dimension (cm)	
20	Sepals no.	
21	Sepals length (cm)	
22	Thorns on calyx	Absent or very weak/ weak/ medium/strong/very strong
23	Calyx blistering	Very weak/weak/medium/strong/very strong
24	Peduncle length (cm)	
25	Flesh color	white /yellow/green
26	Exocarp at phys. maturity.	yellow/orange/brown/red/_____
27	Age of phis. mat.	early/ median/ tardy
28	Seed dispersion in fruit	
29	Seed number/fruit	
30	Seed weight/fruit	

Figure 4. Fruit description sheet

RESULTS AND DISCUSSIONS

The main purpose of the research was to evaluate the germplasm database in terms of genetic stability, expressiveness of traits and their maintenance in the lineage.

Genotypes that showed genetic stability and distinct phenotypic expressivity were promoted from the collection field to the working field and subjected to intensive breeding work (Figure 5).

The main plant characteristics are shown in Table 1, with emphasis on plant height, plant branching, plant breadth, growth habit, leaf blade color, peduncle length, intensity of purple color on flower and anthocyanin coloration on stem.

Figure 5. *Solanum melongena* L. genotypes held by BRGV Buzău

Table 1. Main plant characteristics for the genotypes under study at PGRB Buzău

Genotype	Plant height (cm)	Plant branching (cm)	Plant breadth (cm)	Growth habit	Leaf blade color (upper surface)	Peduncle length (cm)	Intensity of purple color on flower	Stem: anthocyanin coloration
1BG2021	52	2	37	Climbing	Green	5,32	Medium	Absent
2BG2021	58	3	45	Clumping	Green	4,69	Medium	Absent
3BG2021	49	2	41	Clumping	Green	3,9	Light	Present
4BG2021	45	3	43	Clumping	Green	6,35	Light	Absent
5BG2021	43	2	33	Climbing	Green	6,68	Medium	Absent
6BG2021	51	3	45	Clumping	Light green	1,5	Whitish	Absent
7BG2021	42	2	36	Clumping	Green	5,63	Medium	Present
8BG2021	46	3	42	Clumping	Greenish violet	4,75	Dark	Absent
9BG2021	39	3	36	Clumping	Light green	5,67	Light	Absent
10BG2021	67	3	41	Climbing	Green	4,43	Light	Absent
11BG2021	41	2	31	Climbing	Light green	3,63	Light	Absent
12BG2021	46	3	33	Climbing	Light green	2,67	Light	Present
13BG2021	69	3	45	Climbing	Green	6,34	Medium	Absent
14BG2021	50	2	39	Climbing	Green	4,91	Light	Absent
15BG2021	38	2	37	Clumping	Light green	6,09	Dark	Absent
16BG2021	44	2	41	Clumping	Green	6,38	Medium	Absent
17BG2021	75	3	53	Clumping	Light green	6,81	Light	Absent
18BG2021	43	3	39	Clumping	Green	5,37	Dark	Absent
19BG2021	47	2	33	Climbing	Green	11,8	Dark	Present
20BG2021	49	2	33	Climbing	Green	5,25	Dark	Absent
21BG2021	46	3	34	Climbing	Green	8,66	Dark	Absent
22BG2021	53	2	64	Climbing	Light green	5,95	Light	Absent
23BG2021	55	3	67	Clumping	Greenish violet	2,03	Medium	Present
24BG2021	62	3	37	Clumping	Greenish violet	5,01	Dark	Present
25BG2021	50	2	52	Climbing	Light green	3,72	Light	Absent
26BG2021	55	3	41	Climbing	Green	7,45	Light	Absent
27BG2021	51	3	39	Climbing	Light green	5,89	Medium	Absent
28BG2021	57	2	49	Clumping	Green	10,29	Medium	Present
29BG2021	55	2	49	Clumping	Green	4,21	Light	Absent
30BG2021	60	3	52	Clumping	Greenish violet	3,39	Light	Present
31BG2021	61	3	43	Climbing	Green	13,78	Medium	Absent
32BG2021	65	3	61	Clumping	Light green	4,72	Light	Absent
33BG2021	69	3	56	Clumping	Greenish violet	3,45	Medium	Present
34BG2021	71	3	42	Climbing	Dark green	7,66	Dark	Absent
35BG2021	48	2	36	Climbing	Green	6,06	Dark	Absent
36BG2021	52	2	45	Clumping	Greenish violet	8,63	Light	Present
37BG2021	50	2	44	Clumping	Greenish violet	6,09	Light	Present
38BG2021	60	3	39	Climbing	Dark green	5,04	Light	Absent
39BG2021	75	3	55	Clumping	Green	5,75	Light	Absent
40BG2021	62	3	58	Clumping	Greenish violet	7,27	Light	Present
41BG2021	72	3	66	Clumping	Green	7,36	Dark	Absent
42BG2021	69	3	62	Clumping	Dark green	4,95	Whitish	Absent
43BG2021	67	3	58	Clumping	Greenish violet	4,87	Dark	Present
44BG2021	49	2	37	Climbing	Greenish violet	3,1	Medium	Present
45BG2021	55	3	51	Clumping	Dark green	7,05	Medium	Absent
46BG2021	59	3	50	Clumping	Light green	4,5	Light	Absent
47BG2021	65	3	58	Clumping	Greenish violet	6,31	Medium	Present
48BG2021	71	3	59	Climbing	Green	6,95	Medium	Absent
49BG2021	52	2	48	Clumping	Greenish violet	7,57	Medium	Present
50BG2021	47	2	43	Clumping	Green	7,99	Medium	Absent
51BG2021	46	3	39	Clumping	Dark green	4,9	Whitish	Absent
52BG2021	41	2	35	Clumping	Green	8,34	Medium	Absent
53BG2021	55	3	49	Clumping	Green	5,76	Medium	Absent
54BG2021	63	3	47	Clumping	Dark green	8,3	Dark	Absent
55BG2021	59	2	50	Clumping	Green	8,23	Dark	Absent
56BG2021	48	3	41	Clumping	Greenish violet	7,56	Light	Present

57BG2021	45	3	37	Clumping	Green	5,73	Medium	Absent
58BG2021	46	2	39	Clumping	Green	5,61	Medium	Absent
59BG2021	47	2	40	Clumping	Green	10,77	Medium	Absent
60BG2021	55	3	44	Climbing	Greenish violet	3,81	Light	Present
61BG2021	82	3	74	Clumping	Dark green	7,4	Dark	Absent
62BG2021	79	3	67	Clumping	Dark green	7,3	Dark	Absent

As shown in Table 1, the genotypes studied show morphological diversity.

Most genotypes showed heights between 40 and 60 cm. Regarding plant branching, it was observed that genotypes with 3 branches were in the majority, with 38 genotypes having 3 branches and 24 genotypes have 2 branches.

Grouping of the studied genotypes was performed using a dendrogram made with the AHC method (Figure 6), obtaining two clusters with 39 and 23 genotypes, respectively.

The main fruit characteristics are recorded in Table 2.

In terms of fruit weight, values ranging from 22 grams to 1274 grams were recorded, with the mention that the largest fruits were obtained in genotypes from local populations. A great diversity of fruits was observed, due to the different characteristics of the genotypes studied, with both shapes and colors being varied. Eggplants differ widely in size, shape, colour, and compositional traits.

The purple-coloured eggplant is preferred by the consumers over the white and green ones (Charu & Dipanakar, 2020).

Genotypes with the main color of skin at harvest maturity of white, purple, indigo, green, khaki, burgundy, purple black were found. Many of these genotypes presented patches or stripes on their skin.

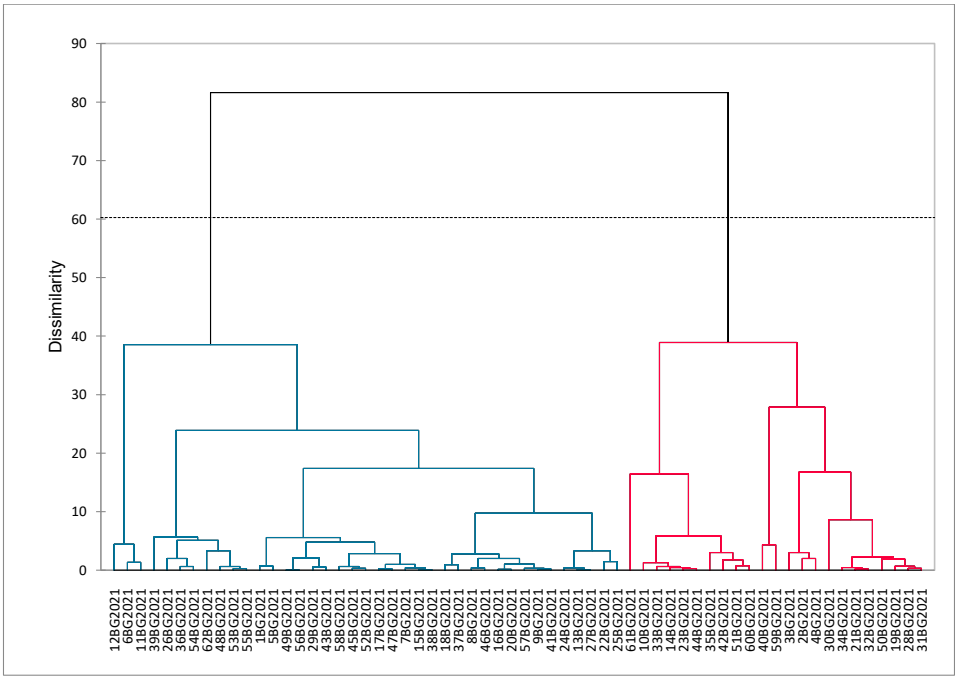

Figure 6. Dendrogram for studied genotypes

Table 2. Main fruit characteristics for the genotypes under study at PGRB Buzău

Genotype	Weight (g)	Length (cm)	Mid-diam (cm)	Pistil scar shape	Apex	Main color of skin at harvest maturity	Patches	Stripes	Ribs	Size of the calyx (cm)	Flesh color
1BG2021	315	21	5,68	circular	pointed	burgundy	present	present	very weak	6,66	greenish
2BG2021	779	17,5	11,02	linear	indented	lilac	present	present	mean	8,35	yellowish
3BG2021	323	10,08	8,89	linear	indented	lilac	present	present	weak	7,94	greenish
4BG2021	491	19	8,66	irregular	indented	white	absent	absent	very weak	8,41	whitish
5BG2021	447	21	7,03	irregular	rounded	indigo	present	present	very weak	6,81	greenish
6BG2021	27	2,41	4,6	irregular	indented	green	absent	absent	strong	1,6	green
7BG2021	483	20,5	7,46	irregular	indented	burgundy	present	present	absent	4,11	greenish
8BG2021	186	14,8	5,11	circular	indented	light purple	present	present	absent	3,16	greenish
9BG2021	316	19,4	5,91	linear	indented	white	absent	absent	very weak	3,86	whitish
10BG2021	582	12,7	11,33	linear	indented	white lilac	present	present	weak	4,31	whitish
11BG2021	115	6,88	6,03	circular	rounded	green	present	present	very weak	2,81	whitish
12BG2021	22	3,99	3,24	Puncti-form	rounded	lilac	absent	present	absent	1,42	whitish
13BG2021	198	15,11	4,64	irregular	flattened	indigo	absent	absent	absent	3,45	greenish
14BG2021	667	13,88	11,29	irregular	flattened	lilac	present	present	weak	4,32	whitish
15BG2021	383	19,5	6,49	circular	flattened	indigo	absent	absent	absent	4,1	greenish
16BG2021	295	20,3	5,26	circular	flattened	burgundy	absent	absent	absent	3,31	greenish
17BG2021	336	20,8	5,25	circular	rounded	lilac	present	present	very weak	3,22	whitish
18BG2021	349	19,4	6,57	circular	pointed	burgundy	present	absent	absent	3,54	greenish
19BG2021	631	24,5	7	irregular	flattened	purple black	absent	absent	absent	5,23	yellowish
20BG2021	336	19,6	6,21	irregular	rounded	purple black	present	absent	absent	3,64	yellowish
21BG2021	444	17,1	5,06	irregular	flattened	purple black	absent	absent	absent	5,2	yellowish
22BG2021	241	9,48	7,67	irregular	flattened	white	absent	absent	absent	3,84	yellowish
23BG2021	668	12,76	9,7	irregular	rounded	purple/white	present	present	very weak	4,79	whitish
24BG2021	195	19,4	4,2	circular	pointed	indigo	absent	present	weak	3,06	whitish
25BG2021	110	8,21	5,29	irregular	indented	white	absent	absent	absent	3,28	whitish
26BG2021	248	27,2	4,1	circular	rounded	white	absent	absent	very weak	1,97	whitish
27BG2021	234	15,6	5,35	circular	indented	purple/green	present	present	absent	3,15	greenish
28BG2021	510	19,7	8,18	irregular	flattened	indigo	absent	present	very weak	4,68	greenish
29BG2021	290	14,66	6,36	irregular	indented	white	absent	absent	very weak	3,93	whitish
30BG2021	575	12,84	11,64	irregular	indented	white	present	absent	very weak	5,04	whitish
31BG2021	565	19,9	7,87	irregular	flattened	indigo	absent	present	mean	4,77	yellowish
32BG2021	424	16,3	6,86	linear	indented	white	absent	absent	absent	5	whitish
33BG2021	492	12,1	9,74	linear	indented	white/purple	present	absent	absent	4,46	whitish
34BG2021	421	15,4	8,47	irregular	indented	indigo	absent	present	mean	4,6	yellowish
35BG2021	912	20,4	10,56	irregular	indented	indigo	absent	present	very weak	5,34	yellowish
36BG2021	289	32,3	4,16	circular	pointed	white/purple	present	absent	weak	2,88	whitish
37BG2021	165	21,9	4,41	circular	rounded	white/purple	present	absent	absent	2,84	whitish
38BG2021	377	17,5	6,79	irregular	indented	white	absent	absent	absent	4,36	greenish
39BG2021	232	26,6	4,22	puncti-form	rounded	light green	absent	absent	absent	3,36	greenish
40BG2021	337	27,6	5	circular	rounded	white/purple	present	absent	absent	3,54	whitish
41BG2021	410	20,4	6,37	irregular	flattened	purple	absent	absent	absent	4,47	yellowish
42BG2021	630	11,66	15,4	linear	indented	light green	present	present	strong	5,63	yellowish
43BG2021	249	10,33	8,14	irregular	indented	purple	absent	present	average	3,91	whitish
44BG2021	623	13,01	11,19	circular	flattened	white/purple	present	absent	weak	5,41	whitish
45BG2021	564	20,4	6,03	irregular	rounded	white/purple	absent	present	absent	4,57	yellowish
46BG2021	260	15,31	5,81	irregular	indented	white	absent	absent	absent	3,3	whitish
47BG2021	307	21,7	5,94	circular	pointed	purple/green	present	absent	absent	4,04	greenish
48BG2021	359	23,3	5,28	irregular	indented	indigo	absent	absent	absent	3,68	yellowish
49BG2021	467	15,6	7,57	irregular	flattened	green/purple	present	present	absent	5,19	greenish
50BG2021	560	16,7	9,19	linear	indented	purple	absent	absent	weak	5,48	yellowish
51BG2021	769	12,56	15,34	linear	indented	khaki green	present	present	strong	4,77	greenish
52BG2021	621	20,5	4,3	irregular	indented	indigo	absent	absent	absent	5,06	yellowish
53BG2021	327	19,3	5,71	circular	rounded	indigo	absent	absent	absent	3,76	greenish
54BG2021	470	27,4	5,3	linear	indented	indigo	absent	absent	absent	2,9	greenish
55BG2021	356	23,6	5,24	circular	rounded	indigo	absent	absent	absent	3,82	greenish
56BG2021	455	15,36	7,25	circular	flattened	indigo-purple	absent	absent	very weak	5,44	greenish
57BG2021	443	21,2	6,69	irregular	indented	indigo	absent	absent	absent	3,64	yellowish
58BG2021	456	25,8	6,13	irregular	rounded	indigo	absent	absent	absent	4,03	greenish
59BG2021	544	24,6	6,39	irregular	rounded	indigo	absent	absent	absent	4,43	yellowish
60BG2021	995	15,5	13,13	irregular	indented	white/purple	present	absent	mean	4,99	whitish
61BG2021	1274	29,1	10,6	irregular	rounded	purple	absent	present	absent	5,1	yellowish
62BG2021	668	22,4	8,1	puncti-form	rounded	purple	absent	present	absent	2,5	yellowish

Table 3. Mean values for the main characteristics of the studied genotypes

Genotype	Fruit length(cm)	Fruit weight (g)	Median diameter (cm)	Plant height (cm)	Plant breadth (cm)
1BG2021	21± 2 ghij	359 ±15,39 ab	5,68 ± 0,05 tuvwxy	52 ± 2,61 lmno	37 ± 3,41 stuvwx
2BG2021	17,5± 1,61 klm	844± 4,00 d	11,02 ± 0,57 cd	58 ± 3,85 hijk	45 ± 3,29 klmnopwr
3BG2021	10,08± 1,16 wxy	350± 3,29 ac	8,89 ± 0,64 fg	49 ± 3,63 nopqr	41 ± 3,40 pqrstuv
4BG2021	19± 1,41 jkl	548 ± 3,22 p	8,66 ± 0,46 fgh	45 ± 2,61 qrstu	43 ± 2,83 nopqrst
5BG2021	21± 1,41 ghij	506 ± 4,26 s	7,03 ± 0,22 lmnop	43 ± 1,63 stuvw	33 ± 4,24 wx
6BG2021	2,41± 0,89 aa	36 ± 4,43 an	4,6 ± 0,50 zaaabac	51 ± 3,41 mnop	45 ± 4,29 lmnopqr
7BG2021	20,5± 1,61 ghij	507±5,29 s	7,46 ± 0,40 jklmn	42 ± 4,43 tuvw	36 ± 4,00 tuvwx
8BG2021	14,8± 1,75 pqr	213 ± 2,83 ak	5,11 ± 0,25 wxyzaa	46 ± 4,60 pqrstu	42 ± 3,03 pqrstuv
9BG2021	19,2± 1,65 jk	362 ± 3,63 ab	5,91 ± 0,60 rstuvwx	39 ± 5,31 vw	36 ± 2,87 x
10BG2021	12,7± 1,18 rstu	654 ± 4,24 k	11,33 ± 0,51 cd	67 ± 4,24 def	41 ± 4,20 wx
11BG2021	6,88± 1,89 z	144 ± 3,41 am	6,03 ± 0,28 qrstuv	41 ± 2,83 uvw	31 ± 3,45 mnopqr
12BG2021	3,99± 1,43 aa	28 ± 2,00 ao	3,24 ± 0,24 ad	46 ± 3,03 pqrstu	33 ± 4,43 rstuvw
13BG2021	15,11± 1,58 opq	233 ± 2,45 aj	4,64 ± 0,51 zaaabac	69 ± 2,45 de	45 ± 4,82 stuvwx
14BG2021	13,88± 1,96 qrst	698 ± 4,43 h	11,29 ± 0,60 cd	50 ± 3,49 mnopq	39 ± 2,86 pqrstuv
15BG2021	19,5± 1,48 ijk	411 ±4,00 y	6,49 ± 0,34 opqrst	38 ± 3,41 w	37 ± 3,69 fghij
16BG2021	20,3± 1,38 ghij	331 ±3,03 ad	5,26 ± 0,26 vwxyz	44 ± 3,03 rstuv	41 ± 3,44 rstuvwx
17BG2021	20,8± 0,99 ghij	398 ± 3,95 z	5,25 ± 0,26 vwxyz	75 ± 3,13 bc	53 ± 4,84 wx
18BG2021	19,4± ,142 jk	422 ± 6,36 x	6,57 ± 0,36 opqrs	43 ± 3,24 stuvw	39 ± 5,40 wx
19BG2021	24,5± 1,49 de	687 ±3,03 i	7 ± 1,41 lmnop	47 ± 3,09 opqrst	33 ± 3,48 vwx
20BG2021	19,6± 1,64 ijk	399 ± 5,02 z	6,21 ± 0,76 pqrst	49 ± 3,41 nopqr	33 ± 2,86 bc
21BG2021	17,1± 1,20 lmno	494 ± 5,02 t	5,06 ± 0,73 xyzaa	46 ± 2,61 pqrstu	34 ± 4,49 b
22BG2021	9,48± 1,46 xy	301 ± 3,03 aeaf	7,67 ± 0,58 ijkl	53 ± 3,41 klmn	64 ± 4,24 stuvwx
23BG2021	12,76± 0,94 rstu	725 ± 3,35 f	9,7 ± 0,67 e	55 ± 3,63 jklm	67 ± 3,85 ghijk
24BG2021	19,4± 1,19 jk	243 ±3,85 ai	4,2 ± 0,69 abac	62 ± 3,03 fghi	37 ± 4,34 pqrstuv
25BG2021	8,21± 1,40 yz	163 ± 3,63 al	5,29 ± 0,39 abac	50 ± 4,00 mnopq	52 ± 3,69 rstuvw
26BG2021	27,2± 1,08 bc	305 ± 4,10 ae	4,1 ± 0,58 ac	55 ± 3,63 jklm	41 ± 4,53 ijklmno
27BG2021	15,6± 1,59 mnopq	292 ± 3,63 ag	5,35 ± 0,23 uvwxyz	51 ± 3,51 mnop	39 ± 4,63 ijklmno
28BG2021	19,7± 1,62 hij	558 ± 6,96 o	8,18 ± 0,64 ghij	57 ± 3,03 ijkl	49 ± 3,09 ghijkl
29BG2021	14,66± 1,22 pqrs	328 ± 4,43 ad	6,36 ± 0,18 pqrst	55 ± 2,63 jklm	49 ± 3,51 nopqrst
30BG2021	12,84± 0,75 rstu	621 ± 3,85 l	11,64 ± 0,55 c	60 ± 4,00 ghij	52 ± 3,46 bcde
31BG2021	19,9± 2,05 hij	614 ± 7,46 l	7,87 ± 0,78 hijk	61 ± 2,04 ghij	43 ± 4,24 defgh
32BG2021	16,3± 1,01 mnop	481 ± 5,66 u	6,86 ± 0,61 lmnopq	65 ± 3,22 efg	61 ± 4,45 opqrstu
33BG2021	12,1± 1,24 tuv	564 ± 3,41 o	9,74 ± 0,57 e	69 ± 3,41 de	56 ± 4,69 opqrstu
34BG2021	15,4± 1,17 mnopq	473 ± 3,03 v	8,47 ± 0,15 fghi	71 ± 2,61 cd	42 ± 5,40 opqrs tu
35BG2021	20,4± 1,68 ghij	962 ± 5,40 c	10,56 ± 0,26 d	48 ± 3,42 nopqrs	36 ± 5,02 opqrstu
36BG2021	32,3± 1,14 a	349 ± 6,81 ac	4,16 ± 0,26 ac	52 ± 3,43 lmnopq	45 ± 5,40 opqrstu
37BG2021	21,9± 1,37 fgh	211 ± 5,22 ak	4,41 ± 0,21 aaabac	50 ± 2,83 ghij	44 ± 4,47 opqrstu
38BG2021	17,5± 1,47 klmn	422 ± 5,25 x	6,79 ± 0,33 mnopq	60 ± 3,47 ghij	39 ± 5,02 opqrstu
39BG2021	26,6± 0,77 c	272 ± 5,62 ah	4,22 ± 0,19 abac	75 ± 4,00 bc	55 ± 5,25 opqrstu
40BG2021	27,6± 1,27 bc	410 ± 6,00 y	5 ± 1,25 yzaaab	62 ± 2,61 fghi	58 ± 4,43 opqrstu
41BG2021	20,4± 0,60 ghij	458 ± 6,00 w	6,37 ± 0,41 pqrst	72 ± 2,51 cd	66 ± 4,82 opqrstu
42BG2021	11,66± 1,27 uvw	678 ± 5,62 j	15,4 ± 1,00 a	69 ± 2,67 de	62 ± 4,44 opqrstu
43BG2021	10,33± 0,75 vwx	296 ± 4,24 afag	8,14 ± 0,54 ghij	67 ± 3,03 def	58 ± 4,00 opqrstu
44BG2021	13,01± 1,19 rstu	674 ± 4,34 j	11,19 ± 0,57 cd	49 ± 4,82 nopqr	37 ± 3,53 opqrstu
45BG2021	20,4± 1 ghij	615 ± 4,43 l	6,03 ± 0,32 qrstuv	55 ± 3,63 jklm	51 ± 3,61 opqrstu
46BG2021	15,31± 1,53 nopq	308 ± 4,82 ae	5,81 ± 0,30 stuvwxy	59 ± 3,45 hij	50 ± 3,85 opqrstu
47BG2021	21,7± 0,65 fghi	373 ± 5,10 aa	5,94 ± 0,34 rstuvw	65 ±2,00 efg	58 ± 4,30 opqrstu
48BG2021	23,3± 0,94 ef	424 ± 5,40 x	5,28 ± 0,22 vwxyz	71 ± 2,66 cd	59 ± 4,46 opqrstu
49BG2021	15,6± 1,17 mnopq	532 ± 3,85 q	7,57 ± 0,31 jklm	52 ± 3,22 lmno	48 ± 2,93 opqrstu
50BG2021	16,7± 1,25 mnop	605 ± 4,86 m	9,19 ± 0,53 ef	47 ± 3,85 opqrst	43 ± 3,85 opqrstu
51BG2021	12,56± 1,39 stu	810 ± 6,26 e	15,34 ± 0,37 a	46 ± 3,03 pqrstu	39 ± 4,05 opqrstu
52BG2021	20,5± 1,47 ghij	651 ± 4,47 k	4,3 ± 0,34 aaabac	41 ±2,83 uvw	35 ± 4,63 opqrstu
53BG2021	19,3± 0,65 jk	379 ± 4,90 aa	5,71 ± 0,21 tuvwxy	55 ± 2,61 jklm	49 ± 4,51 opqrstu
54BG2021	27,4± 0,58 bc	521 ± 3,85 r	5,3 ± 0,26 uvwxyz	63 ± 3,27 fgh	47 ± 5,22 opqrstu
55BG2021	23,6± 1,35 ef	418 ± 4,90 x	5,24 ± 0,28 vwxyz	59 ±4,24 hij	50 ± 3,41 opqrstu
56BG2021	15,36± 1,02 mnopq	494 ± 5,02 t	7,25 ± 0,40 klmno	48 ±2,81 nopqrs	41 ± 4,35 opqrstu
57BG2021	21,2± 0,88 ghij	467 ± 5,83 v	6,69 ± 0,31 nopqr	45 ± 2,02 qrstu	37 ± 4,82 opqrstu
58BG2021	25,8± 1,07 cd	502 ± 5,02 s	6,13 ± 0,14 qrstu	46 ± 3,41 pqrstu	39 ± 4,82 opqrstu
59BG2021	24,6± 1, 09 de	593 ± 3,63 n	6,39 ±0,29 pqrst	47± 3,03 opqrst	40 ± 5,02 opqrstu
60BG2021	15,5± 1,47 mnopq	1053 ± 4,34 b	13,13 ± 0,23 b	55 ± 4,00 jklm	44 ± 4,90 opqrstu
61BG2021	29,1± 1,43 b	1308 ± 4,10 a	10,6 ± 0,62 d	82 ±3,02 a	74 ± 5,62 opqrstu
62BG2021	22,4± 1 fg	712 ± 3,63 g	8,1 ± 0,34 ghij	79 ±4,90 ab	67 ± 5,02 opqrstu

* values represent mean ± standard deviation; * letters represents Duncan test results with 95% confidence interval and p<0.05%

As we can see in Table 3, among the studied genotypes there is a great morphological diversity.
This morphological diversity indicated that the application of specific breeding and selection methods can achieve a considerable improvement in this crop.

CONCLUSIONS

The research led to the enrichment and evaluation of the PGRB Buzau germplasm collection with new genotypes, accumulating valuable information in the database of the Buzau Genebank.
Researches concluded with the organization of a valuable germplasm collection in order to be evaluated according to their genetic stability and the directions of use.
From the classification of the 286 genotypes, 62 of these have been identified as genetically stable, 86 genotypes are in an advanced stage of breeding, and 138 genotypes are in the segregating or recently introduced category, which are not sufficiently known in terms of character expression and stability in the lineage.
Regarding productivity and resistance to the main pathogens, especially Verticillium, it was found that the old local populations, especially those coming from Colibasi area, Giurgiu county, and the old Danubiana and Bucurestene varieties were the most vigorous and productive.
The research was completed with the recording of data regarding the genotypic and phenotypic expressivity specific to each cultivar, regeneration of the seed stock that will be directed to controlled atmosphere storage cells, and a part will be directed to research units, education, gene banks and farmers, for multiplication and technological transfer.

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