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NEW EGGPLANT GENOTYPES WITH DISTINCT PHENOTYPIC EXPRESSIVITY OBTAINED AT V.R.D.S BUZĂU

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Abstract

V.R.D.S. Buzău has a great tradition in the process of breeding for this species. Here were maintained by conservative selection the first valuable Romanian eggplants like 'Danubiana', 'Bucurestene', 'Pana Corbului' along with 'Zaraza' and 'Dragaica'. Recently, the first hybrid of eggplants obtained by the Breeding Laboratory was patented, and registered in the Romanian Official Catalogue for Crop Plants under the name of 'Rebeca F1'. As a result of the researches made over time the Laboratory gathered an important germplasm collection and numerous informations regarding the activity of breeding this species. At this time, the germplasm collection is being compound of over 60 valuable genotypes with distinct phenotypic expressivity for their shape, size and colour. Stable genotypes that are a very important part of this paper were obtained. These have large white fruits, red coloured, brindled, green etc. Of these, the accession A 10 (Camelia), with large white fruits is in the final testing stage for patenting and will be extended on a large scale in production.

Key words*: aubergine, breeding, Camelia, germplasm collection, Solanum melongena.*

INTRODUCTION

„The eggplant arrived in Europe around 1300, and the eggplant fruits were used as food after the sixteenth century" (Cakir et al., 2017).
In Romania, the eggplant crop production was introduced after the 19th century. In the early times, foreign varieties were used in order to establish the crops, and the mainly varieties used for this purpose were: 'Delicates', 'Odesa', 'Lungi violete'. The first Romanian creations in this species were achieved after the Research Stations were founded, and the earliest and most used were 'Danubiana', 'Bucurestene' and 'Pana Corbului'. VRDS Buzau gave a special attention for breeding eggplants since April 1957, this being the year of it's founding, and managed to create two very valuable varieties that are still being used and appreciated: 'Dragaica' and 'Zaraza'. „Now there are an increasing number of F1hybrid varieties bred by seed companies and the seed production of egg-plant is shifting from farmer's hands to seed companies" (Chen et al., 2001). Recently, the first eggplant hybrid creation was patented and registered in the Official Catalogue for Romanian Crop Plants under the name of 'Rebeca F1'. If in the past the requirements of processors and consumers were limited at cultivars with traditional fruits, black or violet, of ovoid or cylindrical shape, now, their requirements have diversified a lot. 'Vegetables from imports are more varied than those derived from domestic production (Soare et al., 2016).
Therefore since 1996, in establishing the breeding objectives the buyer's actual requirements were taken into consideration. Modern breeding methods and a varied genetic material were implemented allowing obtaining a great number of genotypes with distinct phenotypic characteristics included in this paperwork.

MATERIALS AND METHODS

Researches debuted by achieving the germplasm collection. The main focus was on valorisation the autochthonous genetic potential consisting of varieties and local populations. The majority of the genotypes within the

collection belong to the *Solanum melongena* species, but among these are also included varieties from *S. macrocarpon* and *S. ethiopicum.* Therefore, the total collection for the eggplant complex collection is of 286 accessions.

After establishing the eggplant collection, researches were continued by evaluating the genetic stability in lineage and by identifying the useful characteristics for the breeding process.

The main breeding methods used were inter and intraspecific hybridization, the segregating phenomenon and also by breeding the valuable genotypes thru repeated individual selection. The main breeding objectives were channelled towards productivity, earliness and phenotypic distinctiveness.

A special emphasis was placed on breeding the lines that present a special colour variation from white, purple, green, with stripes, patches, and in various shape and size, small, cylindrical, globular, ovate, pear shaped, club shaped, ellipsoid, cylindrical, ribbed.

Simultaneously, genetic stability was monitored. Researches were made in protected areas (greenhouses without a heating system). Sowing was made in alveolar trays with 70 orifices, using as a substrate peat, in the first decade of March.

The seedlings were planted in the second decade of April, using the distance for planting of 70 cm between rows and 40 cm between plants per row. It was kept a distance of 120 cm between the planting strips.

The cultivation technology applied was the one specific to this species, and the special works consisted of trellising and pruning. The selected accessions are: A10, A20, A21B, A22A, A23A, A26, A29A, A30C, A51A, A58 (Figure 1).

A10 presents the greatest interest for the present work has large white fruits, very productive with a very pleasant commercial appearance.

A20 has very small fruits, similar in shape and size with an egg, this being the most attractive feature of it. Also it has a great number of fruits, over 40 allowing the harvesting for the entire cycle of production.

A21B has white fruits with purple stripes. These are of a medium size with a good yield production.

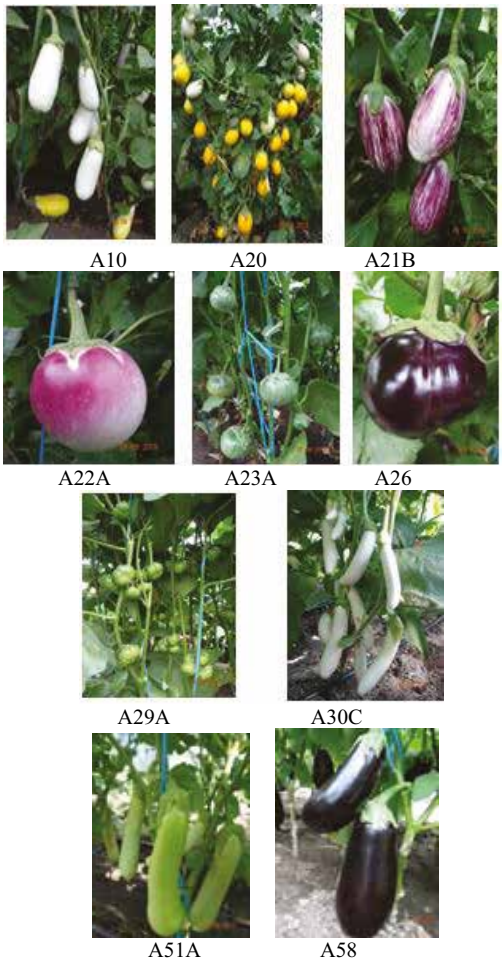

Figure 1. Aspects of the selected genotypes

A23A has greenish rounded and ribbed fruits that are small in size and have a good store resistance.

A26 has medium large fruits, round and a very pleasant appearance due to its purple skin coloration.

A29A was selected for the plant vigour and green fruits that when are fully ripen turn orange-red, their appearance being very similar to a small pumpkin.

A30C has white cylindrical small fruits that produce a great number of fruits with a good storage capacity.

A51A has typical purple ellipsoid fruits. It is a very productive accession with a good resistance to pests and diseases. The fruits are weighing between 700 g and 1100 g, depending on the technology used.

A58 has very interesting fruits due to their green coloration and club shaped appearance.

RESULTS AND DISCUSSIONS

Researches started with the achievement of a rich germplasm collection followed by its evaluation and acknowledgement regarding its genetic stability and also inventing the useful characters for the breeding process.

After establishing and evaluating the germplasm collection, this was structured on 3 groups according to their genetic stability. Of 286 accessions studied, a number of 62 accessions showed genetic stability in lineage, 86 accessions were included in the genetically advanced genotypes group these being the genotypes that proved a small variation regarding the variation expressiveness of the main characteristics.

A number of 138 genotypes form the group of segregating genotypes.

These ones present a great variability regarding the expressiveness of the main characters, the majority originating from the segregation of hybrid combinations made during the breeding program.

From the group of stable genotypes 10 accessions with distinct phenotypic expressivity regarding colour, shape and fruit size were selected. The main plant characteristics are shown in table 1.

Table1. Main plant characteristics-mean values

Plant features / Genotype	**A10**	**A20**	**A21B**	**A22A**	**A23A**
Plant height (cm)	162	155	200	100	156
Stem length(cm)	8	8	13	6	19
No. of side shoots	3	3	2	3	3
Leaf length(cm)	24	15	25	18	22.5
Leaf width(cm)	17	10	15	11	13
Plant features / Genotype	**A26**	**A29A**	**A30C**	**A51A**	**A58**
Plant height (cm)	99	140	114	165	110
Stem length(cm)	17	12	11	14	16
No. of side shoots	2	2	3	2	2
Leaf length(cm)	16	21	26	24	25.5
Leaf width(cm)	7	13	14	18	14

As shown in table no. 1, the accessions studied present different heights, A21B being the one with the most luxurious growth, reaching in mean values 200 cm length, and on the other side A26 has the smallest height of 99 cm-mean value.

Stem length varies from 6 cm to 19 cm with no correlation between plant height and stem length. A10 has a medium height value of 162 cm but is very well developed due to the number of side shoots (3) which gives it an aspect of fullness. These accessions present different leaf sizes and shapes correlated with the plant vigour.

Table2. Fruit characteristics-mean values

Plant features / Genotype	**A10**	**A20**	**A21B**	**A22A**	**A23A**
Peduncle and sepals colour	Green	Green	Green	Green	Green
Peduncle length (cm)	9	3.08	5.1	4.4	3.82
Presence of spines	On sepals	Absent	On sepals	Absent	Absent
Fruit colour at consumption maturity	White	White	White lined with purple	White	White lined with green
Fruit colour at physiological maturity	Yellow	Yellow	Yellow lined with brown	Yellow	Yellow
Fruit length (cm)	18	5.1	11	13	4.83
Median fruit diameter (cm)	9.5	3.71	7	6.2	6.30
Plant features / Genotype	**A26**	**A29A**	**A30C**	**A51A**	**A58**
Peduncle and sepals colour	Purple	Green	Green	Green	Green
Peduncle length (cm)	3.9	1.74	4.52	9	4.5
Presence of spines	On sepals	Absent	On sepals	On sepals	On sepals
Fruit colour at consumption maturity	Purple	Green	White	Purple	Green
Fruit colour at physiological maturity	Brownish	Red	Yellow	Brownish	Yellow
Fruit length (cm)	9.2	3.25	11.13	22	23
Median fruit diameter (cm)	7.8	5.10	3.69	12.1	4.05

According to the data registered in Table 2, accession A10 differs from the other white eggplants presented, through the size of the fruit, having larger fruit than the others, as we can see accession A10 has 18 cm fruit length and the others have fruits of 13 cm and even 5.1 cm. Also the proportion between fruit length and diameter (18 cm/9.5 cm) suggests the good commercial ellipsoid aspect that makes it very attractive for the production market.

Table 3. Fruit harvest-mean values

Plant features / Genotype	A10	A20	A21B	A22A	A23A	A26	A29A	A30C	A51A	A58
Fruit weight (g)	615	31	420	290	125	220.4	32	94	880	164
No. of fruits/plant	11	42	13	19	27	22	45	26	9	21
STAS **I** production (g)	4305	985	4120	3920	2896	3274	1115	2096	5842	3094
STAS **II** production (g)	1830	264	986	1260	345	964	284	279	1111	283
Substandard	630	53	354	330	134	610.8	41	69	967	67
Total production /plant (g)	6765	1302	5460	5510	3375	4848.8	1440	2444	7920	3444

As shown in Table 3, the most productive accession is A51A that presents typical large purple-black fruits followed with a difference of 1155g by A10, which is our point of interest with a production of 6765 g/plant. For A10, the substandard fruit production represents 9.313% of total fruit production/plant, while the STAS I production is 63.637% and STAS II is 27.051% of fruit production/plant. The lowest production was registered at A20, with the specification that this genotype has small fruits that are very attractive for culinary uses, being a great replacement for mushrooms.

After a further evaluation regarding the commercial quality of the fruits the first accession is A51A with a medium STAS I production of fruits/plant of 5842 g, followed by A10 with a medium STAS I production of fruits/plant of 4305. The harvest with the commercial aspect that was slightly depreciated was directed to STAS II; the fruit were slightly deformed or were having an extended blossom point.

All the small fruits, highly depreciated that were not proper for commercial purposes were directed to the substandard group. We need to specify that there were no interventions on the technological flow with fertilizers or additional technological works. For the future researches will continue with the implementation of modern fertilizing plans and pollen stimulation factors.

Applying these new factors, certainly the productivity and quality of the harvest will increase. In the applied experiences, the classical culture technology for eggplants was used in order to evaluate the real genetic potential.

CONCLUSIONS

Researches finalized with the establishment of a valuable germplasm collection, followed by its evaluation according their genetic stability and directions of use.

Ten new genotypes were identified with pronounced traits of distinctiveness especially in matter of shape, size and fruit colour. Of these, A10 accession was registered to ISTIS Bucharest for patenting under the name of *Camelia*. In the present it is in the 2nd year for further testing, and the feedback collected from the partner farmers from the main vegetable holdings are positive. This new achieved genotype has large white fruits, with few seeds in the fruit and a pleasant commercial appearance. It has a specific flavour and taste, a buttery pulp with the specification that the organoleptic qualities don't alter during processing. It can be cultivated both in protected areas and in open field in all the areas favourable for this culture. The research has been completed with the rehabilitation and reduction of the main character variables in cultivar 51 A, a valuable local bio-creation that has been neglected in culture for a long period of time. Also for this new variety the documentation for patenting was prepared and sent to ISTIS Bucharest. The identified and studied cultivars open new directions for use in culinary preparations.

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