

LOCAL POPULATION OF LONG HOT PEPPER, 'CORNUL CAPREI' IMPROVED AT V.R.D.S. BUZAU

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Abstract

In order to prevent biological degradation and impurification over time of local population 'Cornul Caprei', was included in the preservation and valorization program of autochthonous genetic patrimony initiated in 1996 at V.R.D.S. Buzau. In the vegetable basin Buzau, this cultivar has a tradition regarding presence in culture and application. It is known for over 200 years by traditional vegetable growers. This paper presents the genealogy of the local population, quality characteristics and productivity potential resistance to pathogens and vegetation period. This local population has attracted particular attention by its uniqueness, cultivar with long, large fruits, similar to those of long pepper but, at technical and physiological maturity are colored in yellow-orange and are hot. After a detailed evaluation of the main characteristics it was found that in this local population are found several biotypes and 3 of them have distinct expressivity. Were retained the lines L16, L17A, L17 B and the intermediary form were eliminated. The improvement methods used were the ones particular to the species, especially intraspecific hybridization between valuable lines. Resulting hybrid populations were subjected to repeated individual selection for 6 generations. The main objective of this paper was achieved. The line L17 A, being representative for this population, was obtained in 2012 and submitted at ISTIS for homologation and patenting. For this improved cultivar was kept the original consecrated name, 'Cornul Caprei'. The initial material is a valuable reservoir of genes for obtaining new creations.

Key words: cultivar, local population, selection, genotype, 'Cornul Caprei'

INTRODUCTION

Pepper crop in Romania occupies an important place, ranking the fourth place after tomatoes, cabbage and onion. Because of the quality of its fruits, and also by the great diversity of varieties grown, the pepper has a great importance, both for fresh consumption and processed form. High food value of pepper fruit is given by the high content of sugars and vitamins, ascorbic acid is present in large amounts in fruits of pepper, content that varies depending on the kind and condition of the fruit ripening, being between 100 mg% fresh substance at fruits that reached technological maturity and 200-300 mg% fresh substance at fruits that reached physiological maturity.

Besides vitamin C content, fruits of pepper also contain vitamins B1 and B2, vitamin PP, vitamin E and provitamin A (Pintilie, 1996).

For pepper, the goal is to achieve high productivity varieties and hybrids, with high content of dry substance and ascorbic acid, multiple resistance to diseases and adverse environmental conditions, with large fruit, dark green to yellow white at technological maturity and red or yellow orange at physiological maturity (Sutea, 1983).

The vegetable basin Buzau accounted for SCDL Buzau the main genetic resource for improvement. Traditional local growers carefully preserved some local populations, old, valuable, which in time were made known and appreciated on the market. At the base of the main creations homologated by SCDL Buzau

are local populations e.g.: onion 'Aurie de Buzau', 'Diamant', 'Rubiniu', variety of cabbage 'Buzau', 'Magura', bell pepper 'Arum' etc. These cultivars, although they were genetically well sanded and improved by researchers, we encounter today on their raw form, unimproved in the holdings of traditional vegetable growers. Besides these cultivars which were studied and have generated valuable varieties are also some populations that have been neglected. Of these, particularly drew the attention the population of long pepper, 'Cornul Caprei'. In the vegetable basin Buzau, this cultivar has tradition regarding it in culture and cultivation, being known for over 200 years by traditional farmers. This paper presents the genealogy of this local population, the quality characteristics and yield potential, resistance to pathogens and the vegetation period. The cultivar shows uniqueness thru its long fruit, large, similar to those of Kapia pepper, but at technical and physiological maturity are colored in yellow-orange and are hot.

MATERIALS AND METHODS

The researches were performed at S.C.D.L. Buzau in the Laboratory of Plant Breeding. Since 1996, the laboratory has placed great emphasis on the conservation of biodiversity and also had campaigned for the protection of indigenous genetically patrimony. On this occasion a local population of long pepper was discovered, 'Cornul Caprei'. It has been brought long ago in the vegetable basin Buzau by Bulgarian immigrants who settled here. Due to imports of seeds and the introduction in culture of many new biological creations, the local population was in danger of genetic depreciation. The basic genetic material (seeds) were purchased from local traditional growers. Works for improvement have started with a careful assessment of the main characters and their purity in lineage transmission. After the evaluation were identified three distinct genotypes coded as follows: L 16 L17 A, L 17 B were found in crop with the following percentages: L16-12% L 17 A - 62% L17 B - 8% and 18% were eliminated.

After identifying and establishing the main characteristics of distinctively, three genotypes were separated:

- L 16 presents long dark red and hot fruit.
- L 17 A presents long dark green fruit and it colors orange at physiological maturity
- L 17 B presents long light green fruit that can be consumed at this stage, and at physiological maturity turns in yellow orange.

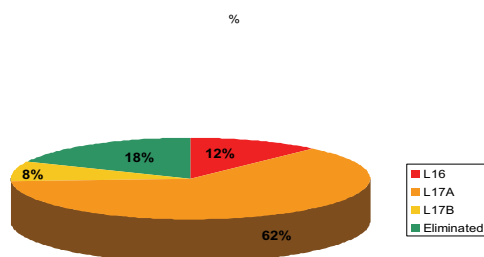


Figure 1. The genotypes percentages



Figure 2. L 16, L 17 A and L 17 B

The line L 17 A is representative for the pepper population 'Cornul Caprei' and resembles very much with the basic genotype.

The other lines appeared in time, due to contamination with other cultivars. In order to obtain these lines, repeated mass selection was done annually in valuable local populations and intraspecific hybridization between valuable lines, followed by genealogical selection until generation 7, continued by annual repeated mass selection in advanced generations.

Way of placing the variants was in randomized blocks in four repetitions.

During the growing season, observations and measurements were made according to the objectives of the proposed improvement.

To maintain the genetic identity of the line L 17 A, 'Cornul Caprei', it was introduced in the maintenance program using the following methods: individual selection of typical plants in the choice field, selection on lines in the field of study of descendants and individual selection after negative characters in pre-basic and basic fields.

Statistics indices for each character were: the average (\bar{x}), standard deviation (s), coefficient of variation (CV%), limits of variability ($\bar{x} \pm S$). The number of individuals in which biometric determinations were made is 100 and at sequence variation preparation were used 8 classes. Based on the study variability of coefficients and limits of variation calculated for each quantitative character, in the links from the selection scheme. The choice of biological material was made every year in order to maintain variety in the range of specificity and authenticity.

RESULTS AND DISCUSSIONS

Researches completed until now with the obtainment of 3 new lines of hot pepper. In this experience was not used any witness variety because we do not have inscribed in the National Catalogue any Romanian creation from this group. Lines obtained meet the condition of variety, have strong distinct characters, are uniform and they transmit unaltered characteristics in descendants.

Table 1. The main characteristics of plants
(average values) 2010-2013

Character	Lines		
	L16	L17A	L17B
Pant height (cm)	44,2	48,8	48,1
Sten height (cm)	16	18	17
Bush diameter	40,7	43,2	41,5
Fruit position on the plant	Pendulum	Pendulum	Pendulum
Immature fruit color	Dark green	Dark green	Light green
Mature fruit color	Red	Orange	Orange
Fruit weight per plant (g)	989	1108	868



Figure 3. L 16, L 17 B and L 17 A

We consider that the main objective of the researches was reached. Line 17A has been inscribed at ISTIS Bucharest under the name of 'Cornul Caprei', thus preserving its traditional name. It is in the second year of testing and the results obtained so far are very good.

Table 2. The main characteristics of fruits
(average values) 2010-2013

Studied character		Lines		
		L16	L17A	L17B
Weight (gr)		52,6	63,3	47,8
Receptacle weight (gr)		7,8	7,3	6,9
Seeds weight (gr)		2,1	1,4	1,9
Seed (no./fruit)		162	101	153
Receptacle rosette diameter (cm)		2,4	2,3	2,1
Tail length (cm)		3,6	4,1	4,2
pulp thickness (cm)		0,3	0,4	0,4
Length (cm)		15	18	21
Fruit diameter (cm)	Base	3,6	3,9	3,1
	Middle	2,9	3,3	2,6
	Apex	1,2	0,9	0,8

The lines obtained at S.C.D.L. Buzau have a high content of capsaicin which concentration grows significantly with fruit maturation.



Figure 4. L 16, L 17 B and L 17 A, detail for immature and mature fruit

Variability of the main characters at L 17 are shown in Table 3.

Table 3. Variability of the main characters at the variety of long pepper 'Cornul Caprei' (17A)

Character	Statistical indices calculated (average on 4 years)			
	\bar{X}	S	CV%	$\bar{X} \pm S$
Plants height-cm	48,8	3,0	6,14	45,8-51,8
Fruits length-cm	18,0	2,0	11,1	16,2-20,2
Fruits weight-gr	63,3	4,0	6,3	59,3-67,2
Production of fruits / plant -gr	1108	120	10,8	988-1228



Figure 5. L 17 A, fruit evolution and fruit longitudinal section

Statistical indices characterizing samples collected for the characters studied at the variety 'Caprei Cornul' is as follows: plant height(cm), overall general average of the experimental year 2010- 2013 was of 48,8 cm with a small coefficient of variability registering a value of 6,14%. Length of fruit - coefficient of variability calculated for the

entire period of experimentation recorded somewhat higher values of 11,1%, which proves that this character has a greater margin of variability.

Regarding the weight of the fruit, the limits of variability were between 59,3 and 67,2 and the coefficient of variability was 6,3. These values recorded demonstrate that the variety shows uniform fruit size, also presenting a pleasant commercial aspect.

The production of fruits harvested from a plant varied within the limits 988 - 1228 gr, recording an average of 1108 gr and the coefficient of variability being 10,8 %.

Due to seniority in culture and natural selection has made this line to manifest the phenomenon of ecological plasticity. Also in terms of resistance to diverse pathogens, it was observed that all three lines possess resistance genes for specific diseases of this species.

New variety obtained opens a new direction of use for this species, being the only long hot pepper that can be preserved by pickling, both alone and combined with other vegetables, doesn't depreciating its firmness during conservation.

CONCLUSIONS

The researches were finalised with reaching the main objectives proposed:

- saving the local population 'Cornul Caprei' which was in danger to extinct;
- obtaining 3 distinct valuable genotypes: L 16 with hot red fruit, L 17 A-typical 'Cornul Caprei', with hot orange and L 17 B immature green fruit and mature yellow fruit;
- patenting the line L 17 A under the name 'Cornul Caprei' represents the major success of the research undertaken until now;

Improved genetic material in the research is a valuable genetic resource for obtaining new biological creations.

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