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Short communication

Validation of Flor de Jamaica Cuban cultivars in Los Palacios, Cuba

Validación de cultivares cubanos de Flor de Jamaica en Los Palacios, Cuba

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ABSTRACT: During July and August, Cuban cultivars 'Benito', 'Dogo' and 'Ficaru 90', of Flor de Jamaica (*Hibiscus sabdariffa* L.), obtained through a genetic improvement program, with the use of mutation induction by ^{60}Co gamma radiation, developed by the National Institute of Agricultural Sciences, were introduced in three localities of Los Palacios municipality. The cultivars evaluated achieved satisfactory results and the interest of producers for their introduction was verified, due to their easy development and great diversity of uses such as the production of soft drinks, wines, jams and flower arrangements, so it is recommended to continue their introduction in other areas and evaluate them at an earlier planting time.

Key words: *Hibiscus sabdariffa*, genotipos, Roselle, Serení.

RESUMEN: Durante los meses de julio y agosto, en tres localidades del municipio, Los Palacios fueron introducidos los cultivares cubanos, 'Benito', 'Dogo' y 'Ficaru 90', de Flor de Jamaica (*Hibiscus sabdariffa* L.), obtenidos mediante un programa de Mejoramiento Genético, con el empleo de inducción de mutaciones por radiaciones gamma de ^{60}Co, desarrollado por el Instituto Nacional de Ciencias Agrícolas. Los cultivares evaluados alcanzaron resultados satisfactorios y se comprobó el interés de los productores para su introducción, debido a su fácil desarrollo y gran diversidad de usos como la elaboración de bebidas refrescantes, vinos, confituras y arreglos florales, por lo que se recomienda continuar su introducción en otras zonas y evaluarlos en una época de siembra más temprana.

Palabras clave: *Hibiscus sabdariffa*, genotipos, Roselle, Serení.

INTRODUCTION

Hibiscus sabdariffa L., known as Flor de Jamaica, Roselle, Serení, Sorrel, among others, belongs to the malvaceae family, is an annual shrub, native to Asia and develops well in tropical and sub-tropical climates. The calyx of its flowers is the most valued plant structure because in this whorl accumulate compounds with medicinal properties, antioxidants, pigments and organic acids, which largely determine its commercial value (1-3).

Its main use is the elaboration of extracts to prepare refreshing drinks, colorants, wines and jams, widely consumed in Latin America, the seeds are used in the elaboration of soups and as animal food due to their high protein content, and the whole plant is used in floral arrangements (4-6).

It is generally cultivated in marginal soils of low fertility and with little humidity retention (7); however, the existing genetic diversity in Cuba is very limited, so it is of interest to have Cuban cultivars that make possible the exploitation of this species in the country (8).

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Due to the potential beneficial effect of this plant, it is important to obtain and characterize new cultivars with higher yield and outstanding characteristics in quality of its dehydrated chalices and aqueous extracts. In this sense, the National Institute of Agricultural Sciences of Cuba (8-10), has begun to develop a genetic improvement program that includes the use of mutation induction with ^{60}Co gamma rays on the Mexican cultivar Yerzy, from which the first genotypes have been obtained. The objective of this work was its validation in three localities of Los Palacios municipality, Pinar del Río province.

MATERIALS AND METHODS

During July and August, on a Gley Nodular Ferruginous Petroferric Eutric Loam soil, poorly humified (11), in the UCTB of INCA and in two organoponics, all located in the municipality of Los Palacios (Table 1), were introduced the Cuban cultivars 'Benito', 'Dogo' and 'Ficaru 90', of Flor de Jamaica (*Hibiscus sabdariffa* L.). They were obtained through a genetic improvement program, with the mutation induction use by ^{60}Co gamma radiation developed by the National Institute of Agricultural Sciences of Cuba.

Sowing was done directly at a planting distance of 1 m x 1 m, two to three seeds were placed per hole and when they germinated, two plants were left. No fertilization was carried out during the entire cultivation period; for germination, sprinkler irrigation was used for 'Dogo' and 'Benito' and furrow irrigation for 'Ficaru 90'. In addition, for all cultivars, the rest of the cycle was favored only with rainfall. Weed control was carried out manually and harvesting was done when the plants had reached maturity and began to defoliate, which occurred in November.

In 10 plants per cultivar and replicated three times, 14 characters were evaluated: height in (cm), number of branches, stem color, leaves, flowers, fruit and leaf veins, shape and lobes of lower leaves, cycle (in days), number of fruits per plant, fresh mass of 10 chalices per plant and mass of 100 seeds (in g). All descriptors proposed by González (12), for the characterization and registration of Cuban varieties of Flor de Jamaica and the height of the first branch (in cm) was added. The data obtained were processed according to a Student's t-test for p≤0.05.

RESULTS AND DISCUSSION

The cultivars of Flor de Jamaica, introduced in the locality of Los Palacios, showed, in general, differences among them in stem color, fruit, leaf veins, leaf shape, height, number of branches, number of fruits per plant, fresh mass of chalices, mass of 100 seeds and height of the first branch, as shown in Tables 2 and 3.

Table 1. Location and sowing date of Flor de Jamaica cultivars 'Benito', 'Dogo' and 'Ficaru 90', evaluated in Los Palacios municipality.

Cultivars	'Benito'	'Dogo'	'Ficaru 90'
Sowing	July 17	August 1	August 31
Locality	UCTB INCA Los Palacios	Maribel Organoponic	Leandro Organoponic

Table 2. Qualitative characters evaluated for cultivars 'Dogo', 'Benito' and 'Ficaru 90' in three localities of Los Palacios municipality.

	'Benito'	'Dogo'	' Ficaru 90'
Stem color	Dark wine red	Dark wine red	Green mottled with red
Leaf color	Dark green	Dark green	Dark green
Flower color	Pink	Pink	Pink
Fruit color	Dark wine red	Wine red	Dark scarlet red
Rib color	Red	Red	Green (some wine red only near petiole)
Shape of lower leaves	Pentalobulated	Pentalobulated	Pentalobulate
Leaf lobes	Split up to ¼ of the base	Split up to – of the base	Split up to ¼ of the base

Table 3. Quantitative traits evaluated for the cultivars 'Dogo', 'Benito' and 'Ficaru 90' in three localities of Los Palacios municipality.

					T[1]	
	'Benito'	'Dogo'	'Ficaru 90'	BD[2]	BF[3]	DF[4]
Height (cm)	135.9	105.4	125.6	23.5*	6.7*	-14.1*
Number of branches	13	14	18	-1.1	-5.1*	-5.1*
Cycle (days)	120	120	120	0.0	0.0	0.0
Fruits per plant	115	67	72	9.6*	12.9*	-1.1
Fresh mass of 10 chalices	57.4	43.3	43.2	9.5*	9.7*	0.1
Mass of 100 seeds (g)	3.6	3.6	3.0	-0.3	8.1*	10.5*
Height of the first branch (cm)	10	10	28.8	0.0	-21.4*	-26.8*

Student T[1]; BD[2]-Benito vs Dogo; BF[3]-BenitovsFicaru 90; DF[4]-DogovsFicaru 90; * significant differences between means for p ≤ 0.05

Between 'Dogo' and 'Benito', according to the Student's t-test used, there were no statistically significant differences for number of branches, cycle, mass of 100 seeds and height of the first branch, while 'Ficaru 90' showed differences for all characters except cycle with 'Benito' and 'Dogo', and for fruits per plant and fresh mass of 10 chalices with 'Dogo'.

There were also differences in their behavior when compared with the characterization made by their breeder (8-10), since all grew less under these conditions. Benito' can reach heights from 150 to 170 cm, 'Dogo' between 150 and 166 cm and 'Ficaru 90' up to 213 cm, this behavior could be related to the interaction that the environment exerts on the behavior of genotypes and it is worth mentioning that they were planted outside the proposed planting date for the crop.

In works carried out in Mexico, for the nutritional characterization of improved cultivars of Flor de Jamaica, differences were found in contents of the evaluated compounds. The authors attribute to the photosynthetic cycle of each one, which is influenced by factors such as hydric stress, leaf structure, chlorophyll content, quality and quantity of incident light in leaves and environmental temperature; also, the high variability of these cultivars may depend on geographical and genetic factors (13).

Regarding the number of branches, for 'Dogo' and 'Benito', it was appreciated that they formed about 50 % less and the color of stems, leaves, flowers, seeds, fruits and leaf veins, as well as leaf shape did not differ from what was found in the literature consulted. However, the cultivar 'Ficaru 90', despite being sown at the later date, he achieved the formation of equal number of branches that informed him in the locality where he was selected. In addition, the color of the fruit, the stem and the rib of its leaves differentiate it from ‘Dogo’ and 'Benito' (Figure 1).

The shape of the leaves in the three cultivars is pentalobulated, but its breeder reported lobes split up to ¼ of the base for cultivating ‘Dogo’ (9) and in this, assay lobes were appreciated only until – of the base. In the case of the cycle, no differences were presented with the informed by this same author.

Despite having a smaller number of branches 'Benito' showed no affectations in the formation of fruits, the fresh mass of the chalices and the mass of 100 seeds since it reached values similar to what was obtained by other authors, but what was not happened. Same with ‘Dogo’ and 'Ficaru 90', which exhibited 50 % of the potential shown in other trials, for the formation of fruits and the fresh mass of the chalices. In this sense, other authors reported that there were significant differences between cultivars 'Benito', 'Dogo' and 'Ficaru 90' (14), cultivated in areas of the National Institute of Agricultural Sciences, Mayabeque province and that 'Benito' has a greater mass of the fruits, fresh chalices and acorns. However, in another work developed in that same locality (15), the authors found that 'Ficaru 90' was the one that obtained a greater number of fruits per plant and ‘Dogo’ the highest performance of fresh chalices per plant.

In this regard, it is raised that Flor de Jamaica produces better in the tropics and sub- tropics, where temperatures, rainfall and photoperiods are presented for development. The results obtained in different environments (6) demonstrate the importance of evaluating the greatest diversity of cultivars available for each location and offer producers the possibility of selecting the best adapted, since even within the same locality at different times the behavior may be different.

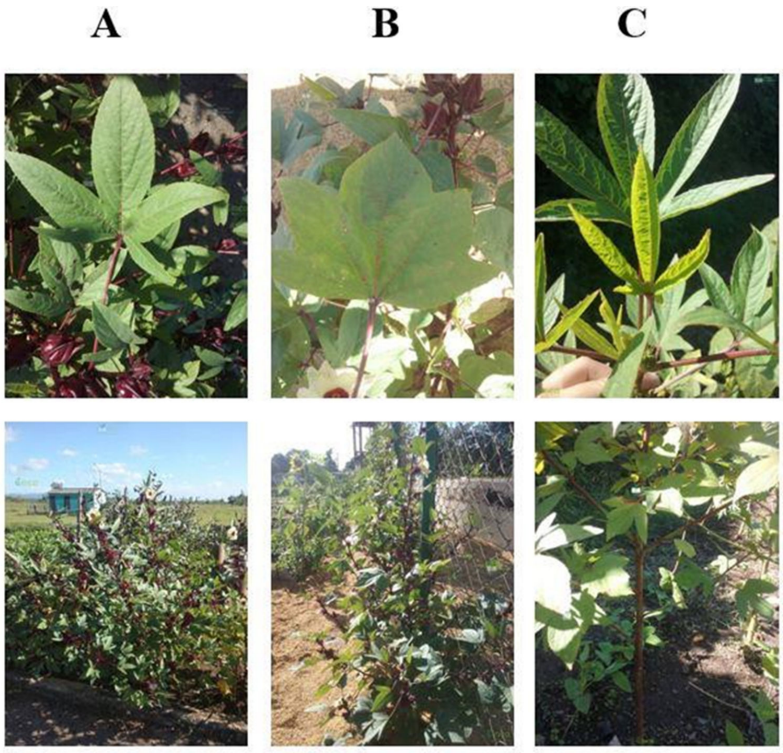

Figure 1. Details of the leaves and stem of the three cultivars (A-Benito, B-Dogo, C-Ficaru-90).

In the literature consulted, no references were found regarding the height evaluation of the first branch. However, the differences shown between 'Ficaru 90' and the other two cultivars ameritate to pay attention to this character in future evaluations, which could be included as another crop descriptor.

CONCLUSIONS

The cultivars evaluated achieved satisfactory results and proved to be accepted by producers for the production of soft drinks, wines, jams and flower arrangements, so it is recommended to continue their introduction in other areas and evaluate them at an earlier planting time.

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