CRITERIA FOR SELECTION OF BIOFORTIFIED SWEET POTATO CLONES

CRITÉRIOS PARA A SELEÇÃO DE CLONES DE BATATA-DOCE BIOFORTIFICADA

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RESUMO - A batata-doce é uma das principais culturas produzidas no mundo. Além de ser muito produtiva, a espécie é muito rústica, possui ampla adaptação, alta tolerância à seca e baixo custo de produção. A região nordeste do Brasil é uma das maiores produtoras da cultura de batata-doce e contraditoriamente, é a região brasileira com maiores indíces de deficiência de micronutrientes. O objetivo do presente trabalho foi avaliar diferentes clones de batata doce biofortificados importados do Peru quanto à eficiência agronômica e teor de matéria seca visando a obtenção de cultivares mais produtivas e com maior aceitação por produtores e consumidores. Dentro desta avaliação inicial que compreendeu dois experimentos independentes realizados em Brasília, DF, no período de 30 de março a 04 de agosto de 2015. Oito clones foram identificados como candidatos a uma etapa pré-comercial por mostrarem melhores características agronômicas que a cultivar controle utilizada.
Palavras-chave: batata-doce, cultivares, micronutrientes

ABSTRACT - Sweet potato is one of the most important crops worldwide. It is very productive, demanding low in put, has wide adaptation and high drougt tolerance resulting in low production cost. The northeast region of Brazil is one of the greatest sweet potato areas in the country but contradictory this region also has one of the highest micronutrient deficencies rates. The goal of the current work was to evaluate the agronomic performance and dry matter content of sweet potato clones imported from Peru with the aim to identifing new cultivars of biofortified sweet potatoes with better yield and acceptance of the grower and consumers. Two independent trias were performed in Brasília with planting months on March and August, 2015. Eight clones were identified as candidates to a pre-commercial stage based on their agornomomic performance in comparison with the control cultivar used.
Keywords: sweet potato, cultivars, micronutrients

INTRODUCTION

Sweet potato is one of the most important horticultural crops produced in the world. Besides being very productive, it does not require a lot of external in-put, has broad adaptation, high drought tolerance and low production costs. This crop is cultivated in most Brazilian states by small or large growers. The Northeastern region of Brazil is one of the main suppliers for the country. Approximately 30% of Brazilian population suffers from vitamin A deficiency, most of it located on the northeast region of the country. There are several different approaches that can be used to increase the level of micronutrients on a diet. Some rely on the artificial supplementation of nutrients, process know as fortification and others rely on the use of cultivares with a greater level of a desidered nutrient in comparison to a conventional cultivar or variety, process known as biofortification. The principle of biofortification is to identify cultivars that have a greater content of a specific nutrient than local varieties consumed by the population. Once these cultivars are identified they have to be incorporated on the diet of a

target population or in some cases these cultivars have to be used as parental lines to be crossed with local cultivars to then produce new cultivars with greater content of a specific micronutrient.

Since sweet potatoes are highly consumed in one of the regions that suffers more from vitamin A deficiency it becomes a potential candidate for biofortification. One of the limitations for the adoption of provitamin A biofortified sweet potatoes is that the Brazilian population is not acquanted with the orange color of roots. In addition, the dry matter content of biofortified sweet potatoes are usually lower than the ones commonly cultivated in Brazil decreasing the adoption of this type of material in Brazil. The goal of this work was to evaluate news clones of sweet potatoes with good agronomic characteristics but also with good acceptance by the producers and consumers.

METHOD

A total of 81 promissing sweet potato clones were imported from the International Center of Potato (CIP), Lima, Peru in 2014. Entries received were quarantined at Cenargen and after released from the quarantine were transferred to Embrapa Vegetables. Samples were then sub-cultured in vitro in the Laboratory of Celular Biology and after one subculture cycle they were transplanted to 5 liters plastic pots with commerical substrate and kept under shade house (50% of shade) conditions. Fourty five days after the first transplant plants kept on shade house were re-transplanted to styrofoan trays and kept under green house conditions for 40 days when they were planted in the field. Because of the differences in clone development and the effect of genotype x environment only 46 clones from the initial 79 produced a minimum quantity of sprouts for field evaluations.

Sprouts of 46 clones were planted on a block randomized experiment on two different seasons August, 2014 and March, 2015. Two plots with 6 plants each were planted in each of the two temporal experiments. Plants were transplanted on the field with a distance of 0,3 m betweem plants and 0,8 m between rows. Leaf and stem shape, color, diameter were assessed during vegetative cycle and clones were mechanically harvested 4-5 months after planting. Harvested roots were kept in plastic boxes and washed with water prior to evaluations.The amount of root pest damage, root mishape, weight of commercial and non-commercial roots and root dry matter based on the weight before and after oven dry (second experiment only) were evaluated. Cultivar Beauregard (clone 82) was used as control. Data was evaluated on SAS 9.2 Software using PROGLM and Tukey and when necessary was transformed by root square of x+0.5.

RESULTS AND DISCUSSION

High variability on insect damage and production of misshaped roots were observed among the different genotypes evaluated (data not shown). Yield ranged from 0.1 to 5.6 Kg per plot (6 plants) but because of the high coeficient of variation most of the cultivars tested were not statistically different from the control cultivar Beauregard (Table 1). As dry matter is a significant trait for Brazilian sweet potato growers and consumers it was evaluated on the summer 2014-15 experiment. The dry matter content ranged from 16,5 to 31,8% (Table 2). The variability observed among the clones evaluated on the two independent experiments was expected since the clones were initially selected in Peru with complete different environment conditions. In addition to this, these clones arised from crosses of 54 males and 7 females which explains part of variability observed.

Table 1. Commercial yield plot of biofortified sweet potatoes clones. Data is average of two independent trials performed on winter 2014 and summer 2014/15. Yield is relative to the production of six plants (plot size). Brasília, DF, Brazil.

Clone	Field		Clone	Yield		Clone	Yield	
	(Kg plot^{-1})			(kg plot^{-1})			(Kg plot^{-1})	
82	5,6	A	18	2,3	ABC	49	1,2	ABC
50	4,9	AB	15	2,3	ABC	59	1,2	ABC
79	3,9	ABC	71	2,2	ABC	47	1,0	ABC
9	3,9	ABC	20	2,2	ABC	25	0,9	ABC
10	3,7	ABC	69	2,1	ABC	65	0,8	ABC
66	3,7	ABC	33	2,1	ABC	76	0,8	ABC
34	3,4	ABC	41	2,0	ABC	35	0,7	ABC
17	3,3	ABC	1	1,9	ABC	83	0,7	ABC
8	3,1	ABC	67	1,9	ABC	43	0,7	ABC
6	3,1	ABC	36	1,7	ABC	46	0,5	BC
24	2,9	ABC	2	1,6	ABC	7	0,4	BC
21	2,8	ABC	81	1,5	ABC	40	0,4	BC
56	2,8	ABC	75	1,5	ABC	4	0,1	C
54	2,6	ABC	37	1,5	ABC	45	0,1	C
5	2,6	ABC	73	1,3	ABC			
19	2,5	ABC	32	1,3	ABC			
70	2,4	ABC	29	1,2	ABC			
42	2,3	ABC	38	1,2	ABC			

*Underlined materials were the ones selected to advance to precommercial stage

**Clones followed by the same letter on the column are not significantly different at the 0.05 level of significance

Using the different characteristics evaluated (commercial and non-commercial yield, root shape and pest damage) 8 clones (undelined on Tables 1 and 2) were selected to a pre-commercial stage. On this level plots will be larger and the experiments will be performed in two different regions (Brasília, DF and Itabaiana, SE). Pre-commercial evaluations are being performed in winter 2015 and summer 2015-16. According to the data above, new cultivars are expected to be released in 2016.

Table 2. Dry matter (%) of sweet potato clones evaluated during one experiment performed on the Summer 2014/15. Brasília, DF, Brazil.

Clone	Dry Matter	Clone	Dry Matter	Clone	Dry Matter
9	31,8 A	65	27,7 ABCD	67	24,0 ABCD
8	31,8 A	45	27,5 ABCD	20	23,7 ABCD
24	31,3 A	33	27,5 ABCD	79	23,0 ABCD
40	31,0 A	32	27,2 ABCD	41	22,6 ABCD
76	30,7 A	69	26,7 ABCD	47	22,1 ABCD
75	30,2 AB	1	26,6 ABCD	10	22,0 ABCD
5	30,1 AB	35	26,3 ABCD	71	21,9 ABCD
59	30,0 AB	42	25,9 ABCD	6	21,2 ABCD
38	29,9 AB	56	25,8 ABCD	17	20,8 ABCD
34	29,9 AB	18	25,4 ABCD	4	20,7 ABCD
81	29,6 AB	29	25,2 ABCD	19	19,5 BCD
37	29,6 AB	73	25,2 ABCD	43	19,4 BCD
54	29,3 ABC	21	25,0 ABCD	2	19,0 BCD
15	29,0 ABC	82	24,7 ABCD	83	18,2 CD
36	29,0 ABC	25	24,5 ABCD	66	16,5 D
46	28,0 ABC	50	24,2 ABCD		
49	27,7 ABC	70	24,1 ABCD		

*Underlined materials were the ones selected to advance to precommercial stage
**Clones followed by the same letter on the column are not significantly different at the 0.05 level of significance

CONCLUSION

Evaluations performed in Brasília, DF for number and weight of commercial roots and damage caused by insects allowed the identification of eight potential sweet potato clones to be released in Brazil.

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