

# A brief report on sugarcane breeding program in Alagoas, Brazil

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## ABSTRACT

The aim of this report is to depict the proceedings for obtaining new RB varieties of sugarcane in Alagoas, Brazil. This process starts at Sugarcane Flowering and Crossing Station, At Serra do Ouro. Serra do Ouro is located at 9°13'S 35° 50'W, 450m above sea level and 35km from the sea. The Winter (the wet season) extends from March to August. The Summer (the dry season) extends from September to February, and under these conditions the flowering process takes place and the annual cross station activity commences. Field trials and industrial analyses are carried out at sub-stations and sugar mills, respectively. The process for releasing new varieties is accomplished over eleven years. Since 1970 Serra do Ouro has produced and released 51 RB commercial varieties which cover over 50% of the sugarcane-growing area in Brazil.

**KEY WORDS:** RB Varieties, procedure breeding.

## INTRODUCTION

Alagoas, a state in the Northeast of Brazil, possesses special climatic conditions for the flowering and shedding of fertile sugarcane pollen with production of viable seeds *Rocha et al* (1999). The special conditions referred to are found at the top of a hill known as Serra do Ouro. The Sugarcane Flowering and Crossing Station was established in this area.

Serra do Ouro is located at 9°13' S 35°50' W, 450m above sea level and 35km from the sea. The wet season (the Winter) extends from March to August. The dry season (the Summer) extends from September to February. Under these conditions the

flowering process commences in February and continues until July. Recently, the Serra do Ouro Breeding Station has completed 33 years of successful work. It has produced, so far, 51 "RB" (Republica do Brasil) varieties (Barbosa *et al.*, 2000; Daros *et al.*, 2001). Annually, seeds are produced at Serra do Ouro for the State of Alagoas breeding program and also for some Brazilian states through the following universities: Federal de Pernambuco, Federal de Minas Gerais, Federal do Rio de Janeiro, Federal de São Carlos/São Paulo and Federal do Paraná. Serra do Ouro has a germoplasm collection of 1986 species and diverse hybrids imported from several sugarcane-producing countries to assist the breeding program.

## MATERIAL AND METHODS

The production process of new varieties of sugarcane from crossing to commercial cultivation lasts eleven years. Table 1 shows, in detail, the steps and the methodology of this process. Cross-fertilization is conducted from April to June at Serra do Ouro. Two types of crosses are carried out at Serra do Ouro, e.g., bi-parental and melting-pot. The cut stalks carrying the tassels are kept alive by immersing the cut ends in a solution containing sulphur dioxide, phosphoric acid, sulfuric acid, and nitric acid with addition of citric acid as recommended by Mangelsdorf (1967) and by Tianco (1969). Seed sowing, transference of seedling



**Figure 1.** Shows a bird's-eye view of Serra do Ouro.

to flats, and early disease-resistance trials are carried out in the Centro de Ciências Agrárias of the Universidade Federal de Alagoas. The process of selection and experimentation are performed in four sub-stations and mills.

## RESULTS

Serra do Ouro has produced outstanding RB varieties of sugarcane (Barbosa *et al.*, 2000; Daros *et al.*, 2001). By the end of 1990, RB varieties covered over 50% of the cultivated area of sugarcane in Brazil. That means over two million planted hectares. Among the varieties shown on (Table 2), RB 72454 is the most outstanding. The code can be broken down as follows: RB stands for Republica do Brasil (Republic of Brazil) 72 stands for 1972, the year of breeding and 454 stands for the number of the selection order.

## RESUMO

### Um breve relato sobre o programa de melhoramento da cana-de-açúcar em Alagoas, Brasil

O presente trabalho descreve o processo de produção de sementes de cana-de-açúcar em Alagoas, Brasil. Inicia-se na Estação de Floração e Cruzamento Serra do Ouro (EFCSO), com o objetivo de obtenção de novas variedades de cana RB (República do Brasil). A EFCSO está localizada no município de Murici-AL a 9° 13' Sul de latitude e 35° 50' Oeste de longitude, altitude de 450m, e a 35km de distância geográfica do litoral. A germinação das sementes produzidas na Serra do Ouro são feitas nos campos experimentais do Centro de Ciências Agrárias da UFAL, as plântulas são transferidas para quatro subestações e os campos de seleção e experimentação

**Table 1.** Procedure for obtaining new sugarcane varieties by the Alagoas Breeding Program.

Year	Month	Stage	Methodology
1 <sup>st</sup>	April to June	Crosses	Bi-parental & melting-pot
	July to August	Sowing Transfer	3g of seeds per flat 24 seedlings per flat
	August to Sept.	Early disease-resistance trials	Disease-resistance LSc and RSD
	Sept. to Nov.	<b>Stage 1</b> Ground nursery Transfer	n ≅ 100,000 The space between seedlings is 0.50m
2 <sup>nd</sup>	Jan. to June	<b>Stage 1</b> Evaluation	Seedling survival and growth, stalk morphology, flowering, pests and diseases
	Sept. to Nov.	Plant cane	Cutting
3 <sup>rd</sup>	Sept. to Nov.	<b>Stage 1</b> 1 <sup>st</sup> ratoon selection	Growth, stalk morphology, flowering, juiceless, stalk number, pests, diseases and BRIX
		<b>Stage 2</b> Planting	n ≅ 2,000 clones 2 furrows x 3.5m x 1 plot
4 <sup>th</sup>	Jan. to June	<b>Stage 2</b> Evaluation	Growth, stalk morphology, flowering, juiceless, pests, diseases
	Sept. to Nov.	Plant cane	Cutting
5 <sup>th</sup>	Sept. to Nov.	<b>Stage 2</b> 1 <sup>st</sup> ratoon selection	Growth, stalk morphology, flowering, juiceless, stalk number, pests, and diseases, BRIX Kg/ plot
		<b>Stage 3</b> Planting Multiplication	n ≅ 200 clones 5 furrows x 4m x 2 blocks 2 Furrows x 5m
6 <sup>th</sup>	Jan. to June	<b>Stage 3</b> Evaluation (plant cane)	Growth, stalk morphology, flowering, juiceless, pests; diseases
	Sept. to Nov.	<b>Stage 3</b> Harvesting (Plant cane) Multiplication	TCH, BRIX, POL, PCC, TPH, fibre, purity and ATR 5 furrows x 10m

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**Table 1.** Procedure for obtaining new sugarcane varieties by the Alagoas Breeding Program.

Year	Month	Stage	Methodology
7 <sup>th</sup>	Jan. to June	<b>Stage 3</b> Evaluation 1 <sup>st</sup> ratoon	Growth, stalk morphology, flowering, juiceless, pests, diseases
	Sept. to Nov.	<b>Stage 3</b> Harvesting 1 <sup>st</sup> ratoon Experimental stage	TCH, BRIX, POL, PCC, TPH, fibre, purity, ATR  n ≅ 36 clones (6 furrows x 6m x 4 randomised block)
		Disease-resistance trials	(2 furrows x 5m)
		Ripening analysis Multiplication	(3 furrows x 4m x 6 blocks) (2 furrows x 10m)
Aug.- Sept.	Disease evaluation	RUST, L Sc, Red Rot, Yellow Spot, Yellow Leaf Syndrome	
8 <sup>th</sup>	Sept.- Mar.	Ripening evaluation	PCC (monthly analysis)
	Sept.- Dec.	Harvesting evaluation (plant cane) Multiplication	TCH, BRIX, POL, PCC, TPH, fibre, purity and ATR and pests 2 furrows x 10m
9 <sup>th</sup>	Sept.- Dec.	Harvesting evaluation (1 <sup>st</sup> ratoon) Multiplication	TCH, BRIX, POL, PCC, TPH, fibre, purity and ATR and pests 20 furrows x 10m
		Harvesting evaluation (2 <sup>nd</sup> ratoon) Multiplication	TCH, BRIX, POL, PCC, TPH, fibre, purity and ATR and pests 200 furrows x 10m
10 <sup>th</sup>	Sept.- Dec.	Harvesting evaluation (2 <sup>nd</sup> ratoon) Multiplication	TCH, BRIX, POL, PCC, TPH, fibre, purity and ATR and pests 200 furrows x 10m
11 <sup>th</sup>		Patent Varieties are released for commercial cultivation	

**Table 2.** RB varieties released for commercial planting from 1970 – 2001 in Brazil.

Period	Varieties			
1970 – 1980	RB70141	RB70194		
	RB705007	RB705051	RB705146	RB705440
1980 – 1990	RB72454	RB721012	RB725147	RB725828
	RB732577	RB735275	RB739359	RB739735
	RB754665	RB765418	RB785148	
	RB75126	RB758540	RB763710	RB785750
1990 – 2000	RB806043	RB813804	RB825336	RB83102
	RB83160	RB83252	RB83594	RB835019
	RB835054	RB835089	RB835486	RB855453
	RB8495	RB842021	RB845257	RB855546
	RB855035	RB855113	RB855156	
	RB855463	RB855511	RB855536	
	RB855563	RB867515		
2000 – 2001	RB855463	RB855511	RB845197	RB845210
	RB855036	RB865230		

em unidades agroindustriais. A obtenção de novas variedades de cana RB, desde o cruzamento a liberação, dura onze anos. Desde 1970 a Estação originou a liberação de 51 variedades de cana em diversas regiões do país, e atualmente representa mais da metade da área cultivada.

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