

COMMERCIAL YIELDS AND RAPID ADOPTION OF THE ECU-01 VARIETY IN ECUADOR

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KEYWORDS: Sugarcane Varieties, Commercial Cane Production, Variety Adoption.

Abstract

THE Ecuadorian variety ECU-01 was released in August 2007, after a 10 year period of clonal selection through four selection stages and evaluations in semi-commercial plots. The variety was derived from the clone ECSP98-169 selected from the cross between SP81-6215 × SP80-1816 performed in COPERSUCAR (CTC) in Brazil. During the selection process, evaluations were performed on sugar content, cane tonnage, and resistance to smut (*Ustilago Scitaminea*), mosaic (ScMV) and common rust (*Puccinia melanocephala*). Additionally, a participatory approach of selection was performed with the cane mill's technicians in order to allow an effective selection. The variety presented averages of cane t/ha of 98 (TCH), sugar t/ha of 9.1 (TSH) and fibre of 13.1% throughout evaluations of stage IV in six localities in plant cane and two ratoons. These values were superior to Ragnar (80 TCH and 7.2 TSH) the leading variety in Ecuador. In commercial production plots in San Carlos Mill, cane plant and first ratoon ECU-01 were on average superior to Ragnar by 2.1 TSH during the 2008-2009 period. A year after its release (2008), the three main sugar mills in Ecuador registered more than 1500 ha planted with ECU-01, and in 2009 the same mills planted 2620 ha. Results from commercial fields during the 2008 harvesting season showed that ECU-01 is superior to Ragnar, CC85-92, CR74-250, B7678, C10571-73 and C87-51.

Introduction

Sugarcane production in the Rio Guayas Valley is dependent on one variety, Ragnar, with more than 70% coverage. This variety was introduced 60 years ago from Australia to Ecuador and has been in commercial production for at least 30 years. Local production has not increased in the past decades, and dependence on a single variety is a permanent risk for a sugar industry settled in tropical conditions.

On the other hand, sugarcane breeding contributes to increased productivity without an increase in growing costs, and disease and insect resistance even reduce the costs of growing the crop (Berding *et al.*, 2004).

The main objective of the Ecuadorian Research Center (CINCAE) is to develop local varieties adapted to the tropical, low sunlight and heavy soil conditions. Support areas of research (plant pathology, entomology, soils and fertiliser and chemistry laboratories) were also established to develop technologies for adequate crop management.

The Ecuadorian varieties should show a combination of cane tonnage and sucrose contents and also fibre for co-generation.

The Varieties Program of CINCAE started in 1998. That year, a sugarcane collection was assembled to have genetic variation for future crosses. Because no facilities were available at this time, an agreement was signed with COPERSUCAR (CTC) from Brazil to make crosses, and the first selection series was planted with fuzz sent from Brazil.

After 10 years of evaluations and selection from Stage I to Stage IV and semi-commercial trials, the best clone was ECSP98-169. The selection trials were planted in several locations to evaluate the performance between locations and years (Castillo *et al.*, 2007).

ECU-01 was named after the clone ECSP98-169 which is a progeny from a cross SP81-6215 × SP80-1816 performed in Centro de Tecnologia Canavieira-CTC (former COPERSUCAR) of Brazil. Fuzz was planted in September 1998 which provided plants to start the selection process from Stage I.

A total of 638 clones were selected to plant in Stage II, ending up with eight clones in Stage IV. After two years of evaluations, three clones were selected to plant in semi-commercial plots in San Carlos, Valdez and La Troncal mills. The best clone of these three was ECSP98-169, named ECU-01 (CINCAE, 2007).

Results from commercial fields

ECU-01 showed higher production of cane per hectare (TCH) than Ragnar in all evaluation trials along the selection stages. The same trend of production was observed in the 2009 harvesting season in all three main mills.

An analysis in plant cane and first ratoon of both varieties showed that ECU-01 is 2.1 tonnes sugar per hectare (TSH) higher than Ragnar on average from commercial fields during the 2009 harvesting season (Table 1).

This higher sugar tonnage might be related to the high tonnes cane per hectare (TCH) produced in the different commercial plots. ECU-01 can also be harvested at 12 months of age on average, while Ragnar is a 13 month variety in all commercial plots.

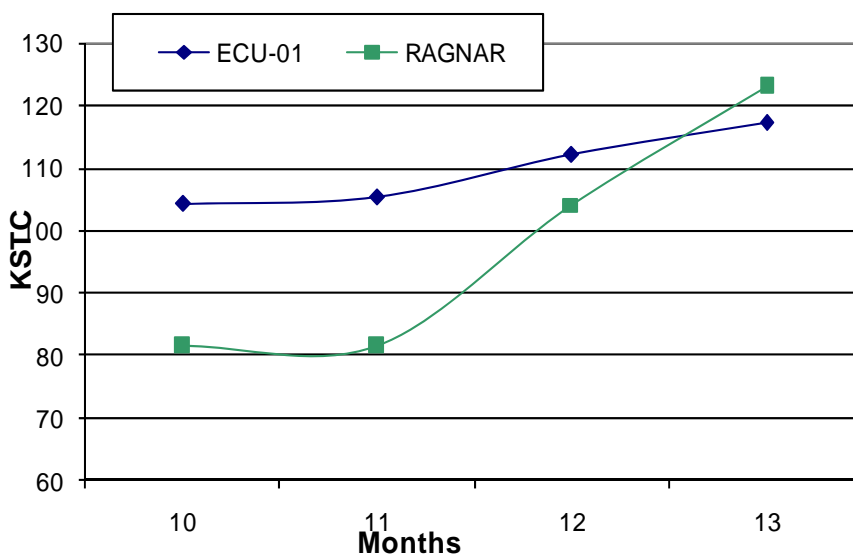
Table 1—Production of cane and sugar of ECU-01 in 2009 compared to variety Ragnar in San Carlos Mill.

Production parameters	Variety	
	ECU-01	Ragnar
Harvesting cycle (months)	12.46	13.04
TCH	107.25	86.21
Sugar/TC (kg)	96.32	95.49
TSH	10.33	8.21

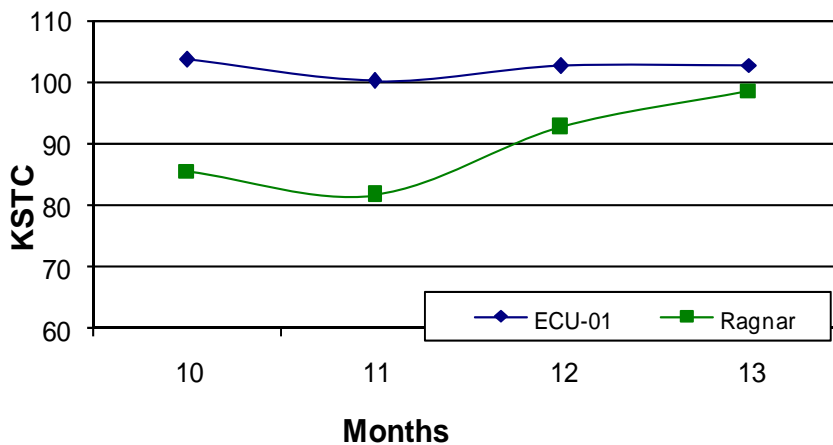
The early ripening character of ECU-01 was analysed during the clonal evaluation data collection. Maturity curves were plotted to evaluate the sucrose accumulation through the months before harvesting. Figure 1 shows the differences between ECU-01 and Ragnar in the three main mills where evaluations were performed in semi-commercial fields. In all three cases, the Ecuadorian variety presents higher and earlier sucrose accumulation compared to Ragnar. Therefore, ECU-01 could be easily harvested at 12 months as the commercial fields are demonstrating in 2009.

Managers and farmers at the mills see the variety as important commercial material to diversify cane production in their units. Since the release of ECU-01 in 2007, there has been a rapid increase in commercial fields. The seed stock provided to the mills in 2006 allowed them to plant a total of 613.81 ha in 2007. This number of units increased to 2620.67 in year 2009 (Table 2) and it is expected to keep increasing its planting area in the coming years.

(A)



(B)



(C)

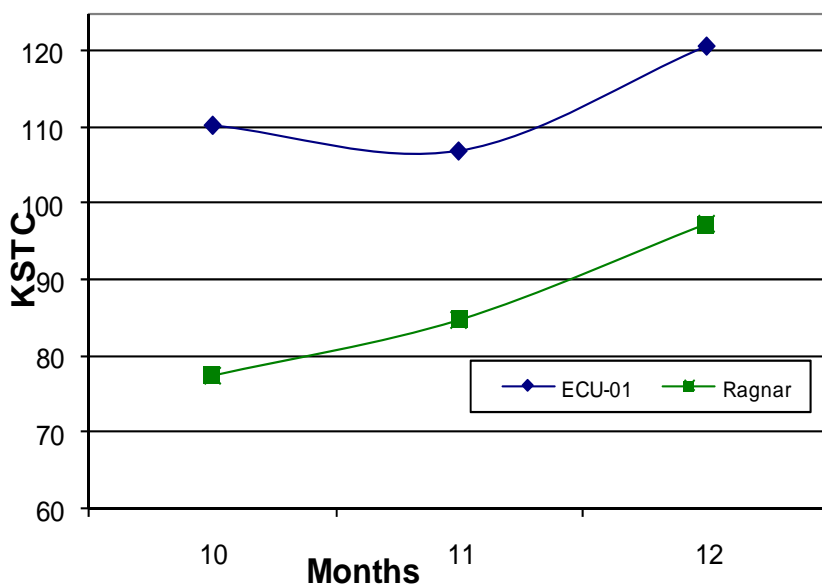


Fig. 1—Sucrose accumulation maturity curves for ECU-01 in three environments: (A) San Carlos, (B) Valdez), and (C) ECUDOS mills. Evaluation carried out in 2008.

Table 2—Number of hectares planted with ECU-01 per year. The release of the variety was September 2007.

Year	Mill*			
	San Carlos	ECUDOS	Valdez	TOTAL
2007	215.0	168.5	230.4	613.8
2008	792.7	363.1	377.1	1532.8
2009	1184.7	500.0	936.0	2620.7
TOTAL	2192.4	1031.6	1543.4	4767.4

*Personal communication: Glenda Toala (ECUDOS mill), Walter Jara (Valdez Mill), and Edgar Sánchez (San Carlos Mill).

Conclusions

The newly released variety ECU-01 shows outstanding yields in the tropical lowland conditions of Ecuador. Its main feature appears to be its ratooning ability and early ripening. Sucrose accumulation starts at 11 months and the variety can be harvested at 12 months. This is the main advantage compared to Ragnar which is a 13 month variety. ECU-01 is superior to Ragnar with 2.1 TSH in plant cane and first ratoon crops. A rapid adoption is observed in the Ecuadorian industry of this new variety due to its good agronomic characteristics.

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RENDEMENT INDUSTRIEL ET ADOPTION RAPIDE DE LA VARIÉTÉ ECU-01 EN ÉQUATEUR

Par

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**MOTS CLÉS: Variétés de Canne à Sucre,
Production Industrielle de Canne à Sucre, Adoption des Variétés.**

Résumé

LA VARIÉTÉ Équatorienne ECU-01 a été homologuée en août 2007, après 10 ans de sélection clonale constituée de quatre stades et des évaluations en parcelles semi-industrielles. La variété découle de la lignée ECSP98-169, sélectionnée à partir d'un croisement entre SP81-6215 × SP80-1816 effectué à COPERSUCAR (CTC) au Brésil. Durant le processus de sélection, des évaluations

ont été effectuées sur la teneur en saccharose, le rendement en canne, la résistance au charbon (*Ustilago scitaminea*), la mosaïque (ScMV) et la rouille brune (*Puccinia melanocephala*). De plus, une approche participative avec les techniciens d'usine a été adoptée afin de permettre une meilleure évaluation de son potentiel industriel. Les rendements moyens de la variété étaient: 98 t/ha en cannes (TCH), 9.1 t/ha en sucre (TSH) et elle avait une teneur en fibre de 13.1% lors des évaluations au stade IV dans six sites en vierge et en deux repousses. Ces valeurs étaient supérieures à la Ragnar (80 TCH et 7.2 TSH), la variété principale cultivée en Équateur. Dans les parcelles industrielles à la sucrerie de San Carlos, le rendement en sucre de ECU-01 était en moyenne de 2.1 TSH supérieure à celui de Ragnar pendant la période 2008–2009. Une année après son homologation, en 2008, les trois sucreries principales en Équateur ont enregistré une superficie de plus de 1500 ha plantée en ECU-01, et en 2009 les mêmes sucreries en ont cultivée 2620 ha. Les résultats des champs industriels pendant la saison 2008 ont démontré que ECU-01 était supérieure à Ragnar, CC85-92, CR74-250, B7678, C10571-73 et C87-51.

PRODUCCIÓN COMERCIAL Y RÁPIDA ADOPCIÓN DE LA VARIEDAD ECU-01 EN ECUADOR

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**PALABRAS CLAVE: Variedades de Caña de Azúcar,
Producción Comercial de Caña, Adopción de Variedades.**

Resumen

LA VARIEDAD ecuatoriana de caña de azúcar (ECU-01) fue liberada en agosto de 2007, luego de un proceso de selección clonal a través de cuatro estados de selección y parcelas semicomerciales, con una duración de 10 años. Esta variedad fue derivada del clon ECSP98-169 proveniente del cruzamiento entre SP81-6215 × SP801816 realizado por COPERSUCAR (hoy CTC) de Brasil. Durante el proceso de selección se realizaron evaluaciones principalmente de contenido azucarero, producción de caña, resistencia a Carbón (*Ustilago Scitaminea*), Mosaico (ScMV) y Roya (*Puccinia melanocephala*). Además, se realizaron evaluaciones participativas en la selección de clones, con el apoyo de técnicos de los ingenios, que permitieron una selección más efectiva. Esta variedad presentó promedios de producción de caña por hectárea (TCH) de 98 toneladas, con una producción de azúcar promedio de 9.1 toneladas por hectárea (TAH), y un promedio de fibra de 13.1%, en evaluaciones en Estado IV en seis localidades y durante tres cortes; superando a la variedad Ragnar, que es la variedad con la mayor área sembrada (66 %), que mostró promedios de 80 TCH y 7.2 TAH. En canteros comerciales del Ingenio San Carlos, en caña planta y primera soca superó con 2.1 TSH a Ragnar en el 2008–2009. Un año después de la liberación de la variedad ECU-01 (2008), los tres ingenios mas grandes del Ecuador registraron una superficie sembrada de 1500 hectáreas, y en el año 2009 alcanzó las 2620 ha. Los primeros resultados a nivel comercial obtenidos en la zafra 2008, indican que la nueva variedad mantiene su superioridad en comparación a la variedad Ragnar, CC85-92, CR74-250, B7678, C10571-73 y C87-51.