SUGARCANE PRODUCTION ENVIRONMENTS

By

J.L. DONZELLI, A.C. JOAQUIM and I.F. BELLINASO

Copersucar Technology Center, POBox 162, Piracicaba/SP Brasil 13400-970
donzelli@copersucar.com.br

KEYWORDS: Cultivars, Recommendation, Production Environments, Soil Type.

Abstract

A SUGARCANE production environment may be defined as a part of the landscape where the soil and weather supply plants with similar conditions for growth, so that cultivars can express their genetic potential under a standard agricultural practice. Thus, different soil types such as a Euthropherric Red Latosol, clay texture and a Haplic Nitosol, clay texture belong to the same Production Environment. This flexibility allows the breeding program to release sugarcane cultivars to a defined Production Environment with similar weather and soil characteristics. This technique enables the planting of different sugarcane cultivars in specific sites for which they are adapted.

Introduction

The Copersucar Technology Center (CTC), through its Sugarcane Breeding Program, has been systematically introducing new technologies for breeding and selecting better cultivars. In this context, the selection of clones adapted to a wide range of soil and weather conditions, or production environments, has been a priority.

A sugarcane production environment may be defined as a part of the landscape where the soil and weather supply plants with similar conditions for growth, so that cultivars can express their genetic potential under a standard agricultural practice (Copersucar, 2003; Joaquim et al., 1994; Joaquim et al., 1997).

Methodology

Since 1991, sugarcane yields (t cane/ha and t sucrose/ha) have been obtained on more than 50 soil types at Copersucar member mills, from fields harvested throughout the harvest season. These soils were grouped into five yield ranges according to their potential for sugarcane production.

This enabled the definition of Sugarcane Production Environments. The yields in tonnes cane per hectare (TCH) and tonnes Pol per hectare (TPH) were obtained as an average of four harvests for each crop.

Results

From an analysis of the data bank, the concept of Sugarcane Production Environments was created (Table 1). Figure 1 shows the average of four harvests in tonnes cane per hectare (TCH) (1) and tonnes sucrose per hectare (TSH) (2) for the five Sugarcane Production Environments (A, B, C, D and E).
Table 1—Yield capacity of five production environments.

<table>
<thead>
<tr>
<th>Production environments</th>
<th>Yield potential</th>
<th>TCH (t cane/ha) (Avg. 4 cuts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>High</td>
<td>TCH &gt; 95</td>
</tr>
<tr>
<td>B</td>
<td>Medium/High</td>
<td>90 &lt; TCH &lt; 95</td>
</tr>
<tr>
<td>C</td>
<td>Medium</td>
<td>85 &lt; TCH &lt; 90</td>
</tr>
<tr>
<td>D</td>
<td>Medium/Low</td>
<td>80 &lt; TCH &lt; 85</td>
</tr>
<tr>
<td>E</td>
<td>Low</td>
<td>TCH &lt; 80</td>
</tr>
</tbody>
</table>

Environment A is classified as a having high potential for sugarcane production. Examples of soils that belong to this environment are: Eutropherric Red Latosol, clay texture (LR-1) and a Haplic Nitosol, clay texture (PVA-1) (Figure 2) (EMBRAPA, 1999; Joaquim et al., 1994; Barbieri et al., 1984).

These soils have different parent material, and basic physical and morphological differences are found in these soils.

Despite these differences, when sugarcane is submitted to similar conditions of weather and agricultural management, yields are above a production range of 95 t/ha (or approximately 14.0 t sucrose/ha).

In terms of occupied area for the 450 000 ha surveyed, Environment A represents only 6%, B 38%, C 29%, D 17% and E 10% (Table 2). This means that, for Copersucar member mills, 56% of their land has medium to low production potential, and agricultural research should be driven to find ways to increase the productivity.

Fig. 1—Average productivity of sugarcane in five production environments in t cane/ha (1) and t sucrose/ha (2).

Fig. 2—Eutropherric Red Latosol (1) and Haplic Nitosol (2).
Table 2—Percentage (%) of occupation of the five sugarcane production environments in the total area surveyed.

<table>
<thead>
<tr>
<th>Production environments</th>
<th>Area (%)</th>
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<tbody>
<tr>
<td>A</td>
<td>6</td>
</tr>
<tr>
<td>B</td>
<td>38</td>
</tr>
<tr>
<td>C</td>
<td>29</td>
</tr>
<tr>
<td>D</td>
<td>17</td>
</tr>
<tr>
<td>E</td>
<td>10</td>
</tr>
</tbody>
</table>

Conclusion

Since 1994, the Soils Management Group of the Copersucar Technology Center has been advising the planting of cultivars based on the concept of Sugarcane Production Environments (Table 3) (Joaquim et al., 1994; Joaquim et al., 1997).

Table 3—Cultivar allocation using the Sugarcane Production Environments concept.

Since the definition of Sugarcane Production Environments, all final trials of Copersucar’s Breeding Program have been laid down based on this concept.

The new cultivars are tested in three groups as follows: 1) Trials in environments of high and medium to high potential (Environments A and B); 2) Trials in environments of intermediate potential (Environment C); and 3) Trials in environments of low potential (Environments D and E) (Copersucar, 2003).

REFERENCES


LES ENVIRONNEMENTS DE LA PRODUCTION CANNIÈRE

J.L. DONZELLI, A.C. JOAQUIM et I.F. BELLINASO
Copersucar Technology Center, POBox 162, Piracicaba/SP Brazil 13400-970
donzelli@copersucar.com.br

MOTS CLÉS: Variétés, Recommandations, Environnements de Production, Type de Sol.

Résumé

Un environnement de production de canne à sucre peut être défini comme étant une partie du paysage où le sol et le climat fournissent à la plante des conditions de croissance similaires, permettant aux clones d’exprimer leur potentiel génétique avec les pratiques culturales courantes. Ainsi, différents types de sols tels que le Red Latosol Euthropherric, à texture argileuse et le Haplic Nitosol, de texture similaire, appartiennent au même milieu de production. Grâce à cette flexibilité, le programme de sélection est à même de produire pour l’homologation des variétés de canne à sucre pour une exploitation dans un environnement de production défini, où les caractéristiques de climat et de sol sont similaires. Cette technique permet la culture de différentes variétés de canne dans les environnements spécifiques auxquels elles sont adaptées.

AMBIENTES DE PRODUCCIÓN DE LA CAÑA DE AZÚCAR

J.L. DONZELLI, A.C. JOAQUIM y I.F. BELLINASO
*Copersucar Technology Center, P.O.Box 162, Piracicaba/SP Brasil 13400-970.
DONZELLI@COPERSUCAR.COM.BR

PALABRAS CLAVES: Cultivares, Recomendación, Ambientes de Producción, Tipo del Suelo.

Resumen

El ambiente de producción de la caña de azúcar se puede definir como parte de un paisaje donde el suelo y el clima proveen a las plantas de condiciones similares para su crecimiento, de modo que los cultivares pueden expresar todo su potencial genético bajo un estándar de prácticas agrícolas. Así, diferentes tipos de suelo tales como Latosoles rojo Euthropherric, de textura arcillosa y un Nitosol Haplic, de textura arcillosa pertenecen al mismo ambiente de producción. Esta flexibilidad permite que el programa de mejoramiento entregue cultivares de caña de azúcar para ambientes de producción específicos con características similares de clima y suelo. Esta técnica plantea la posibilidad de sembrar distintos cultivares de caña de azúcar en sitios específicos para los cuales ellos se han adaptado.