PERMANENT FURROWS AS AN OPTION OF MINIMUM TILLERING FOR SUGARCANE

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ABSTRACT

The sugarcane planting process in wide base at 1.70 m spacing permits soil preparation only in the strip occupied by ratoon line when reforming the sugarcane area. When furrows are reopened in the same place as previous furrowing preceded by the destruction of ratoons and subsoiling operations, the culture assumes the characteristics of plantation in permanent furrows. Reductions of costs with field operations besides cultural remains and fertilizer profits, is advantageous to the new formed culture.

INTRODUCTION

The sugarcane planting through wide base furrowing method (Fernandes et al) with spacing of 1.80 m measured in the center of furrows, permits the traffic of transport vehicle wheels and agricultural machines only in the interlines, therefore avoiding, at least minimizing, the soil compaction in the strip occupied by ratoons lines.

Still according to considerations by Fernandes², planting in 1.70 m spacing in the same furrowing system permits the joint operations of mechanical harvest and transport of sugarcane by vehicles directly from the cultural area.

This spacing may be narrow for double-wheeled vehicles during planting due to the 90-100 cm furrow opening. However, sugarcane rows in the fifth or sixth harvest are not wider than 50-55 cm.

The lateral subsoiling operations such as tillering of ratoons and deep applications of fertilizer permit the preservation of a soil strip with 70-80 cm width under adequate conditions for better development of the root system. Consequently, soil compaction will not be greatly responsible to yield reductions in successive sugarcane harvests. As such the number of harvests in each planting cycle can be increased to 5 or 6, compared with the conventional 3 or 4 harvests.

On the other hand, the well differentiated and alternated strips representing rows and interrows of ratoons, induce the possibility of reconstruction only in those strips occupied by root system, when the area is reformed.
Thus, interrows that received compaction by vehicle in successive harvests remain under those physical conditions during subsequent agricultural cycles. At same time, the traffic control and minimum tillering for sugarcane is obtained.

Sugarcane planting at 1.70 m spacing results in 782 m less of furrows per hectare. Therefore, almost one kilometer is not run over by machines, implements and transport vehicles in each cultivated hectare compared with furrowing at 1.50 m distance.

EXPERIMENTAL PROCEDURE

Sugarcane planting in wide base furrows

Elimination of ratoons was made through traditional process, using one or two heavy harrow operations or one superficial plowing, followed by slight harrowings.

Corrective application, if needed was made over the area before the elimination of ratoons. Another option was to apply deeply through additional device.

Soil preparation

After cleaning the area of the remaining ratoon, all of the other activities follow the recommendations for wide base furrows, beginning with soil preparation. The plowing, subsoiling or harrowing operations, are substituted for only one subsoiling operation.

The fundamental difference lies in the fact that subsoiler implement operate in strips not more than 70-80 cm wide and 1.70 m apart, measured from the centers.

For each strip three rods in the subsoiler were used. If small flies were applied in the lower extremity of only two rod, 60 cm was enough for each strip.

Furrowing

Wide base furrows, 30 cm interval opening and 1.70 m spacing were used exactly on the subsoiled strip.

Fig. 1 shows an implement for wide base furrows. Only simple alterations in common implement are sufficient.

As can be observed, three aspects are important: a) subsoiler flies are made and adapted following a horizontal line in its inferior plane from the beak to the posterior extremity. This will prevent the earth from penetrating into
FIGURE 1. Top and lateral views of wide base furrower.

the furrow during the work; b) for a more efficient work, the soil must be prepared until a profile below the inferior level is reached by the implement; and c) a small fly attached in the inferior part of the furrower rod 32 cm wide completes soil decompaction before furrowing.

Planting and fertilizer application were done simultaneously with furrowing.
Planting

The advantages of conventional furrowing and spacing method begins with distribution of sugarcane seeds in the furrows. Vehicles pass only in interlines. Machine with implement covering the stalk and applying herbicides does not pass inside the furrows.

Cultural tillering of ratoons

Larger producers who prefer to apply fertilizers through machines to achieve a higher operational work do not depend on making it before the beginning of the bridging. The vehicle does not damage the growing plants when passing in the interrows.

Subsoiling operations recommended for sugarcane planting in single furrows in both sides of ratoon are also convenient here to provide better physical conditions of soil near sugarcane rows. During this tillering operation, a deep fertilizer application is possible.

Unlike the agricultural practices in conventional planting, decompaition in interlines of wide base planting does not occur, owing to two main reasons: a) the rain due to the difficulty in penetrating the compact area of interrows flows to the rows, where the fertilizers and most of root system are; b) during the harvest time, the transport operation is facilitated by the hard soil especially under rainy condition.

Harvest

For mechanized harvesting of cane, the preconceived spacing presents a perfect synchronisation between harvester and transport vehicle, both riding in the inter-lines, (Fig. 2).

Sugarcane Replanting in Wide Base

In spite of the advantage presented by wide base furrows, several operations will have to be executed in the period of replanting, following the agricultural characteristics of sugarcane, such as ratoon elimination soil corrective application, restoring better soil physical condition, furrowing and planting. However, it is convenient to emphasize that these operations will be made only in the strips 70-80 cm wide, where the first furrowing was and will be processed as follows:

1) Destruction of ratoons

Using minimum plowing or heavy harrowing to eliminate remaining ratoons would eliminate the marks of rows after sugarcane harvest. Then this work will be substituted by one of the following operations:

a) with herbicide application in adequate dosages and not resulting in
FIGURE 2: Schematic presentation of transport vehicle and harvester positions in the single and wide furlows. Base furrows in the fifth harvester.
residual effects in soil, therefore, a maximum budding of ratoons is expected;

b) using modified rotavator (Fernandes²).

Any of both modification can be executed before or after operations of items 2 and 3.

2) Lime application

Similar to the process used in the last planting, the lime application can be distributed to total area or in depth during the subsoiling operation

3) Subsoiling, furrowing, planting and cultural tillerings

These operations will follow the same methodology of previous planting. Therefore new wide base furrows will have adequate physical conditions through subsoiling in same marked lines of sugarcane, which are still visible.

4) Harvest

For sugarcane harvest and transport operations in all cycles of each replanting period, the traffic of vehicles and agricultural machines in the area with sugarcane will be directed only to the interlines.

DISCUSSIONS AND CONCLUSION

Despite being an operational technology that requires many planting cycle for an adequate interpretation of the several agricultural aspects involved, the present considerations permit to conclude that there is a series of advantages over sugarcane planting through the traditional method. The localization of furrows in the same strip of furrowing of previous planting offers the opportunity of better profit from cultural remains, such as organic and fertilizer residual. The rain or water from sprinkling irrigation, due to the difficulty of infiltration in compacted interlines, will flow to the row where the greater proportion of the root system can be found. Characterized by intercalated stripes concerning compaction aspect, this process will represent an option to the planting in declivous areas to control the erosion. The traffic of vehicles and agricultural machines only in interlines eliminates or minimizes the damage to the ratoons due to the absence of soil compaction in sugarcane rows and represent the factor of fundamental importance as field technology.

Operational aspects

Destruction of ratoon through herbicides or rotavator modified to work only in strips of 60-70 cm will depend on economic factors or operational efficiency. The planting method in wide base furrows does not require introduction of new agricultural implements, but only little modifications in conventional
Minimum tillering aspects

The work of the rotavator in strips 60-70 cm wide eliminating ratoons will contribute to the incorporation, through cultural remains and applied lime. Several pre-planting operations carried through traditional implements (subsoiling in total area, plowing and harrowing) will be substituted by only one subsoiling operation, the implement operating in a 70-80 cm wide strip, corresponding to the row occupied by the sugarcane. The recommended cultural tillerings for ratoons, such as deep fertilizing in both sides of sugarcane lines and the tillering of interlines, have already been executed through only one operation; simultaneous application of herbicides is being studied when aerial application proves to be impossible.

REFERENCES


SURCOS PERMANENTES COMO OPCION DE PROFUNDIDAD MINIMA PARA SIEMBRA DE CAÑA DE AZUCAR

NOTA PREVIA

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RESUMEN

Al reformar un area, el proceso de siembra de caña de azucar en base ancha, a intervalos de 1.70 m permite la preparacion del terreno en la hilera ocupada por retoños unicamente. Al reabrir Sucros previos, precedido por la destrucion de retoños y subsolacion, el cultivo asume caracteristicas de siembra en sucros permanentes. Las ventajas de los nuevos cultivos seran la reduccion de costo en
operación del campo, además de cultivos permanentes y beneficiosos para la fertilización.