

# THE ADAPTATION OF PROGRAMME PLANNING TO SUGAR FARMS AND ESTATES IN THE SOUTH AFRICAN SUGAR INDUSTRY

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## Abstract

It is generally accepted that the need for programme planning in the South African sugar industry is a vital one. The nature of the crop, with predetermined periods for harvesting and crushing, facilitates the introduction of planning. With advances in the purely technological aspects of cane production and the gradual move away from a labour intensive industry to increased mechanization, the design of management must change if full use is to be made of these advances in technology, and the resources now available to the grower. Two systems of programme planning are discussed, both using visual aids as a means of assessing requirements and evaluating progress.

## SYSTEM I

### Introduction

This method was originally designed by the Extension Service of the South African Sugar Association Experiment Station, and it endeavours to encourage the cane grower to examine past performance, take meaningful decisions in preparing his programme during the so called off-season and attempt to cover all known factors which will allow him to achieve his objectives. The necessary operations will be arranged throughout the harvesting season to allow for the best use of all the resources available.

It is assumed that the objective will be to increase profitability, through increasing yields by the most efficient and economic methods and by aiming at the climatic potential for the area.

### Method

In practice this management programme will involve the completion of the following steps:

- (a) collecting and recording all relevant information and achievement in the form of *field records*,
- (b) using these field records in drawing up a *cutting and ploughout programme*, which will be the basis for
- (c) the completion of an *overall operations programme*;
- (d) an *analysis of expected resource requirements* to carry out the above programme and,
- (e) finally, recording *the actual performance* in comparison with the planned operations on the overall operations programme.

#### A. Field records

The collection and recording of field histories are basic necessities in the drawing up of the programme and should include:

Field facts: soil type, area, average slope, variety, etc.

Field history: planting and harvesting dates and performance in terms of yield/ha, yield/ha/month, expressed as mass of cane and of sucrose, and yield in terms of rainfall efficiency, i.e. tons/ha/100 mm rainfall (and/or irrigation).

Standards of performance: the labour requirements for planting, weeding, draining, etc, in man days/ha, and the machine requirements for ploughing, cultivating, etc, in tractor hrs/ha.

Other information: occurrence of frost, waterlogging, erosion, etc.

Up-to-date field records will enable the first crop yield estimate to be prepared before the opening of the harvesting season, and will be essential in the preparation of the *cutting and ploughout programme*.

#### B. Cutting and ploughout programme (Appendix 1)

Once the first estimate has been completed, a *daily rateable delivery* is worked out by dividing the total estimated yield by the expected number of crushing days (usually 200 to 210). Now an *order of harvest* of the fields to be cut is decided upon, considering such factors as ploughout time, age of cane, varieties, occurrence of frost, etc. This having been done, a more accurate *final estimated yield* is calculated by using previous yield performance figures, together with a growth factor, which is a measure of how the current crop is rated in comparison with that previously cut from the field. The expected age at harvest and the area of the field concerned are also used in this calculation. The number of weeks required for harvesting each field can also be calculated. A critical examination of fields and a reference to farm records will be essential when drawing up this programme, and will ensure that all harvestable fields are taken into account and are cut at the optimum time, and that the estimate is an accurate one.

The cutting and ploughout programme forms the basis for the next step.

#### C. The overall operations programme (Appendix 2)

The operation programme is presented in the form of a large, colourful and relatively simple visual aid, divided into the months and weeks of the year. Each operation, including harvesting, is depicted by a colour as reference and, by means of standards formulated by recording on the field record cards, the time required for the completion of any particular operation can be indicated on the programme.

Particular attention will be focussed on the ploughout fields, as it is these fields on which operations will be concentrated, e.g. drainage, conservation works, elimination of old crop, planting, etc.

It is not unlikely that a provisional operations programme will be necessary to avoid clashes in operations and to ensure the optimum use of resources, before a final plan is completed. This will be followed by the:

#### D. Analysis of expected resource requirements (Appendix 3)

Reference to the final operations programme will permit the listing of all the resources required to complete the planned programme, in terms of material, fertilizer and other chemicals, labour, tractor equipment and finance. Emphasis will again have to be placed on the standards of performance needed to complete each operation.

It will be appreciated that in the completion of the analysis of resource requirements, an estimation of total financial and material needs can be calculated and, if necessary, adjusted to fit available resources.

#### E. The actual performance

The actual performance in the field is recorded on the same form as the overall operations programme, the operations actually carried out each month being entered, in line, under those planned for each field. If this shows that there is an appreciable discrepancy between the planned and the actual operations, then the subsequent part of the programme should be readjusted to take care of these discrepancies. In any case, every effort must be made to keep as close as possible to the original overall operations programme.

## SYSTEM II

### Operations planning: the pegboard system

#### Introduction

This system is being carried out in Natal by the Paddock section of the Umzimkulu Sugar Company which has 1 025 ha under cane and harvests approximately 45 000 tons of cane annually. Soils are derived from Table Mountain Sandstone, being mainly of the Cartref Series, and the topography varies from undulating to flat.

A move away from labour intensive operations has been adopted and the following operations are now mechanised:

- (a) planting
- (b) fertilization
- (c) cultivation
- (d) weed control
- (e) cane loading.

The section is being field-planned for optimum mechanical efficiency. The objectives of the programme plan are primarily to reduce labour to a minimum in view of increasing mechanization, to avoid where possible periods of excessive labour demand during particular times of the year, and to permit all operations to be carried out at the optimum time.

#### Method

##### A. The annual programme

Operations are planned to cover the full financial year, from the 1st April until the 31st March. During the month of December, in the previous financial year, *provisional estimate and cutting and replanting programmes* for the forthcoming year are made, using all available field histories and records. Between December and the end of February an examination is made of all the fields, particularly those included in the provisional cutting programme (which are examined in greater detail), and any operations required within the fields during the coming season are recorded. Junior and field staff are encouraged to report on their observations. *A final estimate, and cutting and ploughout programmes* are completed in March, with the necessary adjustments to the provisional programme. This permits the planning of the operations required on each field to commence with the aid of the *operations pegboard*. (Appendix 4).

The operations pegboard is made up in the following way:

- (a) All fields are recorded down the left side of the board directly opposite a horizontal line of peg holes, with area and ratoon number as in the cutting programme previously prepared.
- (b) The remainder of the board is divided, from left to right, into the months of the year, each perpendicular line of peg holes representing the weeks of that particular month.
- (c) Each operation planned for the coming season is given an appropriate colour, with pegs coloured accordingly. The code is shown at the bottom of the pegboard.

The operations are recorded in the following way:

- (1) The harvesting operation for the season is plotted, making use of the *estimate and daily rateable delivery* to calculate the time of completion of each field.
- (2) This is followed by plotting the ploughout and planting operations, using standards of performance previously established.
- (3) All consequent operations, such as windrowing, cultivating, fertilizing, are then plotted according to set standards except where it is known that additional time will be required to complete particular operations, e.g. extra drainage, bad weeds, etc. Adjustments are made after re-examination and assessment, spreading the work programme where necessary and considering the purchase of additional equipment if required. On completion of the operational pegboard, work sheets No. 1 (Appendix 5) and 2 (Appendix 6) are prepared, No. 1 being a detailed programme of individual field operations, showing total units of labour required and necessary materials such as fertilizer, seedcane, etc, and No. 2 a *monthly* labour forecast for each field.

Comparison of monthly labour requirements with estimated availability and performance may necessitate adjustment to the operations pegboard. After final adjustments to the pegboard, this programme is recorded on the operations schedule provided by the South African Sugar Association Experiment Station (Appendix 2) which is used simply as a record of the annual plan in its original form.

The Section's annual budget is prepared from Worksheets Nos. 1 and 2 (Appendices 5 and 6).

##### B. The monthly programme

During each month, as the operations are completed, the appropriate pegs are removed from the pegboard. At the end of each month an assessment of progress is made and the pegboard is adjusted accordingly, taking into account such factors as changes in the rateable delivery of cane.

Actual work performance in each field is recorded in *field records*, which permit standards of performance to be adjusted or verified. The actual operations performed each month are recorded against the original planned operations on the operations schedule (Appendix 2). This is done at each month end during the year, and serves as a quick visual comparison of operations actually performed against operations planned. Performance is also measured each month by comparing actual costs and standards with planned costs and standards.

#### Summary

In both the systems discussed the cutting and ploughout programmes are the basic requirements in the preparation of the operations programme. In order to prepare a satisfactory cutting and ploughout programme, adequate field records are





**Appendix 4**  
**OPERATIONS PLANNING**  
**(PEGBOARD SYSTEM)**

Field No.	Area ha	Plant or Ratoon	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
201			....	....	....	....	....							
202			....	....	....	....	....							
203			....	....	....	....	....							
204			....	....	....	....	....							
205														
206														
207														
208														
209														
210														
211														
212														

Harvesting: Trash: Fertilizer: Ploughing: Land preparation and layout including Draining: Weeding: Herbicide: Roguing: Firebreaks: Planting: Scarifying

**Appendix 5**

**UMZIMKULU SUGAR COMPANY LIMITED**  
**FIELD PROGRAMME**

**STORE DETAILS**

Year — 1st April, 19..... to 31st March 19.....  
Section..... Field No..... Total Hectares.....  
Date Planted..... Plant / Ratoon.....  
Remarks.....

*Fertilizer:* (type, tons per hectare = total Tons)

*Plant Cane:* Tons  
Planting Application:.....

Top Dressing: .....

**Labour Requirements — Man Days**

Land Preparation		Weed Control, etc	
<i>Plant Cane</i> ..... Ha	<i>Plant Cane</i> ..... Ha	<i>Ratoon Cane</i> ..... Ha	
Clearing: .....	Weeding: .....	Trash Management: .....	
Ploughing: .....	Chemicals: .....	Hand Weeding: .....	
Surveying: .....	Scarifying: .....	Scarifying: .....	
Cutting and Treating Seed: .....	Mules / Tractor: .....	(Mules / Tractor): .....	
Planting: .....		Chemicals: .....	
Crops: .....		<i>Other:</i>	
Draining: .....		Top Dressing: .....	
Chemicals: .....		Draining: .....	
Fertilizer: .....			
Other: .....			
<b>Total Man Days</b>	<b>Total Man Days</b>	<b>Total Man Days</b>	

*Ratoon:*  
Top Dressing: .....

*Chemicals:* (type, litre/kg per hectare = Total requirements)

*Plant Cane:* Litres/Kg  
Pre-emergent: .....

*Ratoon Cane:*  
Pre-emergent: .....

*Other Items:* Tons

Harvesting..... Ha — Tons per Ha..... = .....Tons Cane  
Tons per Man..... = .....Men plus Carriers..... = .....  
Total Man Days

Seed Cane Required: .....

\* Indicate source of supply, if own Company state  
Field No..... and Section.....

(Note — Exclude Headman and Water Bearers)

**Appendix 6**

**Labour requirement forecast**

FIELD No.:

Month	Land Prep.	Weed Control		Harvesting
		Plant Cane	Ratoon Cane	
April				
May				
June				
July				
August				
September				
October				
November				
December				
January				
February				
March				
Total				