PRODUCTIVITY IMPROVEMENT IN PLANTING USING ACTIVITY SAMPLING AND ANALYSIS

By O. P. LANDREY

C. G. Smith Sugar Limited, Sezela

Abstract

By analysing the time taken to complete each activity of the planting operation the reasons for poor productivity were exposed. These were, duplication of effort, idle time, unnecessary fetching and carrying as well as delays due to poor scheduling of activities. The reorganisation of the labour force that then followed, allowed economies to be made in factors other than the planting operation itself, namely in transport and in nursery weed control. The advantages that resulted from activity analysis were a 15,8% improvement in labour productivity, a reduction in the time taken to complete the task and an awareness of the higher productivity that could be achieved by using this technique in other facets of cane growing.

Introduction

The need to investigate planting methods at Sezela was indicated because procedures, standards and outputs on the estate vary considerably. Tasking is done on both a group and an individual basis and tasks vary from 231 to 428 metres of cane row planted per man-day and completion times vary from 12h30 to 17h00.

Specific resource productivity (SRP) in the planting operation was 26% lower in the 1982/83 season than in the 1981/82 season. In terms of hectares planted per 100 man-days productivity in 1982/83 was 3,29 and in 1981/2 it was 4,44.

In order to determine where productivity could be improved, it was necessary to analyse the planting operation in terms of activities. The separate activities were stripping the seedcane, chopping into setts, dipping the setts, filling bags, carrying bags into the field, cleaning furrows, fertilizing, planting, covering and resting. An analysis of the percentage of time spent on each activity indicated where improvement could be made.

Methods

For each activity in the planting operation records were made of:

- labour used, in man-days
- materials used, as rate per hectare of seedcane, fertilizer and filtercake
- tools and equipment used
- individual task in terms of description of task, rate of work, and daily target.

Comments and descriptions were also recorded as were any differences found between the planting of seedbeds and the planting of commercial fields.

Throughout the investigation notes were made of all cases of duplication of effort, idle time, unnecessary fetching and carrying, delaying of one activity by non-completion of the previous activity, and delays caused by bad timing of activities.

The number of observations required to achieve a predetermined level of precision may be obtained using the following formula:

$$N = \frac{4\ P\ (100-P)}{L^2}$$

Where N = number of observations

P = Percentage of total time occupied by the activity

L = Limits of accuracy expressed as a percentage

To determine P a number of preliminary surveys of the operation have to be done beforehand.

The object was to develop an efficient planting technique by selecting the best methods currently in use and adding suggestions for their improvement.

The current planting operation on the estate varied widely, as detailed in Table 1.

The Humberdale section was chosen for the detailed study of the planting operation. To facilitate recording, the activities were coded and each labourer had a number attached to his back. Observations were made every ten minutes throughout the working day. The results are shown in Figure 1.

TABLE 1

Analysis of current planting operations: July/August 1983

Section	Man-days				Man-days per hectare	Type of task	Hectares planted per day		Completion time
	Seed preparation	Planting	Fertilizing	Gapping			Target	Actual	
Sezela	406	504	4	—	34,5	Individual	1,25	1,10	14h30
Humberdale	264	913	56	83	24,7	"	0,99	1,15	17h00
Esperanza	290	1 073	70	—	24,4	"	1,20	1,30	13h30
Equeefa	314	1 089	—	56	30,3	"	1,48	1,00	17h00
Beneva	325	1 560	62	27	28,9	"	1,37	1,59	14h00
Mgayi	246	321	45	—	27,7	Group	1,58	1,05	12h30
Lewisham	153	847	12	—	21,5	"	0,89	0,98	13h30
Ifafa	344	630	21	118	23,4	Individual	1,23	1,55	13h15
Percentage of total labour	23,8	70,5	2,7	2,9					

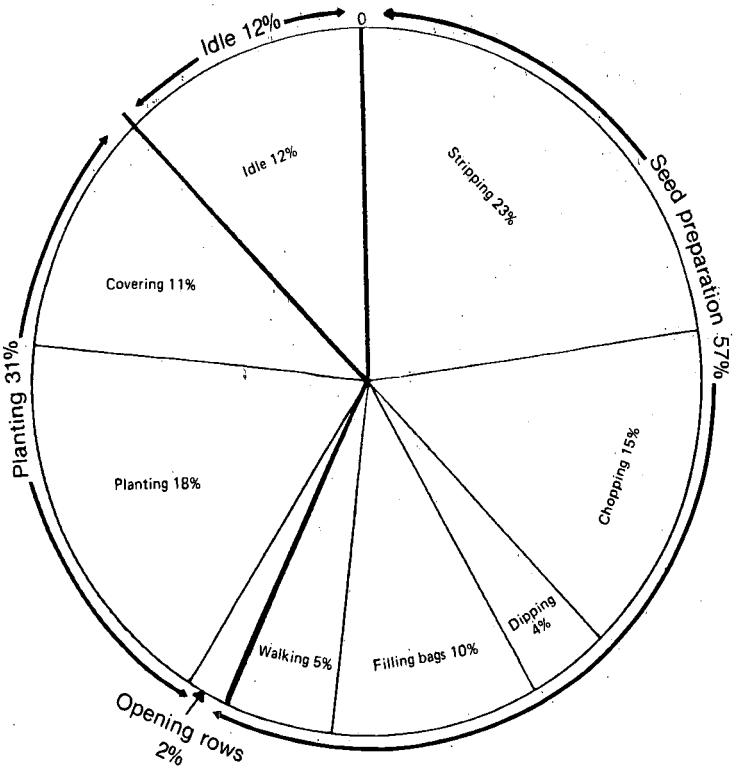

FIGURE 1 Percentage of total planting time spent on each activity

The results indicated where more detailed studies were needed of:

- pretrashing and topping in the nursery
- strategic stack positioning
- introducing smaller seedcane stacks
- separate seed preparation and planting operations
- improving effectivity of indunas
- labour organisation.

Results

Improved productivity was achieved by doing the pretrashing and topping in the nursery rather than as part of the planting operation in the field. The advantages were reduced transport requirements and elimination of the need to clear up trash after planting.

Productivity was also improved by putting the stacks of seedcane on the roads above the area to be planted, limiting stack size to 1,5 tons and by positioning the stacks half way along the road (Figure 2). These measures improved productivity by reducing walking distance between stack and planting area while the completion of seed preparation in the nursery, led to better positioning of baskets or bags of setts in the field itself, further improving efficiency.

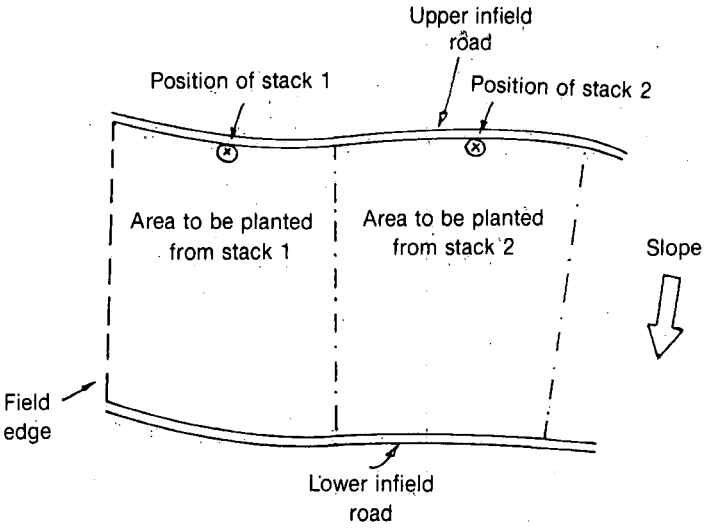

FIGURE 2 Diagram of strategic stack positioning

Implementation of these changes in the planting operation led to a reorganisation of the labour force (Table 2). This had the additional effect of improving the efficiency of indunas through a reduction in their span of control and a more specific task definition, which in turn resulted in more effective supervision and a keener interest in the job.

Table 2

Organisation and numbers of labour for the planting operation before and after activity analysis

Before analysis		After analysis	
Cutting seedcane	3	Pretrashing	3
Indunas	2	Cutting and chopping	
Rope measuring	1	into setts	3
Fertilizer	2	Dipping and loading	2
Preparing seedcane		[8 in seed nursery]	
planting and covering	18	Fertilizing	2
		Rope measuring	1
		Planting	10
		Induna	1
		[14 in the field]	
Total:	26	Total:	22

Conclusion

The reorganisation improved productivity of the planting operation on Humberdale by 15,8% and changed the completion time from 17h00 to 12h30. Applied to the planting programme on the whole estate this improvement in productivity would represent a saving of approximately 3 600 man-days.

Acknowledgements

The author is indebted to John Tudehope and Dilal Maharaj for the field observations and suggestions regarding techniques and labour organisation.