SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

ANNUAL GENERAL MEETING

30 NOVEMBER 1995

MOUNT EDGECOMBE

SOUTH AFRICAN SUGAR INDUSTRY AGRONOMISTS' ASSOCIATION

Annual Meeting 1995

Time : 08.50
Date : 30 November 1995
Venue : Conference Room, SASA Experiment Station

PROGRAMME

8.50 - 9.00	Chairman's address	
	Chairman - JP Boyce	
9.00 - 9.30	The Labour Relations Act	*D Wayne*
9.30 - 10.00	Why employ labour?	*R Stewart*
10.00 - 10.30	Do we want to be cane cutters?	*G Wiseman*
10.30 - 11.00	**T E A**	
	Chairman - TJ Murray	
11.00 - 12.30	Harvesting options for cane growers	*E Meyer*
12.30 - 2.00	**L U N C H**	
	Chairman - PET Turner	
2.00 - 2.30	Some factors to consider to reduce weed control costs	*NB Leibbrandt*
2.30 - 3.00	Cost effective fertiliser application	*M Warren*
3.00 - 3.30	Planting, labour and tractor requirements and costs	*J Penfold*

SOUTH AFRICAN SUGAR INDUSTRY AGRONOMISTS' ASSOCIATION

THE LABOUR RELATIONS BILL 1995: AN OVERVIEW

By DB Wayne

The current Labour Relations Act (LRA) was promulgated in 1956 and has been amended several times since then. It is a fairly cumbersome piece of legislation and there is no doubt that it required an extensive overhaul to make it more easily understandable by all the parties whose working relationship it sought to govern. After the election of the Government of National Unity in April 1994, attention was once again focused on the LRA and whether its provisions were appropriate and relevant for the new and future labour relations dispensation in South Africa. A Ministerial Task Team was appointed in July 1994 and given the task to draft a new Labour Relations Bill that would :

- give effect to the policy reflected in the Reconstruction and Development Programme ;
- comply with the International Labour Organisation Conventions ;
- be simple and easily understandable by all parties ;
- be certain and spell out the rights and obligations of workers, trade unions and employers ;
- promote collective bargaining in the workplace, as well as at industry level ;
- recognise organisational rights of trade unions ;
- provide simple procedures for the resolution of disputes through conciliation, mediation and arbitration ;
- provide labour costs to speedily and inexpensively determine disputes of right ;
- entrench the right to strike and lock-out, subject to reasonable limitations ;
- decriminalise labour law.

The Task Team produced a Draft Negotiating Document in Bill Form, which attracted over 280 submissions and comment. After a period of further negotiation in various forums, the Cabinet approved the Labour Relations Bill for tabling in Parliament in 1995. This took place and the Labour Relations Bill 1955, was passed during the recent Parliamentary sitting. It is envisaged that it will become effective on 1 May 1996.

Whether the Task Team has achieved the objectives set it by the Minister is a matter of opinion and the subject to much debate.

What is clear, however, is that the governance of labour relations in South Africa has entered a new era and almost all sectors of the working society are embraced by it. Some of the parties will have to be drawn kicking and screaming to the table, while others will fall over minor obstacles in their eager rush to implement the provisions of the new Act. What will be required is a cool head to examine and analyze the provisions and assess how they can be managed to encourage a healthy employer/employee relationship.

While many of the elements of the existing LRA have been retained, both employers and employees and their respective organisations and unions, will have to come to grips with the new provisions relating to consultation and participation which are prevalent in the Bill. While the exclusive right of the employer to manage the business as best as he or she thinks fit has been watered down, there has not been a complete handover of control and decision making to the workforce. The necessity to consult on certain issues and the establishment of workplace forums to consider aspects of the business, can give rise to potential conflict. This aspect is addressed through the dispute settling procedures which are set up and which encourage the resolution of disputes through the process of conciliation, mediation and arbitration, rather than through the courts. Will employers and employees adjust to this philosophy?

Collective bargaining and the right to strike (and lock-out) are concepts woven into the legislation. While some sectors are comfortable with these concepts, it is obvious that the agricultural sector in general is uncomfortable with them and that strategies will have to be developed to encompass the practical aspects as far as is possible.

The legislation is set out in a number of Chapters and Schedules and deals with :

- the application of the Act
- freedom of association
- collective bargaining and collective agreements
- strikes and lock-outs
- workplace forums
- trade unions and employers' organisations
- dispute resolution
- unfair dismissal
- general provisions

It is not possible in a paper of this nature to deal with the various aspects in great detail and what follows is merely a brief look at certain aspects of relevance.

Purpose, Application & Interpretation

The Act is intended to advance economic development, social justice, labour peace and the democratisation of the workplace by :

- giving effect to Section 27 of the Constitution ;
- giving effect to the obligations imposed by being a member of the International Labour Organisation ;
- providing a framework for collective bargaining and policy determination between employers and employees.

Members of the National Defence Force, the National Intelligence Agency and the South African Secret Service are excluded from the scope of the Act.

Freedom of Association

Every employee has a right to join a trade union and participate in its lawful activities and every employer has the right to join an employers' organisation and participate in its lawful activities. No person or employer may be discriminated against for exercising the rights conferred by the Act.

Collective Bargaining

The Act endeavours to foster constructive engagement between Labour and Management through all levels of policy determination. These changes will be felt most in the public and agricultural sectors where a bargaining culture has not been developed.

A trade union which is "sufficiently representative" of employees at a workplace may claim :

- rights of access to a workplace for the purposes of recruiting members or communicating with them, including the holding of meetings ;
- the right to require an employer to deduct trade union subscriptions from members wages ;
- the right to reasonable leave during working hours for office bearers to perform their trade union functions.

The Act makes provisions for the establishment of bargaining councils, which replace the former industrial councils. Councils are voluntary bodies whose primary function is to conclude and enforce collective agreements. There is provision for extension of collective agreements to non-parties of the council, as well as for an exemption from a collective

agreement.

The Act also makes provision for agency shop agreements which requires any employer to deduct an agency fee from non-union members and pay it over to the union. This agreement is not obligatory and must be negotiated between the parties concerned. There are limitations as to what the funds collected by the union in this way may be used for. An employer is obliged to bargain with a trade union and is required to disclose to the union "all relevant information that will allow the representative trade union to engage effectively in consultation or collective bargaining."
Certain classes of information are, however, not subject to disclosure.

Strikes & Lock-Outs

If, after following the laid down procedure, a dispute is not resolved, every employee has the right to strike and every employer has recourse to lock-out. The right to strike or lock-out is limited if the terms of a collective agreement prohibit this, or the issue in dispute can be referred to arbitration or to the Labour Court, or the person is engaged in an essential service or maintenance service.

While an employer is not obliged to remunerate an employee during a protected strike or lock-out, if the employee receives remuneration in kind from the employer, the employer may not, if requested by the employee, discontinue such payment in kind. The employer may recover the value of the payment in kind through civil proceedings in the Labour Court after the strike.

An essential service is defined as those of which the interruption of the service will endanger the life, personal safety or health of the whole or any part of the population. An Essential Services Committee appointed by the Minister will determine whether a service is essential or not. A maintenance service is a service in which an interruption has the effect of the material physical destruction of any working area. As a way of balancing the right to continue with a maintenance service during a strike, an employer may not employ replacement labour in the rest of the business during the strike.

The right to picket is authorised by the Act.

The Act also provides that after following a certain procedure, a registered trade union may call for protest action to promote or defend the socio-economic interests of workers.

The Act also makes provision for sympathy or secondary strikes and sets out procedural and substantive requirements for the holding of a lawful secondary strike. There should be a balance between the effect of a secondary strike and the primary strike and an employer has a right of recourse to the Labour Court if the procedures and requirements for a secondary strike are not met by the striking employees.

Workplace Forums

The Act provides for the establishment of a workplace forum in any workplace in which an employer employs more than 100 employees. The procedure for application for the establishment of the workplace forum and the consultation required is set out in the Act. The Workplace is defined as "the place or places where the employees of an employer work." The independence of each of an employer's operations will determine if there is more than one workplace.

Three kinds of meetings are envisaged for the workplace forum. Firstly, regular meetings of the forum itself. Secondly, regular meetings between the forum and the employer. Thirdly, regular meetings between members of the forum of the employees.

Subject to the provisions of any collective agreement, the employer must consult with the workplace forum before it implements any proposals in relation to :

- restructuring the workplace, including the introduction of new technology and new work methods ;
- changes in the organisation of work ;
- partial or total plant closures ;
- mergers and transfers of ownership in so far as they have an impact on the employees ;
- the dismissal of employees for reasons based on operational requirements ;
- exemptions from any collective agreement or any law ;
- job grading ;
- criteria for merit increases or the payment of discretionary bonuses ;
- education and training ;
- product development plans ;
- export promotion.

"Consultation" means that the employer must table the proposal with the workplace forum and disclose all relevant information. The forum must have the opportunity to make representations and to make alternative proposals. The employer must consider and respond to these representations and, if it does not agree with them, must state the reasons for this. The employer must also consult with the workplace forum on matters requiring joint decision making . These are :

- Disciplinary codes and procedures.
- Rules relating to conduct not related to work performance.
- Measures designed to protect persons from unfair discrimination.
- Changes by the employer to the rules regulating social benefit schemes.

Trade Unions and Employers' Organisation

Chapter VI provides for the registration and regulation of trade unions and employers' organisations, the regulation of federations of such organisations and for the appointment of a registrar of labour relations.

Dispute Resolution

A new innovation is the establishment of the Commission for Conciliation, Mediation and Arbitration, which plays a role throughout the Act to conciliate, arbitrate or otherwise to intervene to establish structures of facilitate agreements. The Commission is an independent body and not subject to any direction or interference from the State, any political party, employers or trade unions.

The functions of the Commission are fairly wide, but, in essence, its objective is to resolve disputes between employers and employees, or facilitate their resolution. The procedures for approaching the Commission and for the performance of its functions, are set out in the Act.

The establishment of a Labour Court with the jurisdiction to consider a wide range of disputes is provided for by the Act, which also makes provision for a Labour Appeal Court.

Unfair Dismissal

The Act states that every employee has the right not to be unfairly dismissed. The meaning of "dismissal" is defined in Section 186 and Section 187 provides that certain dismissals are automatically unfair. Further, a dismissal which is not automatically unfair, is unfair if the employer fails to prove that the reason for the dismissal is fair related to the employee's conduct or capacity or is based on operational requirements and that it was effected in accordance with a fair procedure.

A Code of Good Practise for dismissals is set out in Schedule 8 of the Act. This sets out guidelines for procedures relating to dismissal. Give that dismissal is one of the major grievances which an employee raises, employers should take heed of and abide by, the guidelines provided.

The remedies of an employee who is unfairly dismissed are provided for and relate to re-instatement, re-employment or payment of compensation. An employee who is dismissed on the grounds of operational requirements (retrenched), is entitled to severance pay of at least one weeks' pay for every year of continuous service. An employee who unreasonably refuses to accept an offer of alternative employment will not be entitled to severance pay.

Equality Rights

Schedule 7 to the Act provides that it is an unfair labour practice to unfairly discriminate, either directly or indirectly, against an employee on a whole host of grounds, including race, colour, sex and religion, which are drawn in the main from Section 8 of the Constitution. For the purposes of this provision, an "employee" includes an applicant for employment.

SOUTH AFRICAN SUGAR INDUSTRY AGRONOMISTS' ASSOCIATION

WHY EMPLOY LABOUR?

By R Stewart

1) Introduction

   a) World Business Environment
   b) South African Business Leadership
   c) Labour Relations Act (LRA) in context

2) The Employment of Labour makes Business Sense and Social Sense in the South African Context

   a) Economics
   b) Sugar Industry Physical Resources
   c) Labour Requirements for Mechanisation
   d) Government Policy
   e) Flexibility

3) A New South African Paradigm

   a) South African Business Sphere (Figure 1)
   b) Individualism versus Communalism : Modes of Life (Figure 2)
   c) A New Vision
   d) The Process

4) Conclusion and Discussion

Reference

Lessem, Ronnie. 1994. "Four Worlds - The South African Business Sphere". In: Christie, Peter, Ronnie Lessem & Lovemore Mbigi (eds). *African Management : Philosophies, Concepts and Applications.* Randburg : Knowledge Resources.

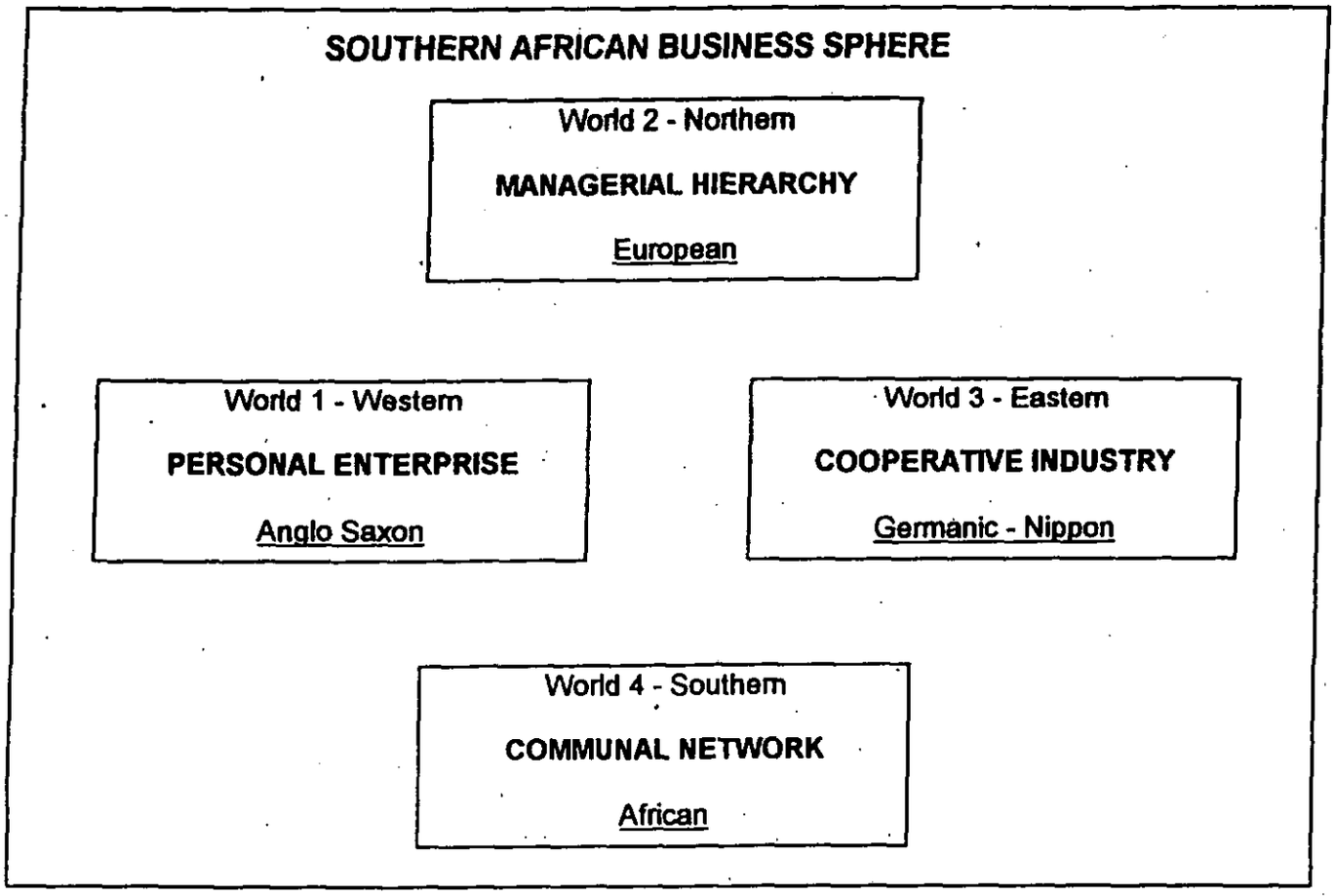

Figure 1. SOUTHERN AFRICAN BUSINESS SPHERE (Lessem, 1994:18)

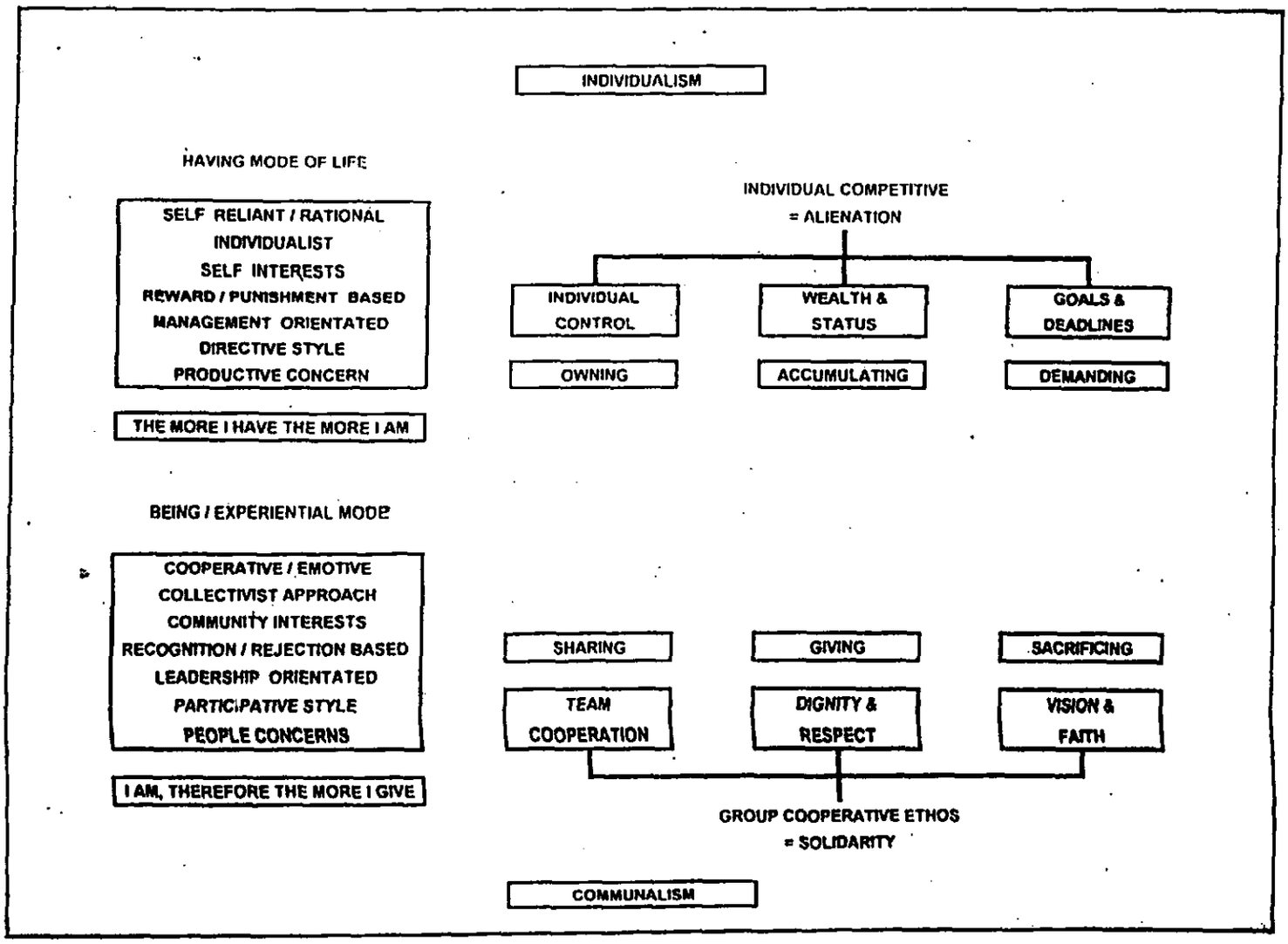

Figure 2. INDIVIDUALISM VERSUS COMMUNALISM : MODES OF LIFE (Lessem, 1994:36)

SOUTH AFRICAN SUGAR INDUSTRY AGRONOMISTS' ASSOCIATION

DO WE WANT TO BE CANE CUTTERS?

by GD Wiseman

1. Introduction

The viability of sugarcane growing as a labour intensive farming enterprise is being threatened by two factors: viz, unsophisticated industrial action, and new labour legislation which is likely to complicate the employment of labourers.

Cane growers will naturally tend to seek ways and means of reducing the number of people employed, and will thus mechanise operations to the maximum affordable extent.

The mechanisation of previously manual operations, principally cane cutting and loading, could result in a large reduction in the number of labouring jobs available in the Sugar Industry, and there is concern for the effect that this might have on the rate of unemployment in a country where this is already unacceptably high.

Is this something which should be troubling the cane grower already facing increased complications with employing people?

2. Demand for labouring jobs in the Sugar Industry

It is contended that, despite the increased difficulty in finding jobs, there is a decreasing demand for cane cutting jobs in the Sugar Industry.

A. Increasing education levels in rural areas are leading people to seek what are perceived to be jobs of a higher order than cane cutting.

B. An increasing level of sophistication in rural populations appears to be coupled with the perception that agricultural labour is for the unsophisticated - not for us!

This is particularly noticeable in the traditional cane growing areas of KwaZulu-Natal. Despite high unemployment rates, people will prefer to remain unemployed while seeking an industrial labouring job than cut cane!

Why are they able to do this?

I believe that the extended family system, with its inherent internal re-distributive mechanism enables high levels of unemployment to be sustained.

Rural (and urban) families apparently tend to look at a household budget as being supplied from a number of different sources, including the old age pension paid by the state.

Increasing industrial, commercial and now agricultural wage rates created by Trade Union activity assist this internal re-distributive mechanism. Higher wages and salaries mean less family members having to work.

A further factor not to be overlooked is the increasing income being derived from small scale cane growing by communities adjacent to commercial farming areas. This is now an industry worth in excess of R100 million per annum.

Mechanisation of cane harvesting operations, leading to a reduction in the number of cane cutting job opportunities in much of the Sugar Industry is thus unlikely to create major poverty problems.

It will, however, create problems in two major areas, viz, the old Transkei and in the northern districts of KwaZulu-Natal and Southern Mocambique. In these areas, local sources of income are limited due to their underdeveloped nature. People tend to be less educated and sophisticated, and thus more amenable to cutting cane.

Is this likely to last?

Should growers therefore actively seek to displace labour with machines? The answer is probably different for every grower in the Sugar Industry, but it is inevitable that cane cutting will become decreasingly popular, that people's expectations will increasingly move beyond cane cutting, and that legislation and union activity will make the employment of agricultural labour more time and effort consuming.

3. **What about Aids?**

Various Doomsday prognoses have predicted massive increases in Aids deaths, to the extent where the economically active strata in society largely disappear. Thus there are no cane cutters. It follows that there is no point in growing sugarcane as there will be a drastically reduced consuming population.

This scenario is yet to be experienced in any country, and there are countries in Central Africa which are a number of years ahead of us in the development of Aids.

Aids will undoubtedly kill large numbers of people, but it will cause neither negative population growth nor zero population growth. It will probably slow the rate of population growth, though whether this will be measurable separately from the slowing of population growth due to changing levels of education and aspiration is difficult to say.

The people in the commercial sugar farming sector to be affected by increasing Aids deaths are unlikely to be the cane cutters.

They are more likely to be tractor drivers and machine operators, and people being used in junior management roles. The people most affected will be the people with higher income and higher status in the farm work force.

It will severely effect the economy through an enormously increased national health budget, and the necessity to train larger numbers of skilled workers for replacement of those who die.

SOUTH AFRICAN SUGAR INDUSTRY
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HARVESTING OPTIONS FOR CANE GROWERS

By E Meyer

INTRODUCTION

The South African cane grower is presently facing rising wage demands, union action and uncertain labour availability to harvest sugarcane by hand. Many cane farmers have now reached a point where they are seriously considering the options available for either reducing harvesting costs and or reliance on labour.

The aim of this paper is to briefly (i) discuss manual cutter performances, (ii) outline some of the past mechanised harvesting research and development conducted in this country and (iii) provide an overview of machinery and systems used in other cane producing countries.

MANUAL HARVESTING

The South African sugar industry's quota holders annually employ in excess of 16 000 cane cutters to harvest its crop. Sugarcane harvesting, therefore is a very important source of income for both rural and urban populations in and around the cane producing areas. The income generated by manual cane cutters plays a vital role in the socio economic development of these regions. Should the South African sugar industry mechanise most of its harvesting operations this would have a serious economic impact on these developing populations.

At the ISSCT Mechanisation Workshop held recently in Mauritius and Reunion many countries indicated that manual labour performances could be improved. It appears that the productivity of manual cane cutters varied from less than one ton/man/day in some countries to more than 14 ton/man/day in others. It was felt that there was a dire need for improving cutter efficiency and output. Improved cutter performance could be achieved by selecting free trashing varieties, training, work studies, incentive schemes, improved diet, cutting equipment design and the introduction of partially mechanised operations such as harvesting aids and mechanical loading. The implementation of such methods could, in some cases, at least double average daily outputs, reducing labour requirements and in this way avoiding or postponing complete mechanised harvesting systems in many countries.

MECHANICAL HARVESTING

It has been quoted that the ideal sugarcane harvester, which should meet the majority of the South African growers requirements, could arguably be:

> "A whole-stalk machine which cuts, tops and detrashes burnt or green cane of all lengths and yield, growing either straight or recumbent. The harvester should leave the cut cane in ordered windrows or bundles on the ground for easy subsequent mechanical loading. The machine should be inexpensive, simple, easy to operate and maintain and be able to harvest sugarcanes on slopes as steep as 20°".

The question to be asked is, can such a machine be realistically developed and in what time frame? Alternatively, what type of mechanical harvesting equipment or system is best suited to the situation, bearing in mind local conditions, existing transport systems and mill receiving facilities to which the grower must deliver his cane and whether or not such systems are cost effective.

1. Past research and development

A brief review of mechanical cutting and harvesting machinery developed by the South African Sugar Association, Experiment Station's Agricultural Engineering Department over the past two decades is presented.

The machines and systems developed and tested range from relatively simple attachments to standard agricultural tractors to sophisticated self-propelled machinery. Furthermore, harvesting systems developed ranged from whole-stalk to chopped cane and from partially to fully mechanised systems. A description of each machine or equipment, machine capabilities, limitations and the problems associated with these are summarised in Appendix 1.

2. Recent developments

Over the past two years, due to a growing real or perceived need by cane growers, several private entrepreneurs have become involved in developing or have developed mechanical harvesting machinery. The machines that have been demonstrated during the current season include a hand operated disc cutter, a three point mounted single row cutter/windrowing attachment and a tractor mounted single row bundling machine.

The merits of two of these machines are discussed and an attempt is made to assess the economic relationship between some of the existing manual, partially mechanised and a fully mechanised harvesting system.

3. Harvesting machines and systems available around the world

a) Whole-stalk harvesters

(I) Windrowing type:
The most common example of this type of machine is the so-called "soldier-type" used in Louisiana. These machines were developed and perfected by companies such as Cameco Industries and Broussard. These machines base cut and top, one or two rows at a time and windrow four to six rows of unburnt cane into one windrow placed at right angles to the cane rows. In Louisiana, the cane is burnt in these windrows prior to being loaded mechanically by high capacity push-pile type loaders.

Other types of whole-stalk harvesters include "walk-behind" machines developed in countries such as Japan and Indonesia. The majority of these relatively low capacity machines will base cut and windrow one row of cane per pass. The windrowed cane is then usually placed into windrows consisting of 4-6 rows of cane or placed into small bundles where the cane is manually topped prior to manual or mechanical loading.

(ii) Bundle type:
Numerous countries have attempted to develop machines which will cut and drop between 200 and 500 kg bundles of cane. Countries which are using or currently involved in developing such machines include Australia, Brazil, France, India and Reunion.

A major disadvantage associated with whole-stalk harvesting machines is that most are unable to handle cane which is badly lodged or even slightly leaning. However, whole-stalk harvesting equipment and harvesting systems will be more readily accepted by the South African industry as no changes in transport system and mill receiving facilities are required.

b) Chopper harvesters

Modern chopper harvesters such as those developed by Austoft, Cameco and Class, with improved reliability, performance and cleaning capabilities are capable of harvesting both burnt and green cane. Given well laid out fields, cane conditions, volume and a suitable and adequate transport system and a high level of management, it has been shown that these machines are able to achieve economical harvesting rates and costs.

However, notwithstanding the above comments growers will have to accept that certain cane losses are associated with such a system. These losses can be as high as 15%. These losses are largely dependant on cane conditions, machine settings and level of maintenance. Furthermore, there is a considerable reduction in machine output when operating in unburnt cane.

At present the chopper harvesting system is the only fully mechanised system that is able to handle unburnt, heavy recumbent cane with acceptable levels of extraneous matter.

SUMMARY

It is believed that our unique agronomic, socio-economic, political as well as environmental factors will play a major role in the development and use of both manual and mechanised harvesting systems in our industry. It is therefore vitally important to identify the key factors which will determine the direction of mechanical harvesting trends within a specific region or in the industry as a whole.

There appears to be tremendous scope for improving manual cutter/loader performances and efficiency. The optimisation of manual harvesting systems for many growers may ultimately determine their survival as economic cane producers.

At present certain partial or fully mechanised harvesting systems for individual growers may not be viable options. However, with possible increasing manual harvesting costs in the future serious consideration should be given to communal/contracting opportunities. If growers are to mechanise their harvesting operations in future it is believed that a serious effort will have to be made to meet some of the requirements which would result in the effective use of such harvesting machines. Special attention will have to be given to field preparation and field layout so that machinery can be effectively and economically utilised. Furthermore, cane varieties which are free trashing, non-brittle and remain erect could play a pivotal role in the successful implementation of certain mechanical harvesters and harvesting systems.

Appendix 1

SUMMARY OF HARVESTING MACHINERY PERFORMANCE

Machine type	Period	Power (kW)	Machine type*	B- Burnt G-Green	Operation				Min. row spacing	Rows /pass	Slope (%)	Lodging tolerance	E.M. (%)**	Losses (%)	Output tons/hour	Problems or major limitations
					Cut	Top	Trash	Load								
Transverse windrowing machines																
Santal	1973-75	50	PA	B	Yes	Yes	No	No	1.4m	1	< 10	None			15 - 25	Poor stability on slopes, requires upright cane
Bell cutter	1978-79	45	SP	B	Yes	Yes	No	Yes	1.0m	1	< 12	Low			6 - 10	Cane stool damage in lighter soils, requires upright cane
Mini-Mech	1978-80	3,5	MO	B	Yes	No	No	No	1.0m	1	NA	Low				Difficult to handle, low output, requires burnt upright cane
Linear windrowing machines																
McConnel Stage I	1973-79	58	PA	B & G	Yes	Yes	No	No	1.2m	1	< 25	High			15 - 25	Stool damage, poor topping and base cutting
Sasex	1974-77	58	3PT	B & G	Yes	Yes	No	No	1.2m	1	< 20	Low			15 - 25	Side draught, uneven base cutting
Edgecombe	1976-78	58	PA	B & G	Yes	Yes	No	No	1.0m	2	< 25	Moderate			15 - 35	Uneven base cutting height, poor operator comfort
Midway	1978-83	58	PA	B & G	Yes	Yes	No	No	1.2m	1	< 25	Moderate			15 - 30	Dedicated machine
Sasex - Bell	1984-86	50	SP	B & G	Yes	Yes	No	Yes	1.0m	2	< 25	Moderate			25 - 40	Uneconomical as a cutter/loader combination
Front Mounted Cutter (FMC)	1986-90	55	DT	B & G	Yes	Yes	No	No	1.0m	1	< 25	Moderate			20 - 35	
Green cane FMC	1988-90	55	DT	G	Yes	Yes	Yes	No	1.0m	1	< 25	None			20	Cane, tops & trash mixed, requires even row spacing, erect cane
Bundling machines																
Gobbler	1973-74	58	3PT	B	Yes	Yes	No	No	1.2m	1	NA	Mod-High			NA	
McConnel Stage II	1975-77	58	PA	B & G	Yes	Yes	Yes	No	1.4m	1	< 20	Mod-High	3.0	3.6	15 - 20	Unreliable, low output, two pass operation
Toft J150	1977	30	SP	B	Yes	Yes	No	No	1.4m	1	< 15	Mod-High			12	Unstable, underpowered, requires erect cane
Sasaby 1 & 2	1978-82	130	SP	G	Yes	Yes	Yes	Yes	1.5m	1	< 25	Mod-High	8.0	7.0	30	
Mini Sasaby	1982-85	58	PA	G	Yes	Yes	Yes	No	1.2m	1	< 25	Mod-High	9.2	3.3	15	Under powered, problems with collection bin
Ngwenya	1991-93	80	SP	G	Yes	Yes	Yes	No	1.5m	1	NA	None	10.0		20-25	Excessive cane losses (design problem with conveyor)
Chopper harvester																
Mini Rotor	1981-84	112	PA	B	Yes	Yes	No	Yes	1.5m	1	< 18	Mod-High	10.4	5.7	20-25	Relative poor output, poor billet quality

* Machine type
3PT - Three point mounted to tractor
MO - Manually operated
PA - Permanently attached to tractor
SP - Self-propelled
DT - Detachable from tractor

** Extraneous matter
Cane quality tests were mainly conducted for green cane harvesting machines

SOUTH AFRICAN SUGAR INDUSTRY AGRONOMIST'S ASSOCIATION

SOME FACTORS TO CONSIDER TO REDUCE WEED CONTROL COSTS.

By N B Leibbrandt

INTRODUCTION

Weed control uses approximately 5% of the farm cane production budget. This may appear a minor expenditure but the cost of herbiciding is money well spent as yield reductions from weed competition are well documented.

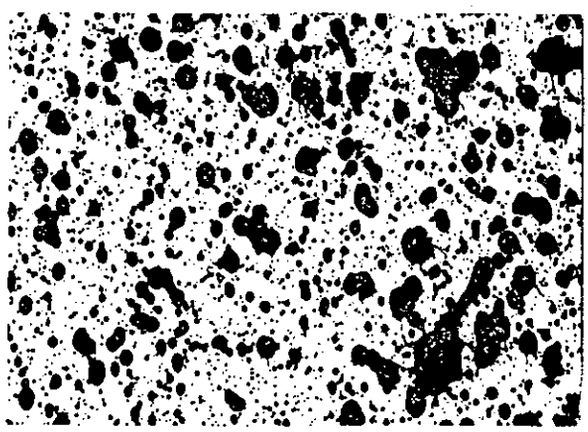
Weed control using hand labour has for numerous reasons become less attractive and the current herbicide prices favour the grower. There is however considerable potential to further reduce weed control costs. To achieve this, the indisputable factor to adjust is the total water volume used, which traditionally ranges between 240 and 300ℓ per ha. If this can be accomplished without loss in weed control efficacy, then savings can be made in both machinery and labour inputs. This paper discusses some options available to growers in order to achieve cost savings for manually applied herbicides.

APPLICATION METHOD COMPARISONS

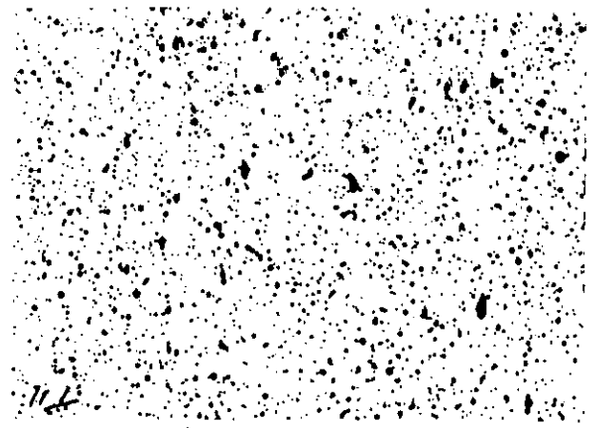
Comparisons were made between conventional lever operated hydraulic type knapsack applicators and controlled droplet applicators (CDA) that distribute herbicides by centrifugal force with spinning discs. CDA equipment is capable of delivering herbicides in low volumes of total spray mixture. This makes the system attractive compared to traditional methods that require additional expenses due to higher total spray volumes.

The typical droplet difference between the two systems is illustrated in Figure 1 where the uniform CDA size and distribution is clearly evident. The CDA droplet contains a higher herbicide concentration, and it's size and spread on the leaf surface results in reduced wastage as it less prone to splash and runnoff.

Figure 1. Comparisons of droplet size and distribution between a Lurmark (AN 4.0) nozzle delivering ±290ℓ/ha and the Herbi 4 CDA delivering ±50ℓ/ha.



Lurmark (AN 4.0) nozzle



Herbi 4 red nozzle

OPERATIONAL COSTS

Cost differences between these two systems are shown in a simple example in Table 1 where weed control expenditure options for a typical sugarcane farm are expressed on a daily basis. The two systems selected are considered the most commonly used in the industry, and it is accepted that costs will vary when others are compared.

Example :
- The size of the farm is 200ha
- 300 hectares to be sprayed per annum (ie 150 ha sprayed twice)
- 50 spraying days per annum
- Six hectares required to be sprayed per day

- Average field to be sprayed is 2km away
- Each knapsack operator sprays 1ha per day (50ha/annum)
- Each CDA operator sprays 2ha per day (100ha/annum)

- Supervisor costs not included
- Spray equipment (knapsack and CDA) costs not included

Table 1. Differences in weed control costs between conventional knapsack spray equipment (CP3 MK2) and a CDA (modified Herbi 4) system.

Knapsack system	Cost/day
<u>One knapsack operator does 1 ha per day</u> 6 operators required @ R20.00 each	R120.00
Water tanker costed at R12.00/hr 0,5hr/day	R6.00
52kw tractor costed at R45.00/hr (3 trips ie 12km) 2hr/day	R90.00
Maintenance costs @ R170.00 per knapsack per annum	R20.40
Knapsack system cost	R236.40

CDA system	Cost/day
One CDA operator does 2 ha per day 3 operators required @ R20.00/day	R60.00
2 WD LDV doing 8km/day @ R1.41/km	R11.28
Maintenance (R150.00 for new motor per annum)	R9.00
Running cost (±70 batteries required per annum @ R1.73 each)	R2.42
Total CDA system cost	R82.70

The cost saving in favour of the CDA system in this example is ±R154 per day or about R26/ha. However, the cost advantage of the CDA system would increase dramatically should the tractor remain at the field and continually move the water tanker supplying the knapsack operators.

The current price of the modified Herbi 4 CDA atomiser, lance and battery pack is ±R400 without VAT and does not include a tank. The tank modification kit costs ±R30 and can be fitted to any make of hydraulic knapsack, making the total in the vicinity of R490 per sprayer. Therefore, in the example used, the saving in costs between the two systems would pay for the conversion to CDA after about 10 spraying days.

The cost advantage of the CDA system would be reduced if the hydraulic system used TURBO-FLO nozzles that enable lower volumes to be applied with conventional equipment. A further advantage

would be the use of hand held booms that cover two interrows, but this could also apply to CDA systems. It would be optimistic to expect labour to cover much more than one hectare per day with knapsacks fitted with lower volume nozzles due to the physical input that is still required. It is also optimistic to expect that there would be much less demand on machinery with these innovations.

RECENT TRIAL RESULTS

Over the last two seasons numerous trials were conducted where CDA and conventionally applied treatments were compared to evaluate weed control efficacy levels between the two systems. Table 2 shows typical results obtained from the trials where the application methods were tested at different weed growth stages.

Results from CDA treatments have generally been encouraging with the only inferior results recorded where CDA treatments were applied to certain creeping grass species. It appears that high spray volumes are required to optimise the control of species such as *Cynodon plectostachyus* (Stargrass) which is possibly due to the very thick growth habit of this species.

Table 2 Weed control efficacy comparisons for the two application systems.(expressed as percentage kill)

PRE-EMERGENCE (80 DAYS AFTER TREATMENT)

Treatment	Rate ℓ or kg/ha	CYPRO
Canopy	0,80	93
Canopy	0,80	90

Knapsack

CDA

EARLY POST-EMERGENCE (44 DAYS AFTER TREATMENT)

Treatment	Rate ℓ or kg/ha	CYPES	COMBE	RCHBR	SOLDI
Velpar + diuron	2,5 + 1,5	0	73	81	100
Velpar + diuron	2,5 + 1,5	0	87	81	100

POST-EMERGENCE (41 DAYS AFTER TREATMENT)

Treatment	Rate ℓ or kg/ha	CYPES	COMBE	RCHBR	SOLDI
Velpar + diuron	2,5 + 1,5	33	85	54	100
Velpar + diuron	2,5 + 1,5	40	56	90	100

CONCLUSIONS

- The cost advantages of CDA are considerable and growers are encouraged to introduce the system, even if only on a limited scale. This can only occur once products are registered for CDA.

- Conversion to the CDA system is very practical as a common knapsack tank can be used and the lever operated system reverted to if required.

- Weed control efficacy is acceptable with the CDA system but timing should be restricted to the pre and early post-emergence stages until more work is completed.

- It is expected that the reduction in labour requirement and the ease of CDA application will make the task of manual herbicide application more prestigious and appealing to labour.

SOUTH AFRICAN SUGAR INDUSTRY AGRONOMISTS' ASSOCIATION

COST EFFECTIVE FERTILIZER APPLICATION

By M. Warren

INTRODUCTION

The fertilizer budget for an average cane farm in South Africa today is usually the second or third highest cost. Inefficient management of this operation can therefore result in significant losses in revenue due to wastage,theft and incorrect applications.

The aim of this excercise was to look at possible methods of improving the efficiency and cost effectiveness of fertilizer applications in the Group. Four main areas were investigated;

* Raw Materials
* Fertilizer Requirements
* Fertilizer Applications
* Monitoring and Controls

The findings are discussed under each of these headings and are followed by some conclusions and recommendations.
Throughout the excercise we have attempted to look at real situations that exist in the cane industry and to keep the recommendations as practical as possible. Certain assumptions have had to be made and these are detailed in the text.

RAW MATERIALS

Types of Raw material

Table 1 gives a breakdown of the most common sources of N,P & K which are available, on the market today.These can be used on their own as straights or mixed to form bulk blends.

Table 1 : Types of raw material available

Nutrient	Chemical source	Conc. of Nutrient	Source of Chemical product
N	Urea (granular)	46% N	Local (Kynoch ex. AECI) or Imported
	Urea (prilled)	46% N	Local (limited) or mostly Imported
	ASN	27% N	Local (by product of steel refining)
	LAN	28% N	Manufactured locally or can be Imported .
P	Rock Phosphate	variable	Local (limited) or mostly Imported
	Super Phosphate	10.5% P	Manufactured locally by IOF and Omnia or can be Imported.
	MAP	11%N & 22%P	
	DAP	18%N & 20%P	
K	KCl(granular)	50% K	Imported from Canada ,USA, Israel, Jordan and Eastern Europe.
	KCl (standard)	50% K	
	KCl (jap fines)	50% K	

Due to the convenience of Blends and the blending services offered in the past ,we have tended to purchase most of our fertilizer in the form of bulk blends at a premium. Changing circumstances have now made us look more carefully at the market and what is available and it may well be possible to aquire fertilizer in different forms from alternative sources at reduced rates. In order to do this some of our methods of operation might have to change but the inconvenience will have to be compensated by the cost savings made.

Sourcing of Raw materials

Referring to Table 1, only KCl is not available in South Africa and has had to be imported. All the other commodities have been manufactured locally and the manufacturers have enjoyed a high level of protection from competition. All these commodities, plus more, are now available on the world market, at varying prices ,depending on market trends, quality of product, and size of order. In order for Illovo Sugar Ltd. to enter into the fertilizer importing business, the facilities would have to exist to handle and store large quantities of fertilizer in a short period of time.The capital outlay involved, as well as the manpower required to manage an operation of this magnitude is high, and we feel it would not be wise to go this route at this stage in time.

There are however companies such as ACFIT, DFD, Cargill and BASF who through local agents are preparing to enter into the market to provide imported fertilizer to bulk buyers at reduced prices. These companies and their agents are familiar with the handling of commodities in bulk and it would be wise to consider them when calling for tenders in future.

The three major manufacturers and suppliers of fertilizer in South Africa at the moment are Kynoch, Omnia and Sasol. These companies are going to have to become more competitive and flexible in the supply of product in order to be able to compete on the world market.

Packaging of Fertilizer.

The traditional pack size is a 50 kg bag, but their are other forms of packaging, ie. 500kg bags and bulk .The relative cost involved in the different forms of packaging have been included in the costing excercise which follows later and their relative merits and demerits will be discussed at that stage.

DETERMINATION OF NUTRIENT REQUIREMENTS

Soil Sampling

In order for fertilizer applications to meet the needs of the crop they have to be based on accurate and representative soil samples. Inaccurate sampling can lead to over or under fertilization which in turn can lead to losses in revenue. The method of sampling used on Illovo's estates is based on the SASEX recommendations, which are simple and easy to follow, but there is an important aspect which has been overlooked, ie. keeping records of where the samples have come from.

In order to establish and maintain an historical record of a fields fertility status, it is necessary to know exactly where each sample has come from in the field. Quota maps (1: 6000) of each farm with individual fields subdivided to show the different sampling areas should be drawn up.This can be done by taking each field and subdividing it according to its soil characteristics.These subdivisions must be permanent and clearly demarcated on the ground, by roads,waterways, etc. as well as being clearly marked on the map. This will enable the Farm manager to control where samples are being taken from , ensure consistancy in numbering of samples and hence build up a history of that field and its subdivisions in terms of its fertility status.

More attention will also have to be given to the people taking the samples to ensure that they are doing the job according to the SASEX guidelines.
The practical application of such a system, on farms of 1000 ha's and larger will require dedication on behalf of the Farm manager and his staff , but the rewards will be worthwhile.

Soil sample Analyses

Mt Edgecombe and Cedara both have facilities to analyse soil samples. There are slight differences in their respective methods of analysis, but generally the results are similar and within acceptable bands of variation. We would recommend that the SASEX service continue to be used as fertilizer recommendations are supplied based on each analysis which are specific to cane.

Fertilizer Recommendations

There has been much debate over the differences between recommendations based on the two respective institutions analyses , even though the analysis results are very similar. It must be noted that although the analyses are conducted at Cedara, the recommendations are usually made by private consultants, whose interpretations of results can differ from those of SASEX. This problem has been addressed and we are confident that it has been resolved. One important aspect which must be given more attention in future recommendations is that of soil amelioration using lime and gypsum. Yield responses obtained from applications of these ameliorants have been significant and their use in neutralising acid soils and aluminium toxicity must not be ignored.

Another important aspect of fertilizer recommendations is that of economic threshold levels, ie. at what point does increasing the levels of fertilizer applied become uneconomical.Work done by the FAS department at SASEX has enabled them to define soil and leaf threshold levels for the major nutrients involved in sugarcane nutrition. They have found that the closer one gets to these threshold levels the smaller is the response to applied nutrients. In addition it has been found that applying above the threshold values does not produce any significant yield response. However having said all of this it is a fact that given ideal conditions, sugarcane will contiue to grow for as long as it is allowed to do so. This will result in larger cane yields with lower sucrose percentages but ultimately higher sucrose tonnages.

Given the objective of maximising sucrose production for the mills we should therefore consider increasing fertilizer applications so as to achieve maximum sucrose production. However the fact that ideal conditions for cane growth do not exist over the majority of our growing area, coupled with the added complication of Eldana and periodic droughts, tends to limit the extent to which we could apply this theory. We would recommend however that further work be done to determine if there can be any increase in sucrose production obtained from increasing fertilizer applications under local growing conditions.

After discussion with members of SASEX and other consultants we are of the opinion that the threshold values and parameters as developed and used by SASEX are accurate and representative of a sugarcane crops needs, and recommend that these parameters continue to be used as the basis for our fertilizer recommendations.

FERTILIZER APPLICATION

Placement

A great deal of research has been conducted on the different methods and positions of fertilizer placement, which has resulted in many different schools of thought. Generally the most common forms of placement used are broadcast or banded applications. No consistantly significant differ= ences in yield response have been found in order to be able to advocate one method above the other and the system used has largely been determined by other factors eg. terrain, and machinery availability. Recent work has however shown that there might be merit in applying fertilizer below the soil surface. Responses obtained could be attributed to a number of factors, the main ones being less loss of N through volatilization, fertilizer being placed in the root zone, improved water penetration due to the disturbance of the soil surface,or a combination of all three.

SASEX to consider another possibility while conducting the experiments in this field, and that is to consider the possibility of being able to reduce levels of applied N if it is placed below the surface, without sacrificing yield. We await the results with interest.

Method of Application

As mentioned before it may be necessary to change some of the current practices in order to facilitate the purchasing of fertilizer in the form of straights or some alternative form of packaging. The change to a new system should only be implemented if it is cost effective within itself and must not rely on a related cost saving. eg. using the cost saving from buying straights to motivate the purchase of a machine specifically designed to apply straights.(Triple Applicator) This is due to the fact that the fertilizer industry is dynamic and one must avoid getting locked into a system which may become costly as pricing structures change.
A computer model was designed to enable the user to calculate the relative costs of various methods of fertilizer applications and by so doing enable them to make informed decisions.
As can be expected not all possible scenarios could be included in the model, and those used as well as the assumptions made for the excercise are as follows.

Scenarios

The scenarios can be divided into three major components, by type of packaging, ie. 50 kg bags; 500 kg bags; and Bulk, these are then split into Blended fertilizer or Straights. These two categories are then further divided according to the method of application which may be used.
The system of operation of each of the scenarios is illustrated by means of a flow diagram and are shown in Annexure 1.

Assumptions

Fertilizer prices are as per Kynoch price list as at April 1995, and are shown in Annexure 2.
Machinery costs are based on the "Guide to Machinery costs"; Bulletin 408, Directorate of Agricultural Economics; Department of Agriculture, and are shown in Annexure 3.
Labour costs are based on the 1994/95 seasons wage rates,(increased by 11%) and are shown in ANNEXURE 4.
All fertilizer in 50 kg bags is offloaded by the transport contractor.
Fertilizer type is 3-1-4 (45)+Zn
Rate per hectare is 650 kg/ha.
Area to fertilize is 600 Ha's
Application time window is 80 days.
Other minor assumptions as well as the table of calculations have been included as Annexures 5 and 6.

The results of the costing exercise have been summarised in Table 2, overleaf.

The following conclusions can be drawn from these results.

The cost saving made by going to 500kg bags is generally offset by the additional cost of machinery required to handle these bags.

In the case of 50kg and 500kg bags the straights option is cheaper than blends in terms of total costs, however application costs are either the same or more expensive.

The only justification in moving to 500kg bags is when used in conjunction with the Pope-Ellis machine. This is in fact the most cost effective method of fertilizer application.

The purchase and application of fertlizer in bulk is not cost effective.

TABLE 2: Costs of different systems of application and types of fertilizer

COST ITEM	50 KG BAGS								
	BLENDS				STRAIGHTS				
	HAND APPLIC.	BAND APPLIC	B/CAST SPAN.	B/CAST MAGI.	HOME MIXING				POPE-ELLIS MACH.
					HAND APPLIC	BAND APPLIC.	B/CAST SPAN.	B/CAST MAGI.	
	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha
LABOUR	28.26	5.98	3.77	3.22	29.39	5.98	3.77	3.22	3.22
MACHINERY	6.73	62.31	35.14	33.17	19.43	62.31	35.14	33.17	33.70
TOTAL APPLICATION COSTS	34.99	68.29	38.91	36.39	48.82	68.29	38.91	36.39	36.91
FERTILIZER TRANSPORT	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25
FERTILIZER - MATERIAL	726.70	726.70	726.70	726.70	682.14	682.14	682.14	682.14	682.14
TOTAL	825.93	892.53	833.77	828.72	809.03	847.97	789.21	784.17	785.22

COST ITEM	500 KG BAGS								
	BLENDS				STRAIGHTS				
	HAND APPLIC.	BAND APPLIC	B/CAST SPAN.	B/CAST MAGI.	HOME MIXING				POPE-ELLIS MACH.
					HAND APPLIC	BAND APPLIC.	B/CAST SPAN.	B/CAST MAGI.	
	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha
LABOUR	28.46	2.85	1.74	1.46	33.27	10.86	8.64	8.09	1.46
MACHINERY	22.85	66.40	38.35	36.59	29.25	75.06	47.01	45.25	37.11
TOTAL APPLICATION COSTS	51.31	69.25	40.08	38.05	62.52	85.92	55.65	53.34	38.57
FERTILIZER TRANSPORT	21.45	21.45	21.45	21.45	21.45	21.45	21.45	21.45	21.45
FERTILIZER - MATERIAL	712.40	712.40	712.40	712.40	662.67	662.67	662.67	662.67	662.67
TOTAL	836.46	872.34	814.02	809.95	809.15	855.96	795.42	790.79	761.26

COST ITEM	PURE BULK								
	BLENDS				STRAIGHTS				
	HAND APPLIC.	BAND APPLIC	B/CAST SPAN.	B/CAST MAGI.	HOME MIXING				POPE-ELLIS MACH.
					HAND APPLIC	BAND APPLIC.	B/CAST SPAN.	B/CAST MAGI.	
	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha	R/Ha
LABOUR	29.73	2.85	1.74	1.46	32.41	5.53	4.42	4.14	1.46
MACHINERY	71.40	125.13	87.82	83.75	78.67	133.80	96.49	92.41	84.27
TOTAL APPLICATION COSTS	101.12	127.98	89.56	85.21	111.08	139.32	100.90	96.55	85.74
FERTILIZER TRANSPORT	50.70	50.70	50.70	50.70	50.70	50.70	50.70	50.70	50.70
FERTILIZER - MATERIAL	707.20	707.20	707.20	707.20	657.50	657.50	657.50	657.50	657.50
TOTAL	960.14	1013.86	937.02	928.32	930.36	986.85	910.01	901.31	879.67

MONITORING AND CONTROLS

Monitoring of Applications.

With a change in fertilizer application methods, packaging and type of fertilizer the control of stocks becomes more complicated and involved. This is a problem which has to be addressed from the start of any new system and must be an integral part of the whole system. There are a number of control systems which have been developed and the systems that will be put in place at the various centres will be determined by local circumstances at those centres and will not be dealt with at this stage. What must be stressed at this point is that any new system will not be introduced without the farm management being fully trained in the use of that particular system.

Monitoring Crop response

Leaf sampling.

As with soil sampling these have to be done according to a plan which makes for accurate record keeping and the formation of an historical database.It is recommended that the SASEX guidelines be adhered to and that the samples be taken according to the same sub-divisions as for the soil samples.This will enable accurate cross referencing of results and follow-up of identified problem areas. Particular attention must be paid to the timing of the taking of samples in order for them to be representative.

RECOMMENDATIONS

Raw materials :

Fertilizer operations must become more flexible so as to be able to utilize the raw material in various forms and pack sizes.

Nutrient requirements :

Soil and leaf sampling must receive more management attention in order for them to form a reliable basis for recommendations. These recommendations must be based on the current SASEX guidelines.

Fertilizer applications :

Methods of fertilizer application will vary from farm to farm depending on the results obtained from running the model for each particular situation. This will also apply to whether the fertilizer is in the form of blends or straights.

Monitoring and controls :

Detailed monitoring and control systems to be implemented on all estates so as to ensure accurate applications and keep losses to a minimum.

General :

The Group must move toward prescription blending which will entail purchasing of raw materials in the form of straights (50kg or 500kg bags) wherever possible.

When calling for tenders the Group Purchasing Dept. must broaden their horizons by considering all the players in the fertilizer market, including overseas companies.

7 - ACKNOWLEDGEMENTS

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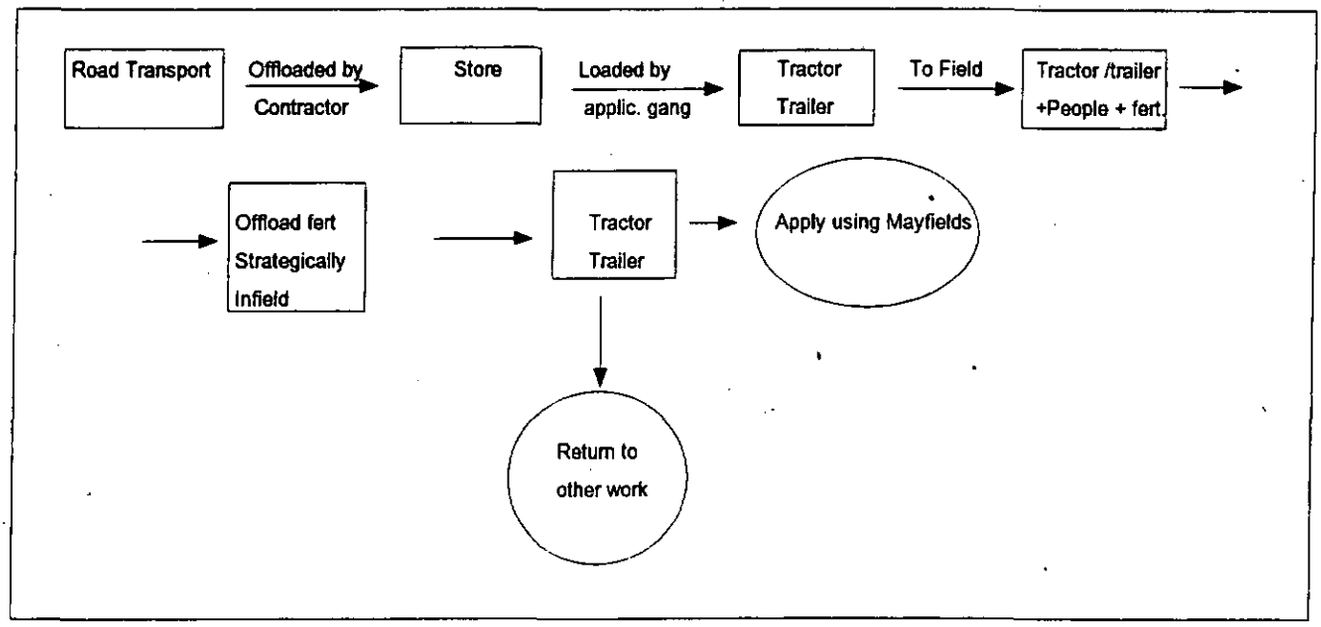
John Spencer
Bernard Schroeder

OPERATING SYSTEMS INCLUDED IN THE COSTING EXCERCISE

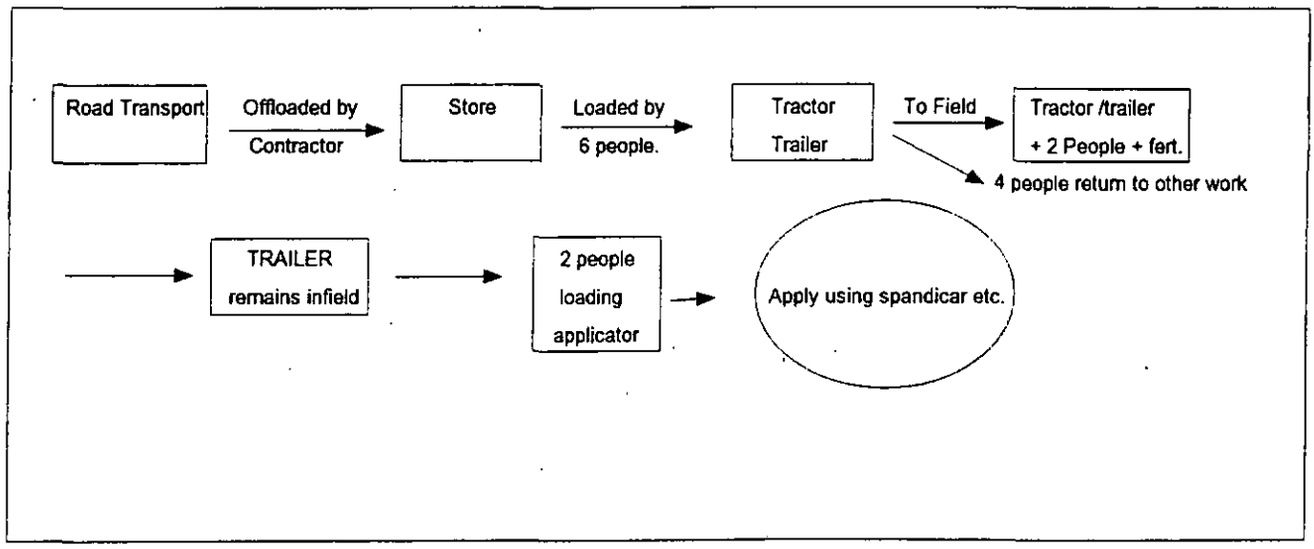
ANNEXURE 1

(1) 50 Kg BAGS - BLENDS

1.1 - Hand Application



1.2 - Mechanical Application (Spandicar; Magitech; Band spreader.)



(2) 50 Kg BAGS - STRAIGHTS

2.1 - Hand application

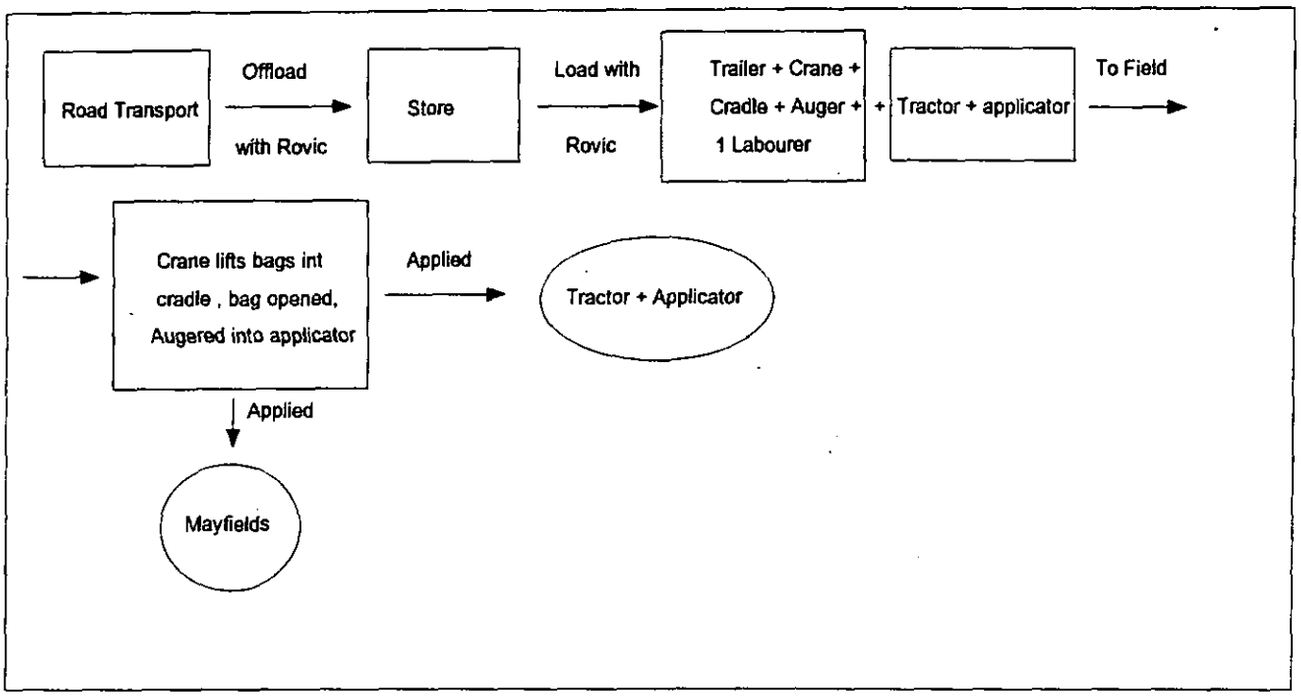
- As with (1.1) Except that the tractor and trailer remain infield to facilitate mixing.

2.2 - Mechanical application

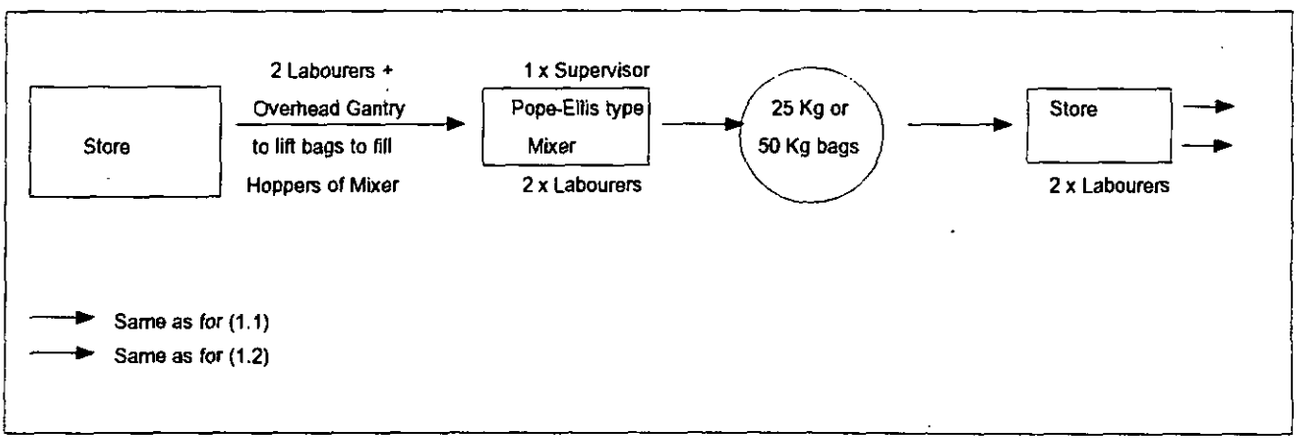
- As with (1.2)
- All mixing is done on the trailer
- The same system is used for the Pope-ellis machine except that no mixing is required.

(3) 500 Kg BAGS - BLENDS

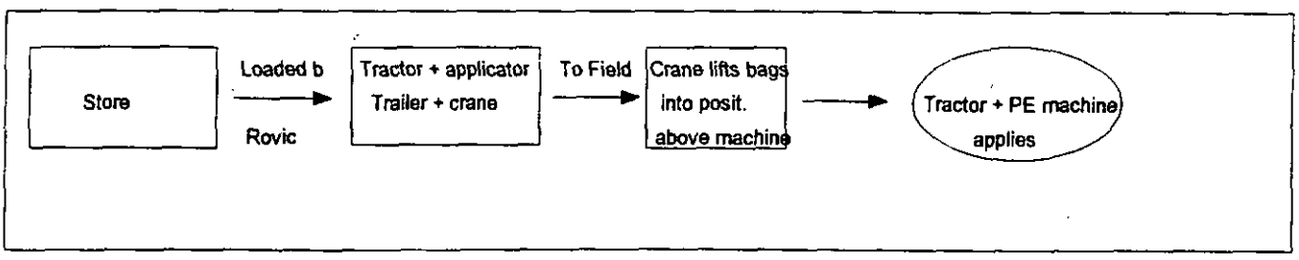
3.1 - All Applications



3.2 - STRAIGHTS (All situations except where the Pope-Ellis machine is used.)

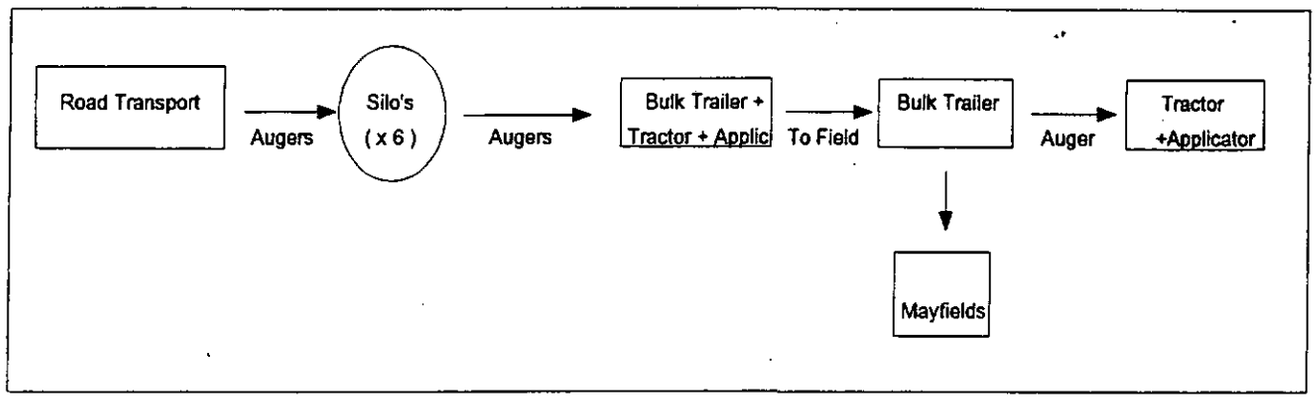


3.3 - STRAIGHTS (Mobile Pope-Ellis machine)

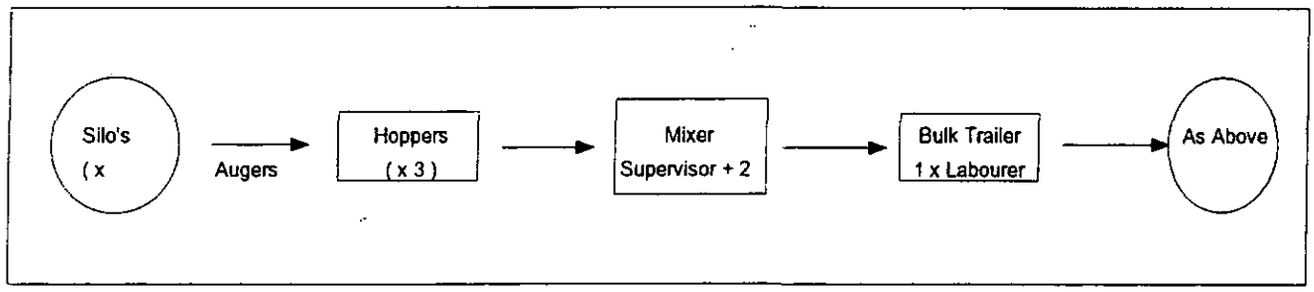


(4) BULK - BLENDS

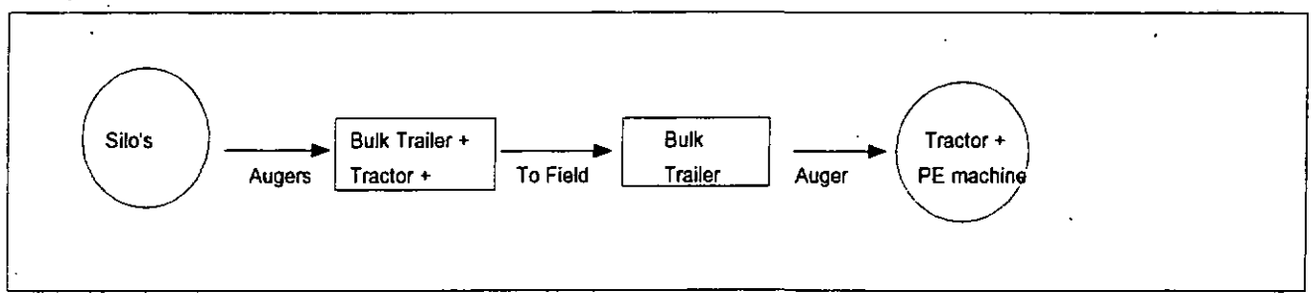
4.1 - All Applications



4.2 - STRAIGHTS (Except Pope-Ellis)



Pope-Ellis Machine



S A SUGAR INDUSTRY AGRONOMISTS ASSOCIATION

LABOUR AND TRACTOR REQUIREMENTS

AND

COSTS OF PLANTING

by J. Penfold

1. INTRODUCTION

Maidstone Estates farms 19 740 hectares under cane divided up into 15 large Estates that stretch from just south of Stanger through to Durban and inland as far as Richmond. The replant programme for the 1995/96 season is 2 232ha, of which 2139ha is hand planted and 93ha is mechanically planted.

In 1990 John Boyce presented a paper entitled "Crop Yield, Labour Productivity & Tractor Productivity on Maidstone MCP Estates" at the Sugar Technologists Association Congress. This paper covered the period 1976 to 1989 and in essence showed that planting labour productivity improved from 40 to 26 mandays/ha at best because the area planted with filtercake reduced (Fig 1). Machine planting reached a peak in 1982/83 and then labour productivity deteriorated as machine planting reduced, due to poor germination in machine planted fields. Tractor productivity for planting tended to be stable at about 38L/ha and deteriorated to 50L/ha as the percentage of machine planting reduced due to poor germination of plant cane (Fig 2).

2. FACTORS AFFECTING STANDARDS AND COSTS

It is against this background that the current 1995/96 season's figures are presented. Planting labour requirements and the reduction thereof, must be seen in the context of the total re-establishment programme i.e. crop eradication, Field layout and tilth preparation. It is important to realise that this operation, when viewed from a machine point of view, is slope dependant.

SLOPE CATEGORY	MAX SLOPE	PERCENT OF AREA UNDER CANE
FLAT	19% (0 - 10°)	56
SEMI-STEEP	34% (11 - 18°)	32
STEEP	> 34% (> 18°)	12

2/....

3. DEFINITION OF SUB-OPERATIONS OF PLANTING

When considering planting standards at Maidstone, it is essential to define which processes constitute the planting operation as follows:

HAND PLANTING - SUB-OPERATIONS

- Prepare furrows
- Cut & load seed
- Seedcane Transport
- Planting
- Covering
- Water application
- 1st Fertilizer application incl. transport
- Filtercake application

MACHINE PLANTING - SUB-OPERATIONS

- Cut & load seed
- Seedcane transport
- Prepare seed
- Machine Planting & covering incl. furrowing
- Water application
- 1st Fertilizer application incl. transport

4. LABOUR AND TRACTOR STANDARDS

An analysis of labour and tractor standards and costs as shown for 1995/96 in Table 1 indicates that there has been no improvement since 1989 in either labour or tractor standards. The percentage area machine planting has reduced even further to 4% of the replant area.

The analysis of this total shows large disparities between Estates for both labour and tractor standards. By analysing the highest, lowest, average Estate and machine planting in terms of labour usage by process, as shown in Table 2, the differences can be explained. These are largely owing to the inclusion of filtercake planting, water planting and hand furrowing on steep areas.

5. LABOUR AND TRACTOR COSTS

The analysis of costs associated with labour and tractors as per Table 1, shows that total costs related to the disparities between Estates, do not in all cases follow the same disparities for labour and tractor standards. This is due to the "mix" of different categories of labour and differences in tractor costs per litre between Estates. The analysis also demonstrates that machine planting is considerably cheaper than hand planting owing to the reduced labour costs but similar tractor costs.

3/....

6. REDUCTION OF STANDARDS AND COSTS

The potential to reduce labour and tractor standards on present methods remains fairly limited in spite of the large differences shown. There is some scope for tightening standards but since these are dependant on a number of variables such as slope, soil type, method of planting, field layout, quality of seedbed preparation etc., no major change is likely. However, the use of a power harrow for covering has resulted in labour reduction on Thornville (18 md/ha). A change to machine planting in view of the difference in cost/ha, provided poor germination problems can be overcome, would have a significant effect. This change would be confined to the "Flat" category of land.

7. POTENTIAL FOR REVOLUTIONARY CHANGE

To really make a major productivity improvement, a completely new approach should be considered. John Boyce, in his paper, suggested that there is potential to improve productivity from 26 to less than 10 man/days per hectare by planting transplants. This idea coupled with a mechanical vegetable planter to plant them with, is an area of investigation that could result in major productivity and cost improvements.

8. FOCUS ON QUALITY REQUIREMENTS

Finally it must be borne in mind that compromising on quality of planting is false economy and therefore any changes or reductions must achieve the same result, and preferably enhance it. It is all too easy to reduce inputs at the expense of quality. The quality measure used at Maidstone is that there should be 1 shoot every 30 cms of row length. In this context the amount of supplying (gapping) done subsequently is a measure of failure to achieve this standard.

REFERENCES

Boyce J.P. (1990) Crop Yield, Labour Productivity and Tractor Productivity on Maidstone MCP Estates. Proc. S Afr. Sug Technol Ass 64 : 56-60

FIGURE 1

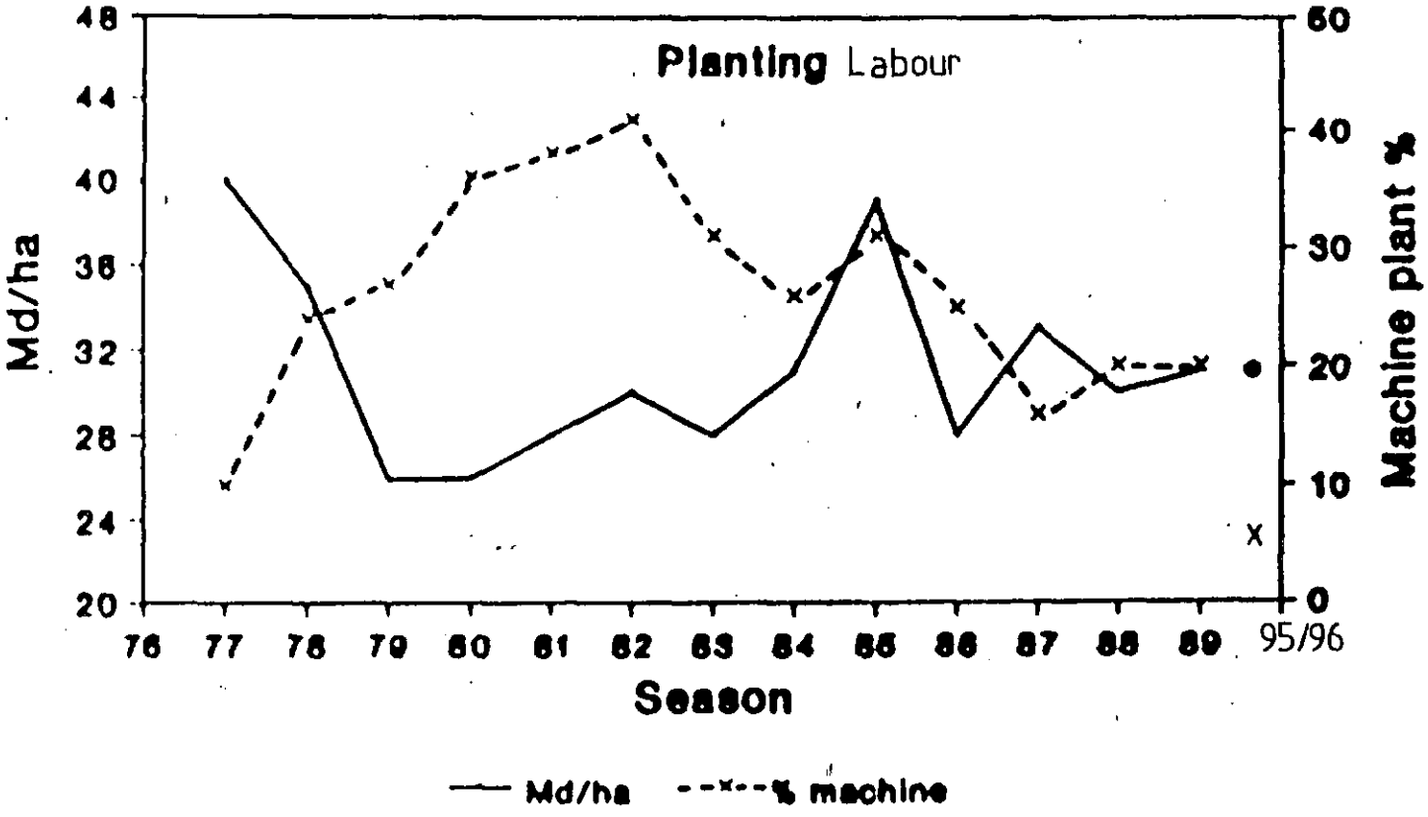
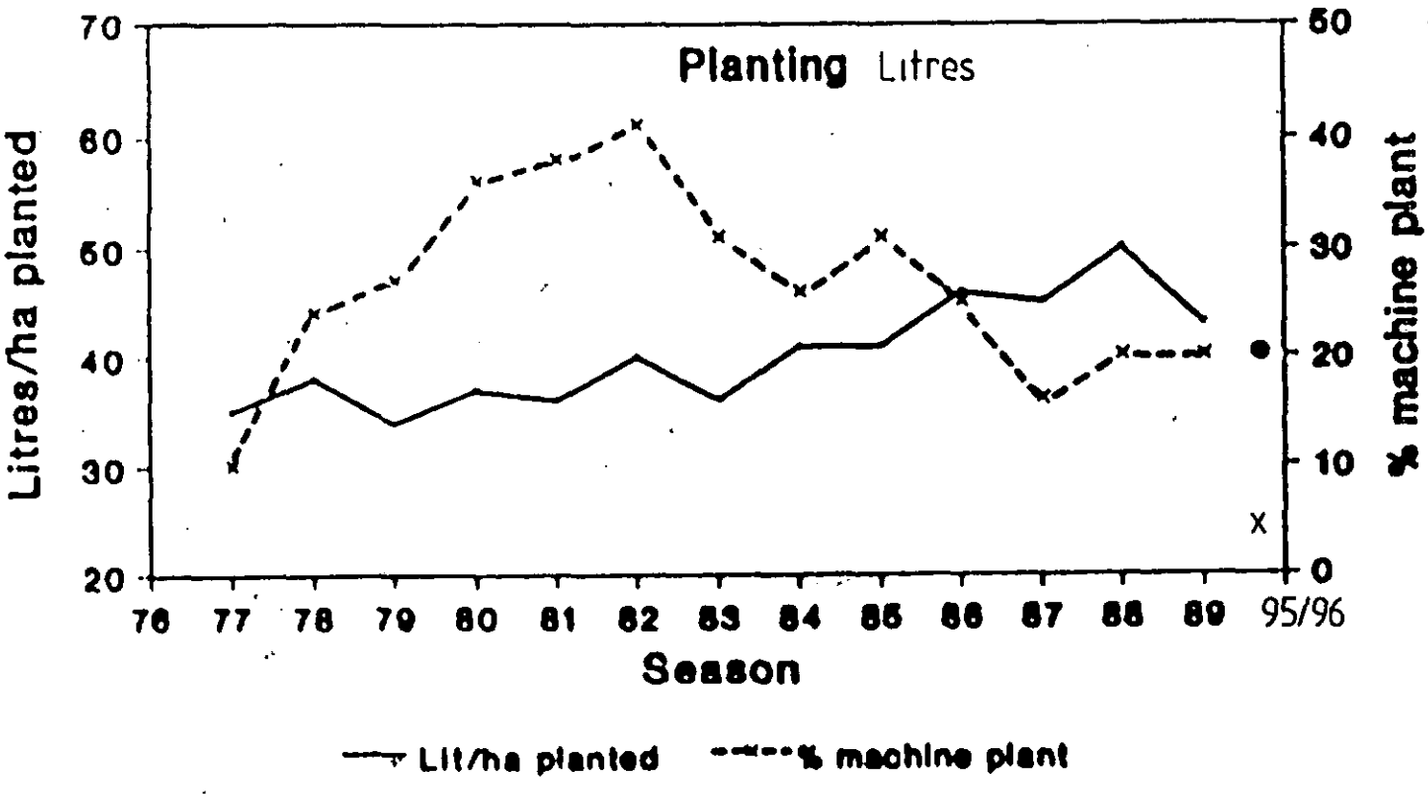


FIGURE 2



LABOUR AND TRACTOR STANDARDS & COSTS (PER HA PLANTED)

TABLE 1

HAND PLANTING

	TONGAAT	WEWE	SINEMBE	INYAN	H/HEAD	B/BURN	CORN	FROST	CRANB	PENC	UMH	B/DRAAI	SHONG	T/VILLE	D/ROAD	TOTAL
PERM LABOUR	4.88	3.99	3.00	3.43	4.00	1.00	3.00	3.15	3.00	2.39	2.38	5.16	2.01	2.00	3.00	3.09
SEAS LABOUR	36.74	24.01	32.00	30.39	28.50	29.00	29.91	37.36	25.00	26.75	27.26	29.91	27.93	16.00	20.00	28.05
TOTAL LABOUR	41.62	28.00	35.00	33.82	32.50	30.00	32.91	40.51	28.00	29.14	29.64	35.07	29.94	18.00	23.00	31.14
LABOUR COST	760.84	534.32	556.22	613.43	604.39	495.95	511.16	740.11	509.37	516.57	528.18	603.04	514.78	337.39	455.78	552.10
WHEEL TRACTOR	40.95	48.00	54.09	53.10	35.01	20.00	45.00	50.00	38.00	39.67	38.06	47.59	45.01	48.00	45.00	43.17
TRACTOR COST	153.15	167.04	186.07	214.52	197.81	105.40	223.20	232.00	159.98	184.07	165.94	250.80	167.89	213.12	199.80	188.05
TOTAL COST	913.99	701.36	742.29	827.95	802.20	601.35	734.36	972.11	669.35	700.64	694.12	853.84	682.67	550.51	655.58	740.15

MACHINE PLANTING

	TONGAAT	WEWE	SINEMBE	INYAN	H/HEAD	B/BURN	CORN	FROST	CRANB	PENC	UMH	B/DRAAI	SHONG	T/VILLE	D/ROAD	TOTAL
PERM LABOUR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.99	0.00	2.65	0.00	0.00	0.00	0.00	0.00	2.32
SEAS LABOUR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00	13.48	0.00	0.00	0.00	0.00	0.00	14.24
TOTAL LABOUR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.99	0.00	16.13	0.00	0.00	0.00	0.00	0.00	16.56
LABOUR COST								327.74		313.40						320.57
WHEEL TRACTOR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.16	0.00	38.15	0.00	0.00	0.00	0.00	0.00	39.16
TRACTOR COST								186.34		177.02						181.68
TOTAL COST								514.08		490.42						502.25

TABLE 2

SUB - OPERATION	HIGH TGT. (41.6 MD/HA)			LOW TVL. (18 MD/HA)			AVERAGE CR. (28 MD/HA)			MACHINE (16.5 MD/HA)		
	LABOUR MD/HA		TRACTOR LITRES/ HA.	LABOUR MD/HA		TRACTOR LITRES/ HA.	LABOUR MD/HA		TRACTOR LITRES/ HA.	LABOUR MD/HA		TRACTOR LITRES/ HA.
	PERM.	SEAS.		PERM.	SEAS.		PERM.	SEAS.		PERM	SEAS.	
PREPARE FURROWS	1		20	1		20.0	1		26			
CUT & LOAD SEED	0.5	3			2			4			6	
SEEDCANE TRANS.	0.5	0.5	15	1		15.0	1		12	1		15
PLANTING	1.5	18			13		1	13		1	8	24
COVERING						13.0						
FERT. APPLIC.		1			1			1			0.5	
TOTAL	3.5	22.5	35	2	16	48	3	18	38	2	14.5	39
		26			18			21			16.5	
WATER APPLIC.	2	2	34									
F.CAKE APPLIC.		20	25									
HAND HOLING STEEP AREAS	2	40						7				