SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

PROGRAMME FOR ANNUAL GENERAL MEETING 20 OCTOBER, 1981

9.30 - 9.45	Chairman's report
9.45 - 10.45	"Labour relations in the sugar industry" - Mr. VAN HEERDEN ~~Mr. J.B. Magwaza~~
10.45 - 11.10	TEA
11.10 - 11.50	"Use of herbicides on a sugarcane estate" - Ken Fell
11.50 - 12.30	"Methods of destumping" - Don Carter-Brown
12.30 - 2.00	LUNCH
2.00 - 2.45	"Sugarcane production in some areas of KwaZulu" - Gavin Wiseman
2.45 - 3.30	"Irrigation practices in sugarcane" - Dudley Crookes

SOUTH AFRICAN SUGAR INDUSTRY

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ANNUAL GENERAL MEETING, 1981

THE USE OF HERBICIDE ON A SUGARCANE ESTATE

by K. Fell

Introduction

Prior to the use of herbicides it was common on Natal Estates, as with many other sugar estates, to have inefficient weed control during the peak labour demand periods of Spring to mid-Summer. A quote from an Agricultural report of the time illustrates the control achieved in the early seventies, the early years of herbicide application."Labour shortages during the period August to December 1974 resulted in very little weed control being practised during this critical growing period. Many fields are infected with patches of Ubabe Grass, which cannot be controlled by herbicides at present. These need year round weeding as fields are harvested, and at peak labour periods labour is not available to carry out this work".

It was in the mid seventies that Management on Natal Estates introduced herbicides into a programmed plan. The success of this programme has led to the easing of the weed burden, particularly on the recent sands,so that from last season a new programme was developed for "clean fields". It is the development of this programme and its application on Natal Estates that will be discussed here.

1. Basic Programme

Because the use of herbicides on sugarcane cannot be seen in isolation it is discussed in terms of the programme as a whole.

1.1. Plant Cane

As plant cane is the most important stage in the life of a crop and it is more susceptible to weed damage at this stage, the basic programme developed in the mid 70's continues to be practised - including minimum tillage fields.

Cont. / Page 2 ...

Table 1. Basic programme of operations for the control of weeds in plant cane.

Operation	Lasso + 2,4-D + Paraquat	Fertilizer Top dressing	Spot weed & Diuron + Actril D.S.	Spot Weed	Paraquat + 2,4-D under canopy
Time after planting	Immediately after planting	+/- 8 weeks	+/- 10 weeks	+/- 18 weeks	+/- 20 weeks

The main difference to this programme from the one previously used is that no inter row cultivation is practised except where planting ridges are excessively high when one cultivation will be included immediately after fertilization - hopefully with shallow ridging this will be the exception rather than the rule.

1.2. Ratoon Cane - trashed

The value of a trash blanket as a weed control measure cannot be disputed, but in view of the large number of vandal fires experienced on Natal Estates it is not always possible to trash our fields. However, in trashed fields with the lower weed burden of the past few years it is sometimes possible to get away with a single application of a relatively cheap post emergent spray - in the case of Natal Estates usually Diuron + Actril D.S.

Table 2. Basic programme of operations for the control of weeds in ratoon cane - trashed

Operation	Spread trash and spot weed	Top Dress	Diuron + Actril D.S.	Spot Weed	Paraquat + 2,4-D	Spot Weed
Time after planting	within 3 weeks	+/- 6 weeks	+/- 10 weeks	+/- 18 weeks	+/- 24 weeks if necessary	Under canopy if necessary

Cont. / Page 3 ..

1.3. Ratoon Cane - burnt

It is in the management of burnt ratoon cane that the major changes and hence cost savings have been made.

Table 3. Basic programme of operations for the control of weeds in ratoon cane - burnt (1976)

Operation	Line trash, top dress, cultivate, Lasso + 2,4-D + Paraquat	Inter-row, cultivate + spot weed	Diuron + Actril D.S.	Spot Weed	Paraquat + 2,4-D
Time after planting	within 3 weeks	+/- 10 weeks	+/- 14 weeks	+/- 22 weeks	+/- 24 weeks

Table 4. Basic programme of operations for the control of weeds in ratoon cane - burnt (1980/81)

Operation	Spot weed and top dress	Diuron + Actril D.S.	Spot weed	Paraquat + 2,4-D under canopy	Spot weed
Time after planting	Within 3 weeks	4 - 6 weeks or after first weeds appear	10 - 12 weeks	+/- 14 weeks	Under canopy if needed

The main change in the programme has been the elimination of cultivation, and hence the lining of tops becomes unnecessary. Because of the success of programmed weed control and the corresponding drop in weed burden it has been possible to substitute a pre-emergent herbicide with a cheaper early post-emergent mixture. Only in some of the more recently acquired land is it necessary to use a pre-emergent herbicide.

Cont. / Page 4 ...

1.4. To illustrate the changes that have taken place over the past 10 years it is interesting to compare weed control costs for the period.

Table 5. Weed control costs/ha harvested at 1980 prices.

YEAR	71/72	72/73	73/74	74/75	75/76	76/77	77/78	78/79	79/80	80/81	AVERAGE
Herbicides (R)	15	17	19	41	56	34	42	39	44	49	
Hand weeding (R)	91	81	75	43	42	47	54	62	60	59	
TOTAL (R)	106	98	94	84	98	81	96	91	104	108	96

Cont. / Page 5 ...

The costs for the past two seasons have been somewhat inflated by the drought and the acquisition of new lands in the Buffelsdraai Estate area, which needed extra attention. On one estate, which is on recent sands, only one application of herbicide was needed - hand weeding costs for that estate being R53/ha harvested giving a total weed control cost of R78/ha harvested.

It is interesting to note that with a decreasing hand weeding cost and increasing herbicide cost the total weed control cost has remained roughly constant at +/- R96/ha harvested, although with a better programming of operations over the past five years or so, more efficient weed control for the same cost is obtained.

2. Herbicide Application on Natal Estates

2.1. Concentrate Mixing

All the estates are served by a centralised mixing plant where concentrates are mixed and decanted into 850 ml concentrate containers (to facilitate transporting to the estates). These are then diluted into 20 litre rondotainers & filled up to the 16 litre mark on the estate. These rondotainers are then moved out into the field on a trailer where one rondotainer fills one CP 3 Knapsack calibrated to apply 300 litres/ha.

It is felt that centralised mixing with a 1 : 1 dilution simplifies herbicide mixing on a large estate and also makes transportation from the mixing plant out to each estate easier whilst eliminating possible error in each estate measuring their own herbicide mixtures. At 18,75 containers/ha it is also easier for estate staff to monitor spraying efficiencies.

2.2. Method of Application

On Natal Estates a CP 3 Knapsack sprayer with a T.K. 2.5 nozzle is preferred to a tractor mounted boom spray, although these are kept as reserve for peak demand periods. Each estate has 8 - 12 knapsacks according to area, giving them the capacity at 1,3 ha/knapsack to do 10 - 16 ha/day.

The main reasons for the choice of hand operated knapsacks over tractor mounted boom sprays are :

2.2.1. The nature of the terrain makes it impossible to spray all the area by machine.

2.2.2. Machine application rates may vary across the slope.

2.2.3. Well trained operators with a supervisor tend to do a better job and are better supervised than a driver/operator on his own.

2.2.4. Although not an important factor considering the cost of chemical applied at 1,3 units/ha (one knapsack + ½ carrier), it is also slightly cheaper to apply herbicide by hand rather than machine.

2.2.5. There is no compaction associated with tractors in the field.

Cont. / Page 6 ...

3. Choice of herbicides

The main factors in the choice of herbicides used on Natal Estates are :

3.1. Cost per time of effective control.

3.2. Simplicity of the system i.e. to simplify mixing and eliminate possible mixing errors. Because of the large amounts of herbicide used, to keep the number of herbicides to a minimum.

3.3. Flowables are chosen in preference to W.P.'s to make mixing easier.

3.4. Because of the large areas to be covered over the peak weed period it is not always possible to spray at exactly the right time or in exactly the right conditions. Cheaper mixtures are, therefore, preferred as a "miss" will cost less. Although bad herbicide applications should not occur, rain storms immediately after spraying and other factors do creep in.

3.5. Because the cheaper herbicides do not give the same length of control one tends to pay attention to a particular field more frequently. Other operations (e.g. FeSo 4 application, spot weeding, split fertilizer application) that may be needed can also be slotted in.

4. Special Cases

Although it may be desirable to stay as close as possible to a standard programme, conditions do vary and one has to take other factors into account. Some "special cases" and how they are handled on Natal Estates are :-

4.1. In recent years the spread of Rottboellia exaltata, at first causing some alarm, has been successfully halted using Diuron + M.S.M.A M.S.M.A. and Rottboellia seam to be tailor made for each other as this grass is very easily controlled by its use.

4.2. For a number of years Cyperus rotundus has been a problem in plant fields on the sands. However, it has been found that Sutan plus incorporated into the soil just before planting gives +/- 7 weeks good control of rotundus. Sutan plus is preferred over Eptam super as it seems to give better control in our situation.

4.3. In sugarcane varieties (especially N8 on Natal Estates) that are very susceptible to herbicide damage, M.C.P.A is used in preference to Actril D.S. mixed with Diuron. For the same reason Bladex plus is being considered this season.

4.4. Because Ametryne seems to give better results than Diuron in dry conditions, it is intended that Ametryne will be used up to the first Spring rains next season.

Cont. / Page 7 ...

4.5. Dirty conditions. In dirty fields , or fields with a bad grass problem, M.S.M.A. is added to Diuron + Actril D.S. or substituted for Actril as a post-emergent spray. It has been found to control Sorghum and young Panicum maximum, as well as setting back large old stools of Panicum and Paspalum. It has been used as a directed spray against Paspalum sp at higher rates with success. M.S.M.A. has, on occasions, done damage to the cane although this has been slight, and for this reason, it is not used on young plant cane.

ACKNOWLEDGEMENT

In concluding, although I would like to claim credit for the success of the weed control programme, as a relative newcomer to the Company most of the credit is due to my predecessors and to the Management of Natal Estates.

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

D.H. CARTER-BROWN

C.G. SMITH SUGAR LIMITED - ILLOVO

DESTUMPING TECHNIQUES

The practice of destumping timber lands and subsequently planting these lands to sugar cane has been undertaken in various ways over the last two decades throughout the Sugar Industry of South Africa.

To-date it would appear that in spite of all the destumping that has taken place in the past, there is still no hard and fast rule - or recommended way - that a farmer or Sugar Company should go about destumping.

The content of this paper outlines and discusses four methods of stump removal that are being practiced in the Sugar Industry today.

The four methods of destumping are as follows:

- Bulldozing
- "Toothpick"
- Grinding
- Chemical

BULLDOZING

A crawler tractor of approximately 100 kW is used to push the stumps out of the ground with the bulldozer blade.

"TOOTHPICK"

A mechanical excavator of approximately 100 kW is fitted with a curved ripper shank at the end of the boom. The ripper shank is used to loosen the stump and finally to extract the stump from the soil - hence the name "toothpick".

GRINDING

A mechanically/hydraulically driven cutting disc is used to "shave" the stump. The shaving process is continued until the stump is completely eradicated.

CHEMICAL

Standing stumps are treated with a chemical to inhibit regrowth - this is applicable in the case of Eucalyptus.
Chemical applications can also be used on young Wattle trees.

When considering which of the four methods to use, it is felt that the following criteria should be considered before a decision is reached.

Time Factor

Topography

Soil Types

Degree of Mechanisation (in crop management)

Financial Implications

Consider first;

THE BULLDOZING TECHNIQUE

Time Factor

A 100 kW bulldozer would destump approximately one hectare per day. The stumps would then require approximately six weeks to dry. (Eucalyptus). They would then have to be stacked and burnt. Further delays could be encountered due to burning regulations.

Topography

Crawler tractors are stable and can be worked in steep terrain.

Soil Types

As a result of the large amount of soil disturbance that takes place, this method is not recommended for shallow or highly erodable soils.

Degree of Mechanisation

As most of the stump and root material is dislodged from the soil in the destumping operation, fully mechanised crop management systems can be implemented.

Financial Implications

Based on present day costs, a bulldozer operation would cost between R380 and R420 per hectare. Subsequent follow up operations in disposing of the stumps once they have been dislodged from the soil would cost between R120 and R200 per hectare.

THE TOOTHPICK TECHNIQUE

Time Factor

Approximately one hectare can be destumped per 12 hour shift. Stump population and stump size have a significant effect on production as each stump is individually extracted. As with the bulldozer technique, delays in burning of the stumps are encountered.

Topography

Mechanical excavators are not as stable as Bulldozers because the machine has to "reach" for each stump. It is felt that this technique could not be used on slopes steeper than 25%.

Soil Types

As each stump is individually extracted, there is little disturbance of the soil between stumps. In weaker, sandier soils, the disturbance is less than in heavy, clay soils where the soil binds to the roots.

It has been found that in sandy soils the stumps are generally free of sand when extracted. This makes the stacking and burning of stumps easier and good, clean burns are achieved.

The soil erosion hazard with this technique is less than the bulldozer technique as a result of less disturbance.

Degree of Mechanisation

As most of the stump and root material is extracted from the soil in the destumping operation, fully mechanised crop management systems can be implemented.

Financial Implications

Based on present day costs, a toothpick operation costs in the region of R400 - R450 per hectare. Subsequent follow-up operations in disposing of the stumps would cost between R120 and R200 per hectare.

THE GRINDING OPERATION

Time Factor

During a normal working day a grinding unit can dispose of between 300 and 400 stumps. No burning or follow-up operations are required and land preparation for planting can follow directly behind the grinding operation. A fairly high percentage of the roots are brought to the surface during land preparation and gleaning of these roots is required.

Topography

As most stump grinders are tractor mounted, they can be operated on any slope less than 30%.

Soil Types

As very little soil disturbance takes place this method can be used on virtually any soil type. This method is not recommended where there are stones present in the soil as a high degree of mechanical damage is incurred to the tungsten cutting tips when striking stones.

Degree of Mechanisation

As all stumps are removed to below ground level, fully mechanised crop management systems can be implemented. During the initial land preparation, mechanical damage, particularly to ridgers, is

THE GRINDING TECHNIQUE

Degree of Mechanisation (Continued)

high as a result of the root structure of the stump being left in situ. It is felt that when using this technique, disc type ploughs and ridgers should be used in the initial preparation.

Financial Implications

Operating costs of stump grinders is between R350 and R450 per hectare. Tungsten cutting tips are the highest cost item and cost in the region of R120 per hectare. Generally it is found that these machines require a very high degree of maintenance. Gleaning operations cost between R15 and R25 per hectare.

CHEMICAL TECHNIQUE

Time Factor

Various types of chemical are available for killing coppice and regrowth. Certain of these chemicals are applied to the stump when the trees are felled, while others are sprayed onto standing coppice. Generally it is found that subsequent spot spraying is required as a follow-up. Depending on the chemical used, this can be done once the new crop is planted.

Topography

As this type of chemical application is generally done by hand, virtually any topography can be treated.

Soil Types

No soil disturbance takes place, therefore this technique would be recommended for highly erodable soils, particularly in steep terrain.

Degree of Mechanisation

As the stumps are left standing above the ground surface, very little mechanised crop management can take place. This method is suited for minimum tillage and maximum labour intensive practices.

Financial Implications

The cost and type of chemicals varies extensively, but based on present day costs this technique costs between R60 and R120 per hectare. Subsequent planting operations will be higher than normal as they are labour intensive.

RESULTS OF A PRACTICAL SITUATION

The following table shows the labour and mechanical standards achieved by Illovo Sugar Estates Ltd. These standards have been achieved since March 1981. Two methods of stump disposal have been used, namely:

Toothpicking

Stump Grinding

Operation	Toothpick	Grinding (3 Units)
Stacking and burning of brush	3,8 md/ha	3,8 md/ha
Destumping costs	R405/ha	R402/ha
Stacking of stumps - mechanical	R72/ha	0
Stacking of stumps - labour	24 md/ha	0
Collecting of roots	5 md/ha	8 md/ha
Area done to-date	251 ha	101 ha

As can be seen in the table above, the significant difference in standards between the two systems is the disposing of the stumps once they have been extracted from the ground, as in the case of the toothpick. On the other hand,though, the work rate of the one toothpick is significantly higher than the three stump grinders and it was for this reason that this machine was used. The soil type in this case was generally T.M.S. and to minimise the erosion hazard toothpicking was used in preference to bulldozing.

It can be concluded that any destumping operation will be expensive. When small areas of stumps require destumping, overall costs may be kept down by using a contractor in spite of the unit area cost being high (i.e. no capital investment in destumping equipment is required). Conversely, the cheaper chemical approach may necessitate the implementation of a new crop management technique requiring extensive in-field road networks, new cane harvesting techniques and cane trailers. It is felt though, in spite of the cost implications, serious consideration should be given to the soil type and topography as in most cases destumping results in the soil being subjected to a completely new form of crop husbandry (i.e. from timber to cane).

AGRONOMISTS' ASSOCIATION

SUGAR CANE PRODUCTION IN THE MAPHUMULO DISTRICT OF KWA-ZULU

By

GAVIN WISEMAN

GDRW/JB
7th October 1981

1. INTRODUCTION

Glendale Sugar Millers (Pty) Ltd have for many years wished to increase the supply of cane to their mill but various circumstances prevented additional tonnage being derived from the Sugar Industries traditional sources, viz White and Indian Growers.

The advent of the Sugar Industry's Small Cane Growers' Financial Aid Fund (F.A.F.) in 1973, coupled with the allocation of a considerable amount of quota for distribution to farmers in Kwa-Zulu, paved the way for most mills, including Glendale, to derive a supply of cane from Zulu farmers farming within Kwa-Zulu. Following this came the recommendation by the Delimitation Commission in 1975 that Glendale mill and its environs be incorporated into Kwa-Zulu and this resulted in a substantial amount of Kwa-Zulu's newly acquired quota being earmarked for allocation in the Glendale mill area.

Glendale thus found itself with the possibility of generating the additional cane supply which it desired.

2. PRELIMINARY STEPS

2.1 SURVEY OF THE MAPHUMULO DISTRICT

Before commencing any large scale development operations in Kwa-Zulu, a survey of the Maphumulo District was carried out to determine the most suitable localities for cane growing within an economic haulage distance of the mill.

Rainfall, soils, topography and temperature were the basic criteria used in determining the suitability of any locality.

2.2 DEVELOPMENT OF COMMUNICATIONS

The Kwa-Zulu Department of Agriculture undertook the construction and maintenance of the necessary main haulage roads, transhipment zones and infield road systems and are, in fact, still actively engaged in this programme.

2.3 CREDIT SOURCES FOR PROSPECTIVE FARMERS

Both the Small Cane Growers' Financial Aid Fund and the Corporation for Economic Development (C.E.D.) supply loan finance to Zulu cane farmers, both sources currently advancing credit at an interest rate of 8% per annum.

2.4 PROVISION OF CAPITAL EQUIPMENT

Capital equipment in the form of tractors and machinery was provided by using a combination of company owned and hired machinery. Hired machinery was initially obtained from White Contractors who also carried out a portion of the development programme.

The current position ...../PAGE TWO

The current position is that heavy plant is hired from Plant Hire Companies while wheel tractors required in excess of the Company's own machinery comes from local Zulu Contractors.

Six Zulu owned tractors are currently engaged in the land preparation and planting programme.

3. CULTURAL PRACTICES

The policy adopted by Glendale in Kwa-Zulu is to develop uniform cultural practices in any locality.

This uniformity is dictated by the very small area of cane grown by the average grower. Compounding the problem of small land areas is their scattered nature.

3.1 SEED CANE

This is the most difficult commodity to plan for and provide.

Glendale's development programme is standardised at present on variety NCO376 with a small amount of 293 (now discontinued) and an experimental planting of N12 for high altitude areas.

Seed cane is drawn from 3 sources, viz. Glendale Estate, White commercial seed cane producers and H.T. seedbeds established on Zulu growers' land.

3.2 ROW SPACING

To encourage a quick canopy for weed control purposes, a universal row spacing of 1 metre is used.

3.3 FERTILIZATION

3.3.1 AT PLANTING

The majority of Glendale's development areas have hitherto fallen in high altitude areas comprising mostly T.M.S. derived soils and in these areas, two basic fertilization patterns are followed:-

(a) Umpumulo Area

All lands receive an application of 3 tons/hectare of Dolomitic lime incorporated before planting.

Thereafter, 1 200 kg 2:3:4 (30) is applied in the planting furrow. This supplies 80 kg N, 120 kg P and 160 kg K per hectare. No topdressing is applied before harvest.

(b) Newspaper Area

All plots are sampled in this area to determine:-

(i) the need for lime; and

(ii) the need for additional P application.

Depending on F.A.S. recommendations, plots would be fertilized as follows:-

All plots would receive 1 200 kg/hectare 2:3:4(30) + zn. Where necessary they would receive a maximum of 3 tons Dolomitic lime and/or 1 000 kg Supers 10.5 per hectare. Lime would be broadcast and incorporated. Supers is placed in the furrow together with 2:3:4.

The difference in policy between Umpumulo and Newspaper arises from the greater uniformity of soils on the Umpumulo plateau as opposed to the Newspaper area.

Lower altitude areas, moving out of the T.M.S. soils, have according to F.A.S. recommendations, a very high P requirement but no K requirement. Fertilization here consists of 1 100 kg Saaifos 16 + zn and 200 kg LAN(28). This supplies 98 kg N and 134 kg P.

3.3.2 RATOON TOPDRESSING

High altitude areas receive a standard application of 600 kg 5:1:5(45) supplying 122 N, 25 kg P and 122 kg K while the lower altitude areas receive either 250 kg urea or 500 kg 4:1:0(30) per hectare depending on average F.A.S. recommendations.

3.4 LAND PREPARATION AND PLANTING

Glendale's policy in land development in Kwa-Zulu areas is to assist farmers on an individual basis with those operations which they cannot perform for themselves.

A few farmers require no assistance apart from the supply of seed cane and fertilizer while a fair number are able to do their own fertilization and planting after their land preparation has been performed for them.

The majority of farmers, however, require assistance with all operations.

Of the 650 hectares of development on the 1981/82 programme, about 50% will be performed with Company equipment while 50% will be performed by local Zulu Contractors supervised by Company staff. These Contractors perform the complete operation from land preparation to planting.

Conventional methods of land preparation are employed. In the case of Company machinery, the rip and disc method is followed while Zulu Contractors prefer to use a mouldboard or disc plough. Several of them have reversible mouldboard ploughs.

3.5 WEED CONTROL

Lack of adequate weed control is probably the greatest single danger to any sugar cane development programme in Kwa-Zulu.

Glendale's policy is at present to use hand labour only for weed control. The reasons for this are -

(a) The availability of adequate labour in the development areas;

(b) A desire to provide paid employment to the maximum number of people possible in development areas; and

(c) Problems of finding water in suitable localities and the difficulty of closely supervising herbicide programmes in remote areas.

3.6 AGE AT HARVEST

The current policy is to harvest cane in high altitude areas at about 22 - 24 months of age.

When adequate rainfall permits, cane in the Umvoti Valley is cut annually.

4. PROGRESS OF THE DEVELOPMENT PROGRAMME AND RESULTS OBTAINED

Table I reflects the progress of the Development Programme and the total amount of cane delivered to Glendale mill from Kwa-Zulu from the 1967/77 season.

5. INTERNAL FACTORS LIMITING SUGAR CANE DEVELOPMENT IN KWA-ZULU

5.1 PHYSICAL FACTORS

5.1.1 SMALL LAND UNITS

One of the major factors affecting the cost of development and the long term viability of cane farming in Kwa-Zulu is the small size of land holdings in most ecologically suitable tribal areas. Glendale's experience is that the average black cane farmer has 2,40 hectares of sugar cane, this average arising from a range of between 0,5 hectares for the smallest and 36 hectares for the largest grower.

There is a considerable locality variation within the Maphumulo District, the Otimati area averaging 1,4 hectares per grower, while the average Umpumulo grower farms 4 hectares.

The difficulties associated with developing scattered plots of land of this magnitude are easy to imagine.

5.1.2 LACK OF INFRASTRUCTURE

5.1.2 LACK OF INFRASTRUCTURE

Non-existent or poor roads are an invariable feature of tribal areas. Glendale's experience has generally been that road infrastructure has followed cane development, making the initial introduction of cane into an area a major exercise.

Other associated difficulties when working up to 50 km from base are factors such as lack of housing for area staff, lack of secure bases for storing valuable (and much sought after) commodities such as fertilizer and diesel fuel, rudimentary telephone systems ~~and~~ very poor postal services and a lack of trained induna level management.

5.1.3 LACK OF PHYSICAL PLANNING IN TRIBAL AREAS

As yet no tribal area in the Maphumulo District has been planned, resulting in a random settlement of people and a patchwork of arable lands, grazing camps and woodlots. Under this type of random settlement it becomes impossible to materially alleviate the diseconomies of working small plots by concurrently ploughing contiguous plots.

5.2 SOCIOLOGIAL AND ECONOMIC FACTORS

5.2.1 THE TRIBAL SYSTEM

When undertaking development work in a tribal area, it is essential to understand the workings of the tribal system with its hierarchical structure, its common grazing patterns and its resulting effects on the planting of perennial crops.

For the developer, this basically means that for any individual to plant sugar cane on his arable allocation, there must be consent from the Chief and the community, especially if a "White" Company is involved, before cane is planted.

The tribal system also results in strong tribal bonds within any Chief's ward and and a great reluctance to co-operate with people from neighbouring wards, no matter how artificial the ward boundaries may be.

5.2.2 LAND TENURE

While land is communally held in Zulu tribal areas, land is very seldom communally worked and it is a fact that once people have been allocated a residential and arable lot, they have surprisingly secure tenure of that land.

Glendale's experience ../PAGE SIX

Glendale's experience is that the system of land tenure alone is not a significant restraint to cane development.

5.2.3 THE DUAL ECONOMY

A factor of major importance, indeed of overwhelming importance, in cane development in Kwa-Zulu is the dual nature of the South African economy. Because of the large number of employment opportunities in the "White" sector of the economy it becomes unnecessary for all but a very few people living in the tribal areas to look to these areas for their total livelihood. People regard land in tribal areas more as a security than as an economic asset.

5.2.4 ASSUMPTION OF RESPONSIBILITY IN ZULU SOCIETY

To the outsider trying to work in Kwa-Zulu, Zulu society gives the impression of being the ultimate in non-responsibility.

There is a very great reluctance on the part of any individual to accept responsibility for his actions.

5.2.5 LOW STANDARD OF EDUCATION

A major problem in communicating the administrative and accounting aspects of cane development to tribal people is the very low standard of literacy and numeracy pertaining in rural areas, innumeracy being the major problem area.

Basic arithmetic and accounting concepts are generally not understood and are very difficult to explain to the innumerate.

5.2.6 COMMUNICATION WITH TRIBAL PEOPLES

People from a Western European ethnic background experience great difficulties in communicating with Zulu tribal people, these difficulties going far beyond a purely language barrier.

It may, in fact, be said that fluency in a common language merely assists people to talk past each other more easily.

The person trying to communicate with tribal people on a matter such as cane development must have a basic understanding of the tribal system under which the rural Zulu person lives and the restraints placed upon him by this system, by his low standard of numeracy and by his relative unsophistication in commercial matters.

Rural people have .../PAGE SEVEN

Rural people have very little access to telephones and most will just arrive unannounced at any time of day (and sometimes night) to discuss a problem. Very often this person has no real problem, but would like a sympathetic shoulder to cry on and leaves much happier for having unburdened his heart.

The cane developer has a very real problem in that his development must be economically sound and a careful path must be steered between over sympathy with the problems of rural tribal people and economic realities.

TABLE I

AREA PLANTED BY GLENDALE SUGAR MILLERS (PTY) LTD PER ANNUM IN KWA-ZULU AND TOTAL TONNES HARVESTED FROM KWA-ZULU 1976/77 TO 1980/81 AND ESTIMATES FOR 1981/82

SEASON	HA PLANTED	TONNES CANE HARVESTED	ZULU CANE AS % OF TOTAL GLENDALE CANE
1976/77	40	24 842	9,7
1977/78	557	26 365	11,0
1978/79	698	40 657	15,7
1979/80	535	65 684	22,9
1980/81	810 *	52 316	34,5
1981/82(Est.)	650 **	81 500	26,7

* Includes 94 Hectares re-development.
** Will include 100 Hectares re-development.

Yields per hectare cannot be derived accurately from the above Table because the total yields include cane cut from fields developed by self-motivated growers without assistance from Glendale.

Yields vary considerably from locality to locality but yields to date this season reflect the following:-

Umpumulo	90 tons/hectare at 24 months
Newspaper	68 tons/hectare at 24 months
Maqumbi	61 tons/hectare at 19 months
Mthandeni Irrigation Scheme	105 tons/hectare at 11 months

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

SOME ASPECTS OF IRRIGATION OF SUGARCANE

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There are numerous surface and overhead irrigation systems in use throughout the industry at present. Some of these systems are outlined below.

1. LAND FORMING AND LAND SMOOTHING

In planning any irrigation system the grower must consider how much earth will have to be moved to facilitate good drainage. The amount of earth to be moved will very often dictate whether a sprinkler or surface irrigation system should be installed.

1.1 Land forming and land levelling is the operation of redesigning the soil surface to facilitate the movement of water in a specific direction - Cut and Fill.

1.2. Land smoothing is the operation involved in moving a minimum amount of soil to iron out any small irregularities on the soil surface.

2. SURFACE IRRIGATION

Irrigation type	Cost/ha.	Advantages	Disadvantages
a) Contour Layout Spade or Syphen	± R100 Dependant on topography	Low cost	Varying line lengths. Poor irrigation efficiency. Poor labour utilisation. Difficult to manage. Annual maintenance on earth contour furrow. Poor land utilisation.
b) Herring Bone Layout	Varies - dependant on method of extracting water from supply furrow	Constant line length Excellent labour utilisation Good irrigation efficiency Simplified management Low maintenance cost	Permanent concrete furrow limits mechanical operation efficiency. If headlands on either side of furrow are not planted this leads to poor land utilisation and weed problem area
2.1 SOME FORMS OF HERRING BONE			
a) Spile and Syphon	± R600 depending on soil type and line length	as in 2 (b) above	as in 2 (b) above
b) Corrugated Furrow	± R400 depending on soil type and line length	as in 2 (b) above, however, maintenance costs lower than for spile or syphon	as in 2 (b) above

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Irrigation type	Cost/ha.	Advantages	Disadvantages
c) Gated Pipe	± R900	as in 2 (b) above, plus better land utilisation and more efficient use of machines.	High initial cost. Varying head of water - on sloping land this affects discharge of outlets, decreasing irrigation efficiency.

d) Portable Furrow : If one could be manufactured at a reasonable cost, most of the disadvantages listed above would be eliminated.

3. SPRINKLER IRRIGATION

Irrigation Type	Cost/ha.	Advantages	Disadvantages
a) Conventional Portable	± R750	Cost - reasonable Medium pressure ± 3,8 Bars at the hydrant.	Labour intensive High maintenance cost Wind distortion
b) Dragline	± R1 150	Quick cycles Flexible application of water Labour saving Medium pressure ± 4,2 Bars at the hydrant.	Fairly high maintenace costs on dragline and tripods Difficult to manage sprinkler changes if moves required at night.
c) Travelling Gun	± R1 100	Labour requirement minimal Can be moved from field to field with minimum of fuss Advantage in supplementary irrigation areas Quick and easy to install Ease of management Better land utilisation- fewer laterals	High working pressure at hydrant of 5 to 6 Bars. Therefore high running costs High maintenance costs Vehicle required to move traveller at end of each run Wind distortion
d) Centre Pivot	R1 300 dependant on area to be irrigated. above on 85 Ha.	Permanent labour not required Medium pressure of 4 Bars at the Pivot Cycle times can be adjusted Can apply 5mm/ha on 85ha in 24 hours Can be used on most soils Even distribution of water Quick to install Able to apply both fertiliser and chemicals	Unknown maintenance costs at this stage Can only be used on large lands of from 800 metres in diameter Poor land utilisation on edge of circle Difficult to move from one area to another Wind - although not to the same extent as any of the other systems listed above Land topography can be a limiting factor
e) Drip Irrigation	± R2 000	Very low operating pressure of 1,2 Bars at hydrant Excellent control of water Cycle times can be adjusted Ability to fertilise Evaporation losses reduced Distribution of water better than any other form of irrigation	Water has to be filtered High installation cost Problems with drippers clogging which will only be discovered once crop is showing stress The practicalities of installing 3,3km of dripper line per hectare each year and withdrawing and storing this quantity prior to harvest

3./ ----------

Irrigation type	Cost/ha.	Advantages	Disadvantages
			If the line is buried - the problems of trenching and maintaining 3300 drippers per hectare. The cost of burying the dripper lines will escalate the cost of the system dramatically because of heavier wall pipe being required. Design and survey are absolutely critical as the margin for error is limited by the very low working pressure required for drip. In undulating topography it will become necessary to ensure that the lines extracted prior to harvest are returned to the same area from which they were taken Maintenance of drip lines placed on the surface is likely to be high and will always be vulnerable to fire.