

# THE PROBLEM OF MOVING SUGARCANE FROM WET LANDS BY MECHANICAL MEANS

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## Introduction

The problem of moving cane from wet lands is not a new one to the industry, but has become more accentuated of recent years in view of the developments with infield loading by mechanical means.

## Areas Affected

The areas more particularly affected by this problem are those alluvial flats with a high water-table situated in high rainfall areas. There are many other areas in the industry which are also affected, such as heavy clay lands and land overlying hardpan or an impervious layer of "oukclip" or "ngubane", but these usually only form a small portion of a farmer's holding and can be dealt with during the dry winter months. Nearly all lands in the industry are to some extent affected by this problem during an exceptionally wet summer such as was experienced during 1957-58, with the possible exception of the sandy areas, where a problem similar to this is faced under dry conditions.

## The Problem

The problem is to provide an economical means of moving sugarcane from wet and boggy fields (with a minimum usage of labour), without cutting them up and thus unnecessarily repressing the yield from future ratoons. In some cases under extremely adverse conditions the problem is to get the cane cut without regard for the subsequent ratoons.

The alluvial flats which are amongst the most fertile, economic and well watered areas in the industry are more often than not served by tramline systems to move their cane. The individual task and bonus systems which tramline allows, coupled with the fact that nearly all cane from the flats is burnt, have proved an attraction to labour seeking employment in the industry, and consequently farmers on the flats have not experienced any particular shortage of labour up to now.

The advent of self loading trailers and other methods of infield loading by mechanical means, however, has now brought individual tasks and bonus systems within the reach of any farmer not previously on a tramline system. These systems of infield loading also have the effect of divorcing the labourer from dependence on the arrival of tramtrucks from the mill to complete his task.

The result of this development is that the labourer seeking employment in the industry is now anxious

to work on those farms which employ mechanical means of infield loading, as opposed to the flats which use infield tramline necessitating a long carry by hand.

Infield loading by mechanical means is adaptable to the alluvial flats during the drier periods of the year, but breaks down seriously during the wetter periods of the cutting season owing to a lack of traction and the sinking of both tractor and trailer.

This problem is not impossible to solve. The main difficulty, however, is to find a method of working which can be adapted readily to both wet and dry conditions and which is within the economic means of the grower.

## Past and Present Efforts to Solve this Problem

In order to arrive at a possible solution to this problem it would be as well to consider what has been done by various farmers who have been faced with this difficulty in the past, and at the same time enumerate some of the difficulties and disadvantages of the infield tramline system particularly under wet conditions.

### Infield Tramline

1. Labour is required to move and lay the infield line.
2. Cane has to be carried for long distances by hand.
3. Tram track sinks and sags under wet conditions and derailments are common and require additional labour to relay track and reload fallen trucks.
4. In bad cases cane has had to be used as ballast for infield line. This is hardly economic.
5. Fields are cut up badly, particularly by tractors etc. when hauling out loaded trams.
6. The wear and tear of infield track, trams, tractors and animals where used, is high under wet conditions.

### Tracked Wagons

These wagons were used by Mr. Tony Colenbrander on the Tugela flats about 25-30 years ago. They were fitted with tracks similar to those on a crawler tractor, and although they were reasonably successful in avoiding sinking, the draft was far too heavy for anything then available to pull them. This old effort

may offer an idea for the future with the tracks driven through a powered axle.

The tracks and final drives of a discarded crawler tractor might well form the basis of a trailer to move cane out of extremely wet fields. The tracks would be driven from the hauling tractor's power taken off through a slip clutch to the final drives. The wider the track plates the more effective the system might be.

#### **Old Ships' Plates**

This is another method which was used by Trevene Estates of Inyoni about 25-30 years ago. The plates were used to form a strip road into the wet field along which a lorry was backed, loaded and then driven out. The system was very successful, but required additional labour to constantly move the plates to the next loading position. This method still offers a solution to the problem, provided ships' plates or some similar material can be purchased at a reasonable price, and the length of haul is not excessive.

#### **Dual Wheels on Self Loading Trailers**

This system is a help under moderate conditions but is not the solution, otherwise they would be universally used by those confronted with the problem of wet fields. Dual wheels must be very carefully attended to, particularly when used on collodial soils, otherwise the mud which packs between the wheels, will, on drying out, crack rims or strip wheel nuts and studs.

#### **Powered Axle**

This system is at present being used by Est. R. Kramer at Gingindhlovu. The self loading trailer has been constructed using a heavy duty lorry rear axle with large dual wheels. The axle is driven from the tractor power take-off through a gearbox. A slip clutch has been incorporated in the drive, which automatically allows for any difference between the forward speed of the tractor and the driven speed of the trailer wheels. This system works very effectively provided reasonably small loads are handled. This particular trailer has been constructed to take 10 tons, which unfortunately has the effect of defeating its own object. This system has possibilities if used in conjunction with a 4 wheel drive tractor, a tractor fitted with half tracks or large field tyres. The trailer could then be fitted with half tracks. It must be stressed however, that loads should be confined to a limit of 3 tons.

#### **The Sommerville System**

This is a method of working which has been devised by Mr. Dick Sommerville of Gingindhlovu who has a very definite wet land problem, as his farm for the most part overlies a layer of impervious "ngubane".

The system is briefly as follows.

Cane is cut, trashed and stacked by the cutter into bundles of about 1 ton. A chain is then placed around the bundle and it is picked up by a device, designed and constructed by Mr. Sommerville, and transferred to a home-made crane at the roadside, where the bundles are loaded onto trailers of about 8 ton capacity for direct delivery to the Amatikulu Mill.

The infield device is two wheeled, using old Ferguson rear half-shafts and wheels and constructed to form a 14 ft. axle. On to the axle are welded two U frames which form a cradle rather like the v.d. Watt trailer. The U frames are lowered for insertion of the lower prongs under the bundle and raised to lift the bundle into the cradle by means of a double acting hydraulic ram. The drawbar is attached to this axle by two hinges and the whole unit is operated by a 35 h.p. tractor. The bundles are tipped off at the crane by reversing the loading process.

Mr. Sommerville is very satisfied with the system and has had no difficulties operating under wet conditions during the past season. He feels, however, that his device might be improved by using 14x30 tractor wheels and tyres instead of the smaller Ferguson rear wheels at present in use. The system is reasonably fast and should be adequate to handle 40 tons a day comfortably.

It must be stressed again that the secret of success of this system is the small size of the bundle handled which reduces to a minimum the possibility of sinking.

#### **Skids on Self Loading Trailers**

This is a method of pulling the self loading trailers on to two steel skids, about 30" x 18", immediately prior to pulling on the load. The skids are attached to the trailer frame by chains. The skids prevent the narrow trailer wheels from sinking and the load is sledged out of the field until a hard road is reached, where the trailer is backed off the skids. These are then detached from the trailer.

The disadvantages of this system are that the skids tend to build up trash in front of them and that the draft is increased greatly, which has the effect of making the tractor sink or dig itself in. It is however, a cheap and effective means of overcoming the problem where conditions are not too severe and sufficient power is available to sledge the trailer out without digging in.

#### **Winches on Tractors**

An effective means of providing positive movement to tractor and trailer is to attach a winch to the front end of the hauling tractor. With the cable suitably anchored ahead of the tractor, the winch when driven draws tractor and loaded trailer forward thus reducing sinking to a minimum.

This system has been seen to pull a tractor and loaded trailer through a ploughed field with the tractor in neutral.

#### **Toft Loader**

This is an Australian loader mounted on a wheeled tractor, at present being used by Mr. Harry Proksch on the Umfolozi flats. Mr. Proksch hopes by means of this loader, which moves cane from the cutting face towards the permanent tramline in small bundles of less than 1,000 lbs., to overcome the wet land problem. He is satisfied with the operation of the loader, but not much information has been gained of working under wet conditions, and developments with this machine will be watched with interest.

#### **Possible Future Solutions**

*Drainage*—This would appear to be the obvious solution to the wet land problem, and to a large extent is the most likely solution where the wet areas only form isolated pockets on a farm. It should be obvious to all that under these conditions permanent tile drains should be laid, as advocated by Mr. Frank Jex many years ago, so that the passage of tractors, implements and trailers is not impeded by open furrows.

On the large alluvial flats which usually have a high water-table, drainage is a real problem, particularly in view of their topography. Drainage into sumps, such as is being done on parts of the Umfolozi flats using Dragline loaders or dredgers offers a possible alleviation of the problem, but here again economics enter into the question. Dragline loaders are expensive items of equipment and the removal of spoil could be a major undertaking. Communal ownership of a dragline loader or the digging of sumps on a contract basis might bear investigation.

*Low Pressure Tyres*—These sausage-shaped tyres, about which we know very little at present, might offer a possible solution by stopping trailers from sinking, but it is thought that they may increase the draft and this will have to be investigated. The question of draft could be overcome as mentioned earlier, by using 4 wheel drive tractors, or tractors fitted with half tracks or rice field tyres.

It should be pointed out that half tracks do not necessarily stop a tractor sinking under very wet conditions, but they do increase traction.

#### **Conclusion**

It has been shown that the problem of moving cane from wet lands by mechanical means, is to arrive at an economic solution that will avoid sinking and digging in of tractor and trailer, and will be readily adaptable to both wet and dry conditions.

It has been pointed out that in very wet seasons the whole of the industry is affected by the problem

of wet lands, and that isolated areas of wet land occur on most farms, but that for the most part the areas mainly affected are those alluvial flats with a high water-table where conditions become difficult if not impossible even after a moderate rain.

Systems which have been used in the past and others which are at present in use have been enumerated and their possible future adoption has been discussed.

Methods of approaching the problem in the future have been briefly stated.

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**Mr. Main** asked if any cost data were available in the comparison between the various systems. He also asked if there was any information about Mr. Wood's self-loading trailer.

**Mr. Morris** replied that whilst no cost figures were actually available at the moment, in the case of wet lands the main point was to get the cane off, and whilst economics must be carefully gone into, it must be expected that extra costs would be incurred.

**Mr. N. F. McIver** described the sledge type trailer which had a full sheet attached to the sledge's bottom; this did not cause any trouble as far as building up of trash was concerned. It was moved about the field by winch on a tractor.

**Mr. Morris** said that this was possibly the answer to getting the cane out of the field, but the difficulty remained of getting the sledge back to the cutters. It either had to be moved by mules which puddled the fields, or some other way.

**Mr. A. C. Barnes** said that this was not a problem peculiar to Natal. He said that an opportunity now occurred when our representatives were going overseas to study the methods used in other countries. In the West Indies the answer was found to be the use of a very light trailer with very light loads. The grower invests in a system which can move his cane speedily under normal conditions and wet land was not a normal problem to them, but when it did come along then the equipment normally used was not satisfactory. The person concerned either had to adapt the machinery that he had, or invest in special equipment for these special conditions. This equipment would probably lie idle for many months in the season. He described the system where four wheel rubber-tyred trailers were used, the rear wheels being placed further apart than the front ones. He had seen a method used in Uganda where the tramline tracks are laid permanently at a distance of 600 ft. apart. These tracks are solid and sinking very seldom occurs. The cane is carried by hand to the side of the portable track.

**Mr. Steward** did not agree with the statement made about labour. His firm had various methods of transport and he had found that the attraction of the labour to the various methods showed no particular preference. Some loaders accustomed to loading tram trucks preferred to continue with that method, while some of the newer loaders preferred loading into stacks for infield trailers. Although it paid the individual planter to use stack loading, as far as the labour was concerned, they were not at all attracted to any one system.

**Mr. de Robillard** asked how far the labour had to carry cane from the cutting face to the tramline.

**Mr. Morris** said that the distances varied. When labour had only to carry to a stack, the distance was always considerably reduced. The whole approach to mechanisation was the saving of labour.

**Mr. P. Hempsom** said that he had found that an economical distance to carry heavy cane was about fifty yards.

**Mr. Steward** said that distance was only one of the factors, and that grade was also extremely important. It was easier to carry one hundred yards on the flat, than fifty yards up a steep hill.

**Mr. Pearson** said that Mr. Morris had also mentioned the amount of water which was held in the ground and he thought further work on the drainage of the fields with permanent drains was worth investigation. He also thought that work done on concrete moulds rather than tiles would be profitable. Lots of work remained to be done to investigate the various types and the importance of drainage should be looked into further.

**Mr. Morris** said that as far as obtaining cheap tiles was concerned, there was a firm in Durban now working out a method of producing cheaper tiles.

**Mr. Main** said that after the Umfolozi floods two years ago, a large amount of sand had been left on his farm. After about two months, although the sand appeared to be quite dry, all the tractors got stuck except the small Ferguson type. The smaller tractors without water in the wheels had a tremendous advantage over the bigger machines on wet ground. It might be possible to obtain even larger tyres for small tractors. He thought that a good approach would be the use of smaller tractors with larger tyres and taking smaller bundles.

**Mr. Bentley** asked if the mechanisation committee had considered the system where the load was carried on the tractor and not on the trailer. He said that from the paper it would appear that the tendency was to use small tractors carrying small loads. In Hawaii there were tremendous tractors and trailers carrying up to forty tons of cane. This did cause compaction of the soil but they did not seem to be very concerned about this in Hawaii.

However the smaller infield type "buggy" was worth consideration as the tractor carried the load itself and wet conditions did not hamper the operation as was the case with a tractor-trailer.

**Mr. Morris** said that such large tractors and trailers were out of the question for small growers. He said that he had toyed with the idea of building such a unit as the American buggy type, but that he was far more impressed with the light tractor drawing a light load. The suggestion of using larger air-filled tyres on small tractors and 4-wheel drive was worth considering. If he was farming on the flats he thought he would go for a small tractor with large tyres and a light trailer with powered wheels. He pointed to the machine used by Mr. Kramer, of Gingindhlovu. He thought that in any case on the flats one was limited to a three-ton load. The problem as Mr. Barnes had said was to adapt the existing equipment so that it could be used under very wet conditions. He said that the system to be aimed at was one that could be used all the year round and which could be modified to suit various conditions.

**Mr. Rault** enquired whether with the shortage of labour, the practice of burning cane on the flats was definitely increasing. He also said that he would like to know if the damage done to agriculture by burning would offset the more positive advantages of reaping, loading, transporting a smaller weight of cleaner canes at a higher sucrose content and raising the efficiency of factory operations.

**Mr. Morris** said that it was a well-known fact that more of the flats had been burned of necessity. Some had tried trashing and the usual explanation as to why they burned was that this was due to the ratoons not coming away because of water logging. He was alarmed to see that the practice of burning was on the increase. This was no doubt due to the increased output of the cutters when dealing with burnt cane. He was, however, not in favour of burning on hill-sides but he was not prepared to commit himself as far as the flats were concerned.

**Mr. Sherrard** considered that it had been proved that the tramline system was the best system to use on the alluvial flats. He thought that one problem which could be profitably investigated was the loading of cane on to the tramline from an infield trailer. As far as burning was concerned on the flats it was almost impossible to cut the cane without burning. Burning on the flats was not so severe as on the hill-sides and even after burning there was quite a lot of trash and tops left to be lined up in the fields. Burning on the flats was not as bad a practice as it sounded.

**Dr. Dodds** said that he saw from the paper that strip roads were used by utilising old iron plates for tracks. He said this scheme had its disadvantages,

and he wondered if it would not be possible for the more permanent tracks, to use concrete strips as formerly used in Rhodesia on roads.

**Mr. Morris** said that he thought this would be a very expensive solution to the problem.

**Mr. A. C. Barnes** said that in India during the war, strips were laid down made by impregnating hessian

with bitumen and this was most successful for airfields, but it had been now developed in England to line reservoirs and irrigation channels. They now used bituminised fibreglass. Something of that nature might be worth investigating. It could be made into a temporary track which could be moved about.