

# MECHANISATION PROGRESS REPORT

By W. F. C. JEX.

I have been asked to contribute a paper on mechanisation to this Congress, and am happy to do so. I feel the paper should best take the form of a progress report on mechanisation within the industry, with particular emphasis on the less expensive, and possibly less dramatic avenues, but avenues nevertheless, which have proved successful over the past few years in achieving quite considerable labour economy. There will inevitably be some repetition of earlier articles on the subject, and I make no apology for this repetition, for I feel that some of the points will have to be repeated again and again, until the systems outlined are in more general use throughout the industry. The major hurdle is always the supply of equipment for approved techniques, and it is only by the wide use of equipment which is standardised as far as possible, that manufacturers can be persuaded to carry stocks at reasonable cost to meet the needs of the industry. The interchangeability of equipment from one tractor to another is similarly important, and the efforts of the Mechanisation Committee in the past year have been largely concentrated in this direction. This will become apparent in more detail later in the paper.

I will again adopt the tabulated form of presentation of the paper, for I feel that this is the more effective method, and will go on to make comments on the different operations, in their sequence.

## Preparation

The past few years have tended to confirm the efficiency of hydraulically controlled, direct mounted equipment, and wise planning for the future, will ensure that all tractors purchased will be fully equipped with hydraulics. The scope and effectiveness of wheeled tractors has been enormously improved by the use of mounted equipment, with the result that wheeled tractors have tended to replace crawlers to a considerable extent for preparation, with consequent economy. It is interesting to observe that crawler tractor manufacturers are now concentrating their attention on direct mountings, with hydraulically controlled toolbars, and this should increase the versatility of the crawlers, and enable a wise balance of tractor types to be achieved by the grower—crawlers for steep work, and wheeled for the relatively easy slopes. It is an advantage to have as much equipment as possible interchangeable between the different tractor types, and all equipment designed recently has been standardised to fit a  $2\frac{1}{4}$ " bar, while at the same time,  $2\frac{1}{4}$ " bar mountings have been designed to fit wheeled tractors.

Labour economy in preparation then, can be best achieved by the use of the above mentioned types of equipment, where usually only a driver is necessary. Direct mounted ploughs and harrows do the work very efficiently where the traditional method of preparation is used. Interesting results are being recorded from the newer technique of preparation by the use of deep chisels, combined with harrows, or rotavators. Soil inversion is kept at a minimum by this method, with consequent reduction of time required for preparation of the seed bed. Results so far seem to indicate several advantages over the time-honoured method of ploughing and harrowing.

## Planting

The object of recent research has been to try to produce a planter unit which was capable of standardised use throughout the industry, and which was readily attached to any type of tractor or tool carrier, depending on the nature or amount of the work to be done. Since all new tractors are being supplied with hydraulic implement control, it is felt that advantage should be taken of this trend, and new planters are designed for hydraulic operation. Bearing the above in mind, also simplicity and reduction of cost, the prototype known as the "Abrex" has been produced and has now completed two heavy seasons of trial. This machine can be direct mounted to a  $2\frac{1}{4}$ " bar on any wheel tractor or crawler, and this mounting is suitable for short runs on flats, or medium slopes. It is ideal also for filling in awkward corners. Seed material must in this case be carried in boxes mounted on the tractor, and the capacity is necessarily limited.

For longer runs, and steeper slopes, the same planting attachment is mounted on a stock tool carrier—the John Deere is ideal—with a seed box fitted to the frame. Runs of 800 to 1,000 yards are then practicable, and up to 10 acres per day can be planted with an all-in labour requirement of  $2\frac{1}{4}$  to 3 units per acre. Operator fatigue is reduced to a minimum in the design. One of the big advantages of the planter unit designed as an attachment, is that it is merely attached to the chisel carrier unit which has been previously used for preparation, and saves duplication of the carrier assembly, with ultimate reduction in capital cost.

## Cultivation and Weed Control—Plant Cane

The past year has seen the virtual perfection of the mechanical weed control technique for plant cane. This involves the initial use of a set of "border" discs direct mounted on the tractor tool bar, for

cutting away the ridge left by the planter furrower. This is done within ten days of planting, and in the process, the field is left in flat condition suitable for the fast movement of light wheel tractors which keep the weeds down. Where conditions are slightly hilly, this first operation is best performed by a light crawler tractor. The earth moved away is held in reserve for subsequent burying of any weeds that may escape the weeding tynes.

From this point onwards, weed control is achieved by moving light wheeled tractors fast over the fields at not less than ten day intervals. These tractors are equipped with a "Scratcher"—which is the business end of the old Eaton—or the newer "Simplicity," for cleaning the rows, with coil spring tynes to handle the inter-row. All the above are designed to fit the standard  $2\frac{1}{4}$ " bar.

The final operation, when the cane is two to three feet high, is earthing up with the "border" discs used in the first operation, but this time reset to throw the earth back on the cane. It is sometimes necessary to perform this operation in two runs, spaced a month or so apart, especially if some weeds appear to be escaping the "Scratchers," in which case they must be buried before they reach any size.

If the above operations are performed efficiently, tractor requirements can be said to be one per hundred acres of plant cane, and labour should not exceed one unit per twenty acres.

#### **Chemical Weed Control**

Preliminary research is in progress within the industry, both in the chemical, and the mechanical aspects, to evolve suitable techniques for South African conditions. I trust that a paper will be presented to the next Congress giving details of present experience.

#### **Ratoon Weed Control**

The trash blanket has so far proved the most efficient conserver of labour in ratoon cane. Nevertheless, it is of doubtful benefit from the labour conservation point of view at yields below thirty tons per acre, and only really efficient at yields of forty upwards. It is probable that when suitable methods are evolved for the mechanical application of chemical weedicides to ratoon cane, weeds which can be handled by such means will no longer prove a problem.

#### **Fertilising**

Fertilisation of young ratoons, soon after they are cut, presents little difficulty with present equipment. For open lands, practically any type of spreader is suitable, while on hilly lands, the direct mounted two-row type evolved by Natal Estates is the most efficient. Application to larger cane is quite a problem, and can only be done by hand, or by air. The

simplest approach, therefore, appears to be to apply all the requirements for the two-year crop immediately after harvesting, and this will involve a fairly heavy application of a mixture balanced as to chemical and organic components, to last through the full two years. For this, we look to the help of the Experiment Station, since a satisfactory solution would result in considerable labour economy.

#### **Harvesting**

The benefits of trash conservation have become so clearly apparent in the industry over the past few years, that it is felt that few, if any, growers would readily contemplate a return to burning. It is an unfortunate fact, however, that while there are many very efficient machines for harvesting burned cane of a reasonable length and straightness, and one or two for handling long and twisted, burned cane, there is at present nothing to handle our cane and keep the trash. For this reason, it is manifest that we must concentrate our labour-saving energies on simpler and more immediately practicable lines, and hope for the appropriate harvester in the not too distant future. Work is progressing steadily on the design of a harvester in this country, and it is hoped that this will bear fruit, but it is a long, slow process. It is interesting to note that in Louisiana, where the habit has been to burn cane at harvest, they are now evolving a machine to strip off the trash, and apparently early models have already been produced.

#### **Loading and Transport**

These items are grouped together, because they are very closely interrelated. The ideal equipment for transport is naturally that which will both load and carry, and it is understood that one firm at least is working along these lines and hopes to be able to demonstrate in the not too remote future, something that will load, carry, and offload into the mill, or transport. We hope they will succeed, and at reasonable cost. The Nkwaleni Trailer similarly, has been designed to carry, while at the same time minimising handling. The prototype has now completed two seasons' trial, and it is probable that sufficient experience has now been gained to attempt a perfected model.

In the meanwhile, tractors and trailers appear to be filling the breach for the industry, and while not possibly achieving the ultimate in labour economy, are going a long way towards it, and at the same time providing a very economical means of transport over limited distances. It is understood that cut and load figures of two to three tons per unit are being achieved, and that this could probably be bettered were there some practical weighing device to facilitate bonus payments to cutters. It is hoped that some of our inventors will give this problem their attention.

Gantries for transloading from trailers to basket trucks have proved their place in the industry, and are now a common sight. There is still a gap in the handling of cane between wagons or trailers and S.A. Railway trucks. Such cranes as the "Unit," or the "P. & H." can be seen working very efficiently where the quantity of cane justifies them, but it is hoped that some supplying firm will provide the means to handle economically the quantities handled on an individual private siding. Such fixed cranes were available in the past, and are still working at Empangeni, but seem to be unobtainable now.

### General

Stress must again be laid on the anticipation of future mechanisation by beginning now to lay out fields for mechanical equipment. Open drains and obstructions must be removed, and it must be realised that at least eight years must elapse from the inception of such a programme to its completion, since fields are only replanted once in eight years, and field reorganisation can only be done at replanting. No mechanisation programme can be effective unless it is complete, and it can not be complete while the movement of tractors is hindered by obstructions.

A word, too, might well be said on mechanical organisation. It is evident that to be effective, machines must be organised under a separate department in larger concerns, and used strategically, where their effect can be concentrated. This involves careful planning of their use backed by efficient workshops and training facilities. Full scale mechanisation can readily be adopted by the larger companies, with consequent conservation of hand labour, while partial mechanisation, involving the use of smaller machines, should presently satisfy the requirements of individual growers until such time as group organisation, or contract work become necessary.

**The President** said that the cutting and handling of cane was most diversified throughout the world. Where labour was cheap mechanisation hardly existed, but in this country where we were becoming increasingly short of labour, mechanisation must be further developed.

**Mr. Pearson** expressed regret that the mechanisation committee had closed down their workshop at Umhlali, for while it was in operation it was of considerable interest to the planting community. He urged that if this committee operated again they would consider centralisation at some such place as the experimental farm, so that growers could easily see what was actually in operation in the Industry; there would always be land upon which the instruments could be demonstrated. He considered that

the work now being done was of vital importance to the Industry, but a combination of workshop and land would be of still greater benefit.

**Mr. Jex** explained that the work-shop at Umhlali was meant as a research station and that while great interest was shown about five years ago, the interest seemed to have declined and it was felt that research was rather in advance of the Industry's requirements and it was resolved to carry on in the perfection of those instruments which had already been evolved. The mechanisation committee realised that it would be desirable to establish a work-shop on say a place such as the experimental farm. This was a missing link at present. The reorganisation of this mechanisation committee was now being considered. He did not know what the reaction of the Sugar Association would be but if more pleas were put forward there might be a greater possibility of such suggestions eventually being acceptable.

**Mr. Main** made a plea for a full-time professional man to be engaged upon the subject of giving mechanisation advice to growers. He had tried to get a disc plough which would plough in trash when attached to a Ferguson tractor, but the manufacturers had nothing suitable. Under his conditions with a heavy blanket of trash he could not get a fertilising machine for distributing fertiliser satisfactorily. There were many aspects of mechanisation as far as the planter in Natal was concerned, which required specialised development. He thought that a professional man handling this subject would enable progress to be made more rapidly.

**Mr. Saunders** said that in connection with the harvesting in Louisiana a machine had been devised which could harvest up to twelve acres a day. He thought that this machine had possibilities in this country, as it dealt with unburnt cane. With regard to Mr. Jex's suggestion that all fertiliser requirements might be applied at planting, this possibility was at complete variance with Dr. Clement's practice of crop-logging.

**Mr. Pearson** explained that as far as the possibility of using a single furrow plough for ploughing in trash was concerned, the manufacturers of light tractors sold their machines on the amount of ploughing they could do a day. He thought that for ploughing in trash with small tractors a single furrowed disc would perhaps meet the case for our conditions.

**Mr. Jex** supported this view, saying that he thought that a single but perhaps larger disc would meet the case. He did not know of one at present, but it should not be beyond the scope of engineering designers. He was sure this could be done.

**Mr. Boule** inquired if the trouble was not that the trash banked up under the beam of the plough, rather than the disc cutting the trash.

**Mr. Jex** thought that this was due to insufficient loading on the disc so that the disc could not cut the trash and therefore it packed up.

**Mr. Main** said that the only way he could see that this would be overcome was by fitting a mechanically-driven coulter in front of the disc. As far as he knew only a mould-board plough did the job effectively.

**Mr. Jex** asked growers to send forward their problems to the committee, so that they could go ahead and attempt to tackle them.

**Mr. Main** suggested that this plea be published in the *S.A. Sugar Journal*.

**Mr. King** asked if a resolution from this Association would not be of assistance in getting the S.A.S.A. to restart its mechanisation committee. He thought that no time should be lost as it could be too late when we were chronically short of labour.

The Chairman asked that such a resolution be properly formulated so that after discussion in Council it could be passed on to the S.A.S.A.