

MECHANISATION

Past and Present

THE RECENT INCREASE IN MINIMUM LABOUR WAGE HAS INITIATED A RENEWED INTEREST IN MECHANICAL AIDS TO REDUCE INPUT COSTS. THIS SITUATION IS NOT NEW; MECHANISATION ARTICLES FROM AS FAR BACK AS THE LATE 1960'S REPORTED CONCERNS OVER THE FUTURE AVAILABILITY OF LABOUR TO CUT CANE. THIS LED TO THE INVESTIGATION OF DEVICES TO ASSIST CUTTER PRODUCTIVITY AND VARIOUS MECHANISATION ALTERNATIVES. LABOUR REQUIREMENT AND PRODUCTIVITY DATA SEEMED TO BE HIGHLY VARIABLE AT THAT TIME. INDICATIONS WERE THAT APPROPRIATE MECHANISATION COULD LEAD TO AN 80% REDUCTION IN LABOUR COSTS. AT THAT TIME AN AVERAGE OF 11 LABOURERS WERE REQUIRED PER 1000 TONS OF PRODUCTION. A NUMBER OF ARTICLES PROCEEDED TO TELL OF VARIOUS MECHANISATION SYSTEMS THAT WERE DEMONSTRATING EXACTLY SUCH REDUCTIONS THROUGH THE ADOPTION OF LOADING AND CANE HANDLING SYSTEMS.

Research into the development and evaluation of various harvesters and loaders was initiated. Cutting knives and their designs were also investigated in order to improve manual cutter performance. A range of mechanical cane planters became available to growers in the industry at that time. One Sugarmech article presented

approximately 11 different types of infield loaders ranging from a 10 tons per hour "easily removable" grab loader which could be "fitted to most makes of tractor" to a high capacity (± 80 tons per hour) slew type grab loader fitted onto a new tractor. The prices in 1968 ranged from R684 to R11000 (including R7000 for the tractor) respectively.

From the mid 1970's to the mid 1980's the South African sugar industry developed a number of semi-mechanised, low cost harvesting systems. The focus at the time was to develop whole stalk cutters that could be compatible with existing harvesting and handling systems. The possible lack of labour willing to cut cane was the motivation for the work. The purpose was to develop machines that were to be operated on slopes of up to 30% and within fields not carefully prepared for mechanised operations. The machinery had to be simple in design, operation and maintenance. An ISSCT paper by de Beer (1980) titled, "Semi-mechanised sugar harvesting systems for a developing country" describes a number of these machines that were developed. A South African Sugar Industry Agronomists Association Review paper (no 11) describes in detail the development over time of various types of cane harvesting machines and systems in South Africa.

“The Link” article (May 1996) titled “Mechanical Cane Harvesting Equipment-What choices are there?” details the range of mechanisation options that were commercially available in the industry at that time.

These included the following equipment:

- **Front mounted cutters (Various designs): ($\pm 30\text{t/h}$ to base cut and top)**

An ISSCT paper by Boast, 1989, describes the development of an economical mechanical front mounted cane cutter. The paper gives details on labour requirements for the harvesting and loading systems associated with the system.



- **Orbach: (± 20 to $\pm 40\text{t/h}$ to base cut and top).**
This equipment is currently available.
This cane harvester is designed to base cut, top and bundle cane in the field. The tractor power requirement was about 50kW. The harvester is mounted onto the 3-point tractor linkage. The harvester has since been upgraded from the one shown and is rated at



$\pm 50\text{t/h}$ depending on field and operating conditions. A speed of $\pm 5\text{km/h}$ is referenced. A tractor of $\pm 70\text{kW}$ is required and 4wd is preferable especially on slopes.

A similar concept machine currently available to the industry is:

- **Vicro harvester: ($\pm 25\text{t/h}$)**
The Vicro harvester is mounted on the 3-point tractor linkage and cuts cane rows adjacent to the tractor. The harvester is designed to base cut, top and bundle cane in the field. A tractor of $>60\text{kW}$ is required and 4wd is preferable.



More recently, research was done in developing a brush cutter for cane cutting. This became known as the Illovo cane cutter, details of which can be found in SASTA papers (Langton *et al.*, 2006) and (Lyne *et al.*, 2007).



Further work on mechanical cutters led to the development of the walk behind, self-propelled Cane Thumper (Langton *et al.*, 2008). This has a double-knife sickle bar principle with oscillating blades for base cutting of the cane. It is rated as being capable of harvesting 0.8 to 1 ha per day using 7 to 8 labourers under average conditions.



Source: ESM website: www.canethumper.co.za (Further technical specifications and reports are available on the website)

The mechanisation options available have changed somewhat since the 1960's. However, the same issues regarding the availability of mechanisation options and mechanical aids are still of concern to growers to assist in reducing cane production costs.

So what are the various mechanisation options and resources available to assist growers?

A review of international cane harvesting machinery and systems was conducted by SASRI in 1997. In May 2004, "The Link" contained an article titled "What's new on the harvesting front" which detailed a number of mechanical harvesting options available. Following this, a review was conducted on the various mechanisation systems used in South Africa (Meyer, 2005), and further information is provided in:

- SASRI Information Sheet 6.6: *Mechanical cane harvesting systems*, which has a list of harvesting equipment, and

- SASRI Information Sheet 6.7: *Factors to consider when implementing a mechanised cane harvesting system*.

Each year, SASRI compiles Mechanisation Reports which assist growers with comparing costs associated with mechanised operations. A valuable addition to these reports is a table of typical products that are commonly found in the industry, including a range of tractors, harvesters, cane handling equipment and implements. Up-to-date website addresses for both products and suppliers have been included in the table. The Mechanisation Reports and associated table can be accessed through the SASA website at www.sasa.org.za. Follow the link to 'Publications' and then 'SASRI publications'.

Specific technical information regarding products and pricing can be sourced directly from the local suppliers. Please check with the local dealership on the availability of specific products. Backup service and product support must be considered when comparing similar products from various suppliers. ↻

References:

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