

AUSTRALIAN CANE-FARMING MECHANIZATION

Australian production of sugarcane reached a record 18,413,000 tons in 1968/69, an increase of 1.6 million tons over the previous best in 1967, and double the output of 1961.

Handling of this ever-increasing annual crop would not have been possible without the remarkable progress in mechanical harvesting and loading made throughout the 1960's.

Australian engineers and agricultural engineers between them have developed such a variety of implements and machines that today the entire cycle from planting to loading the cut cane is virtually fully-mechanized.

This high degree of mechanization on the farm helps account for the exceptionally high Australian average yield of one ton of raw sugar to every seven tons of cane (over-seas average is one ton of sugar for every ten tons of cane).

Australian has 8485 cane-farms, 34 mills, six bulk-handling sugar ports and six refineries — the achievement of 105 years' work.

Season	Total Crop Harvested, m. tons	Mech. Harvested m. tons	% of total crop
1961	9.02	0.48	5.4
1963	11.50	1.55	13.4
1965	12.55	5.30	39.1
1967	15.72	9.26	58.6
1968	17.41	12.47	71.6

The average cane-farm is about 85 acres. Each cane-farmer has available to him the following range of equipment, which he either owns or hires depending on the size of his crop:—

• Standard farming implements, including tractors, ripper, disc harrow, full set of toolbar equipment, tiller, trash rake, drain plough, break-pusher, root rake, grubber, fertilizer applicator, cultivator; Specialized cane-farming equipment: disc ratooner, stable shaver, planter, harvester, loader.

Disc Ratooner: This implement has individually-adjustable gangs of discs permitting an infinite variety of settings to allow a wide range of operations in the ratooning of cane crops.

Stable Shaver: Recognized for many years as the best method of putting cane land into order after

harvesting, is done by means of special implements — available either as power takeoff units or ground wheel drive units — designed to cut off stubble and force ratoon shoots to develop with deeper eyes, ensuring heavier crops.

Cane Planter: Cane planters have been designed to carry out the complete planting of cane in one operation. They can be either dip-type or spray-type, single-row or double-row. An Australian invention, the cane planter digs its own furrow, cuts the planting stick into two three-eye sets, sprays each set with fungicide then plants it, fertilizes it and covers it up. It is a two-man operation.

with one driving the tractor and his partner attending to the planter. A single-row planter can do 3½ to 4 acres per day.

Harvester: The Australia-designed and made mechanical harvester is the secret of the ever-increasing efficiency of Australian cane-growing its wholehearted acceptance by cane-growers throughout the cane-belt (a 300-mile stretch of the north-eastern seaboard from northern NSW to North Queensland) is revealed by the figures:—

Over 12,473,000 tons of cane were mechanically harvested in Queensland, which produces more than 95% of Australia's total crop) in 1968, representing 71.6% of the crop. There were 327 cane-growers more tons mechanically harvested in 1968 than in 1967, an increase of 13%. In 1969 it is estimated that more than 80% of the crop will be mechanically harvested. The rate of pro-

gress in mechanical harvesting can be gauged from the table. The number of mechanical harvesters in use rose from 109 in 1961 to 1623 in 1968 and will reach 1819 in 1969, on present indications.

There are two types of mechanical harvester: (a) *Chopper type:*

This machine gathers the crop, either standing or lodged, removes the tops, cuts the cane off at ground level, conveys the cane up to and through a set of chopping knives, where it is chopped into billets of uniform length (12 to 14 inches) and delivers these billets, cleaned of dirt and trash, into a transport bin or truck for immediate dispatch to the

mill. The harvester is mounted on a tractor and is driven by the tractor PTO (power take-off) shaft. In normal conditions a rubber-tyred tractor of at least 50 PTO horsepower at 540 rpm is required.

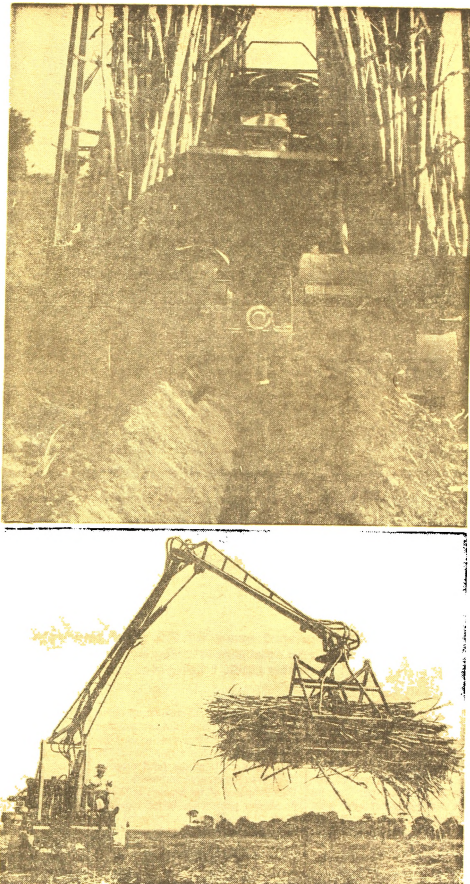
The standard chopper harvester of the make most commonly used in Australia (commanding 53% of the market in 1968) consists of a heavy duty main frame which carries the harvesting system attached to a massive heavy duty tractor sub-frame.

The harvester is raised and lowered by twin hydraulic rams directly connected to the tractor hydraulic system, and is car-

ried on a heavy duty rear axle extension. The hydraulically-activated, independently-controlled, top-per unit, which is adjustable for tilt, is mounted on the harvester main frame and is fully controlled from the operator's seat.

The cane is gathered into the specially-designed mouth by two hydraulically-driven auger-type crop-lifters. These rotating crop-lifters raise and gather lodged cane into the mouth. For straight-standing cane the crop-lifters can be turned off. Special floating shoes with adjustable points are fitted at the lower ends of the crop-lifters. These shoes ensure that all cane stalks being harvested go

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Mechanical planting of sugar cane (top photo)—the machine cuts the cane stalks into short lengths and buries them in furrows. The machine also buries insecticide to protect the cuttings and fertilizer to help cane grow. Lower photo shows mechanical handling in Bundaberg cane field, Queensland.

Australian Cane-Farming Mechanization

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Into the machine. The harvesting system consists of a revolving base cutting disc, floating primary feed roller, roller conveyor system and a special system (two knives rotating at right angles to the motion of the cane) and a slewing elevator. A six-foot grid section in the lower end which assist with removal of dirt. An extractor mounted above this grid section draws air through it at a rate of 13,000 cu. ft. per minute through the tumbling can, to clean it. At the dropping point at the top of the elevator a heavy duty trash extractor unit, moving 320,000 cu. ft. of air per minute, removes any other loose leaf, trash, dirt etc.

This chopper harvester can handle 25,000 tons in a 25-week season. It will fill a four-ton bin in two minutes. An auxiliary power unit fitted to the machine will increase capacity considerably.

Overall length is 18 ft 6, height 15.0, width when fitted to tractor, maximum 11.0 (depends on tractor), weight 3 tons 15 cwt.

(a) **Wholesale type**
Tractor-mounted like the chopper harvester, this machine simultaneously tops and cuts the cane at ground level, then lays it to one side, flat on the ground to be picked up later by hand or, as is most likely these days, by mechanical loader.

A special "down cane pick-up" is available for handling sprawled or tangled crops. A specially-designed base cutter ensures clean ground cutting even in extremes of ridge or hollow.

Mechanical Loading:

Mechanical loading has developed to virtually the maximum possible since 1961 when just over half the crop was mechanically loaded. In 1968 98.6% of the crop was mechanically loaded.

Front-end loaders handled 56% of the crop in 1963 but have lost favor gradually and handled only 23.5% of the crop in 1968. Jib-type loaders have meanwhile steadily increased in popularity, handling 24.4% of the crop in 1968. (Chopper harvesters "loaders" the remainder of the crop.)

The jib-type loader, operated by one man, is a tractor-mounted elbow-action hydraulically-operated rotatable boom grab. Slewing is effected by foot pedals, leaving the operator's hands free for boom and grab manipulation.

The rotatable grab head permits the turning of the bucket or grab to dig or pick up in the most favourable position. Operation calls for considerable

manual dexterity and coordination of hand, foot and eye; operators acquire pride in their skill with these machines and at the annual Intersail Sugar Festival a special contest is staged for them, in which contestants have to load and unload several tons of wholestick cane, being judged on both speed and efficiency.

This versatile machine can be equipped with special attachments for trench and channel digging, drain-cleaning, ditch-handling and other practical farm applications when not being used for

cane-loading.

A large-capacity, diesel-powered, self-propelled four-wheel drive, four-wheel steer loader is also available.

In operation, the felled cane is bundled by a two-pronged attachment on the end of the tractor. With the forward motion of the tractor, the prongs slide under the cane.

As the cane piles up under the pressure, the grab is brought down to lift up the bundle. Design of the grab is such that when it is positioned over the loose bundle and

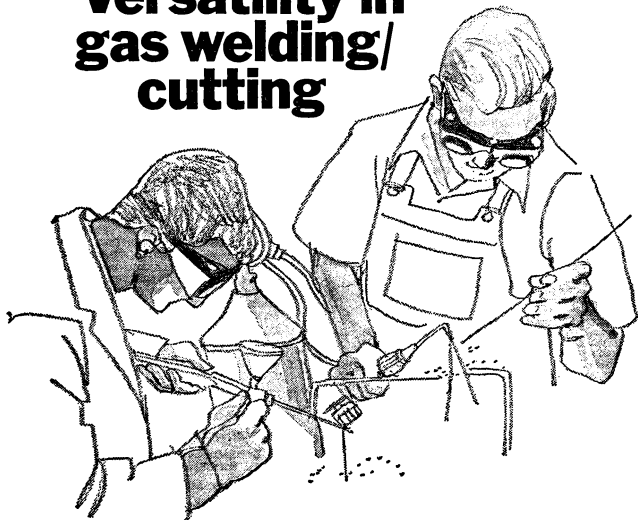
the operator activates the lever closing the grab, the flingers of the grab barely skim the ground, gradually working the cane into a neat bundle inside the grab. This avoids picking up dirt and extraneous matter, which could happen if the fingers dug into the soil.

The standard loader has an overall length of 23 feet 2, width 6.3, height 13 feet, wheelbase 7 feet, weight 4 tons 15 cwt. It has a maximum reach of 19 feet, maximum lift of 17 feet, and recommended load of 1000 lbs and max. digging depth of 6 feet.

The large-capacity model is 20 feet long, 15 feet 3 high, wheelbase 8 feet, width 7 feet 3, weight 7 tons 6 cwt; recommended load of 10 cwt at max. reach of 26 feet, or 25 cwt at 12 foot radius. Its max. digging depth is 18 feet.

All these machines are most efficient in their present stage of development, but are constantly being modified and improved as farmers and manufacturers continue to strive for extra efficiency in all conditions, from bone-dry to boggy, from flat to hilly.

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