

MECHANISATION ON A COCONUT ESTATE

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Why Mechanise a Coconut Estate ?

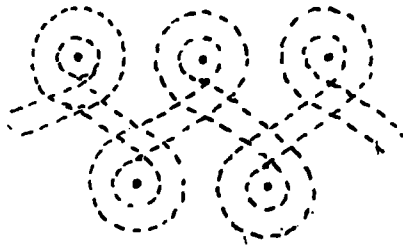
THE fundamental purpose is to speed up agricultural operations and to reduce production costs and thereby the price to the consumer of this important food commodity and so ultimately the cost of living.

How Can a Coconut Estate Be Mechanised ?

Anyone contemplating mechanisation of his coconut estate should understand clearly that "mechanisation" does not simply imply the mere replacement of labour, draught bulls or buffaloes with a tractor, but rather the adoption of new methods and revised procedures, within the limits of good agricultural practice, that will best utilise the mechanical power available and the implements through which this power can be applied to the industry. It is poor economy indeed (and yet many agriculturists fail to realise this) to restrict a tractor's operations to a few functions which occupy it for only a small portion of the year. The many implements that are available enable a tractor to be kept usefully occupied all the time, but which of these the proprietor will wish to invest in will depend on:—(a) what he can afford, (b) the size of his property, (c) the nature and cost in terms of time and money of his present operations, (d) the possibility of hiring the tractor out to neighbouring estates when not occupied on his own, (e) the nature of his soil and the variety of operations he performs.

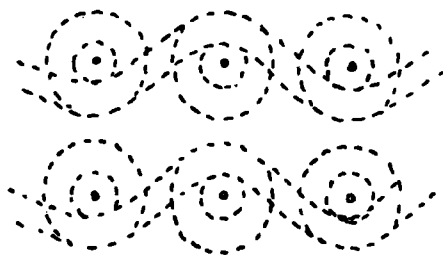
Operations on a coconut estate which offer opportunities for mechanisation are:—

- (a) Incorporating fertiliser into the soil.
- (b) Chopping up and turning in weeds so as to form a mulch.
- (c) Collecting and transporting nuts from the field to the kiln.
- (d) Transporting copra to the buyer.
- (e) Subsoiling, *i.e.* the process of breaking up a "pan" in the soil to allow water to permeate through it.
- (f) The digging of fence post holes.
- (g) The digging and husking of holes for planting out coconut seedlings.
- (h) The incorporation of husk into the soil for moisture-retaining purposes.
- (i) Constructing contour bunds for erosion control and water conservation.
- (j) Other powered operations such as driving a mill, pumping water, sawing timber, pulling down old palms, etc., which utilise the power of the tractor engine through a pulley and power-take-off.



"RING FERTILISING" WITH
TRACTOR DRAWN HARROW
ON TRIANGULAR PLANTED
ESTATES

FIG. 1



"RING FERTILISING" WITH
TRACTOR DRAWN HARROW
ON SQUARE PLANTED
ESTATES

FIG. 2.

What are the Economics of Mechanisation ?

The table below lists the initial cost of the equipment needed to carry out operations (ii) to (i) above :—

1 Tractor (Kerosene)	...	...	...	...	Rs. 7,900
1 3-ton Tipping Trailer	...	...	...	...	„ 3,700
1 3-furrow Mouldboard Plough	...	...	...	...	„ 1,300
1 Offset Disc Harrow (trailing type)	„ 1,500
1 Subsoiler and Disc Ridger	„ 1,500
1 Fore Loader	„ 800
1 Post Hole Borer	„ 900
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Total					Rs. 17,600

Considering the life of a very hard used (and often abused) tractor and trailer as 5 years, and other implements as 10 years, depreciation works out at Rs. 2,920 a year or Rs. 10 per day. If the depreciation money is set aside, it will be possible to obtain a new tractor every 5 years.

Operating costs for an average 8-hour day are therefore :—

Depreciation	...	...	...	...	Rs. 10.00
Driver-mechanic	...	...	...	...	„ 4.50
Kerosene (8 gallons)	...	...	...	...	„ 8.00
Petrol (1 gallon)	...	...	...	...	„ 2.50
Lubricating oil and grease	...	...	...	...	„ 1.00
Repairs and maintenance (average)	...	...	...	...	„ 4.00

Rs. 30.00 or Rs. 3.75 per hour

(a) **Manuring.**—Of the various methods of incorporating fertiliser into the soil the most suitable for mature palms is to broadcast the fertiliser over alternate avenues, and then plough it in. Where young palms are being “ring fertilised” this too can be effected by sprinkling the fertiliser over the prescribed area around the base of the palm and then turning it in by driving the harrow once round the tree. Figures 1 and 2 suggest two alternate ways the tractor can set about this operation. It has been found in practise that a tractor will plough in an average of 10 acres (alternate avenues), or 300 squares a day at 10 cents per square, or if “ring fertilised” an average of 500 palms a day at 6 cents. The usual practise of opening 16-foot broad trenches along the avenues and closing them after the fertiliser has been put in costs on an average Rs. 1.10 per square, when performed manually. Turning in the fertiliser with mammoties around “ring-fertilised” palms also costs something in the region of 20 cents per palm, when performed manually.

The saving is therefore Rs. 30 per acre when fertilising alternate avenues or Rs. 10 per acre when “ring fertilising.”

(b) **Weed Slashing.**—When slashing weeds, the disc harrow incorporates this green manure into the soil thus improving both texture and fertility. Usually only the alternate, unploughed avenues are harrowed each year (or twice a year in some areas). The tractor drawing a tandem disc harrow can harrow about 15 acres of alternate rows a day, thus one acre’s harrowing will cost Rs. 2. Manually it costs an average of Rs. 10 per acre, thus showing a saving of Rs. 8 per acre.



SCOOPING UP A LOAD.



LOADING THE TRAILER.

(c) **Collecting Nuts and Husk.**—It is particularly in the collection and transporting of nuts and husks that a tractor and trailer really demonstrate the value of mechanisation—the system being for the tractor to drive up to the pile of nuts or husks with the “fore loader” rigged in front of it, and the trailer behind. The trailer is then unhitched, and the fore loader scoops up about 170 husked nuts at a time, and tips them into the trailer which can carry a total of about 4,000 husked nuts. The process is illustrated in photographs 1 to 4. Loading the 4,000 nuts takes an average of 15 minutes. The tractor then rehitches the trailer and takes the nuts to the kiln, where it hydraulically “tips” the load out. It has been found that a tractor and trailer can do the work of four bullock carts, and that with each load the yield of nuts from about 8 acres are collected and transported at an average cost of Rs. 2.50 per trip (depending of course on the size of the estate and the distance from the fields to the kiln). Cost per acre per year for collecting and transporting nuts including overheads then comes to about Rs. 1.86. In contrast, transporting nuts by bullock cart costs around Rs. 15.00 an acre each year, taking into account carters’ wages, draught bull feed, depreciation and repairs on cart, and depreciation on bulls. The saving by mechanisation thus is around Rs. 13 per acre.

(d) **Transport of Copra.**—Transporting of copra in a tractor-drawn 3-ton trailer has been found to cost 40 cents per mile, 13 candies being transported on each trip. This compares very favourably with cost of transportation by lorry at 80 cents per 3-ton mile, the saving per trip mile being 40 cents. Transport by bullock cart over long distances is today rarely economical.

(e) **Sub-soiling.**—This is one of the operations that cannot be undertaken without mechanised power and a tractor drawn sub-soiler can usually “subsoil” at the rate of 30 feet a minute, and at a cost of 18 cents per chain. This is an entirely new agricultural development made possible by mechanisation.

(f) **Hole-boring.**—The post-hole boring implement can bore a hole 1 foot in diameter and 3 feet deep, every minute in sandy loam, including time taken for jockeying into position. The cost per hole is therefore about 7 cents. The corresponding cost by manual labour is 25 cents per hole.

(g) **Planting.**—For those undertaking replanting of large areas, the post-hole borer is invaluable. The most efficient procedure devised so far is first to send a cart round dropping off 25

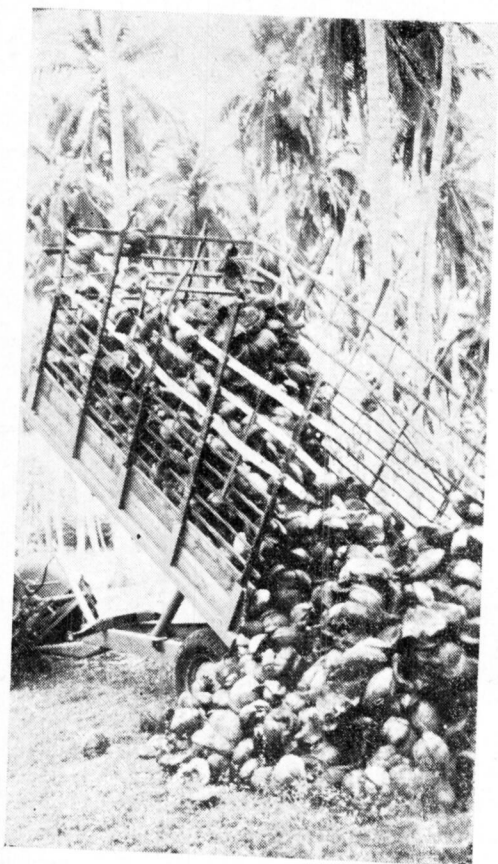


**HOLE
BORING**



THE NEW AND THE OLD

DISCHARGING
THE
LOAD



husks near each marking peg. A labourer must later accompany the tractor during its hole-boring operations to drop the husks into the holes after they are bored. On reaching a peg, the tractor driver bores his holes in the order and positions illustrated in figures 3 and 4, the labourer throwing 5 or 6 husks into each hole as soon as it is bored, so that the disturbance during the boring of the next hole automatically helps fill up the previous hole and cover the husks. The cost per seedling hole works out at about 30 cents which compares most favourably with the usual labour charge of Re. 1 merely for digging the hole. The advantage of this new method of planting is that the roots of the seedling are drawn towards the columns of husks in the four surrounding holes, thus encouraging root development outwards. The process of boring also makes the top soil tumble into the holes first which is exactly what is required.

Calculated on an acreage basis, the borer method enables holes to be cut, husked and filled at a cost of Rs. 24.50, whereas with the usual manual system it costs Rs. 92, a clear saving of Rs. 67.50 per acre.

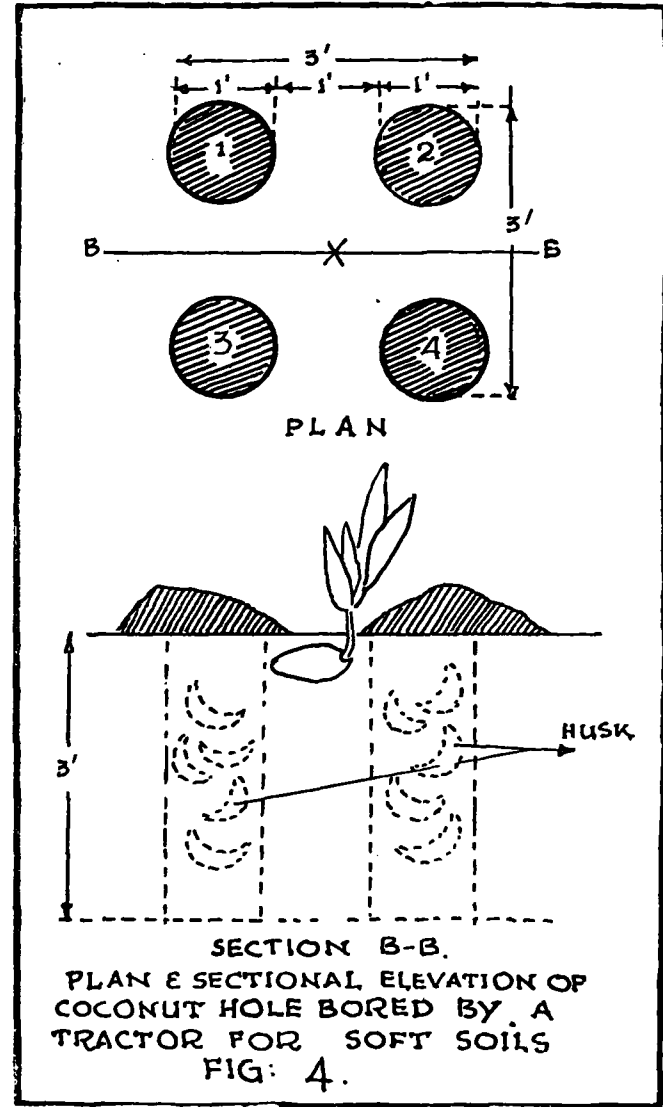
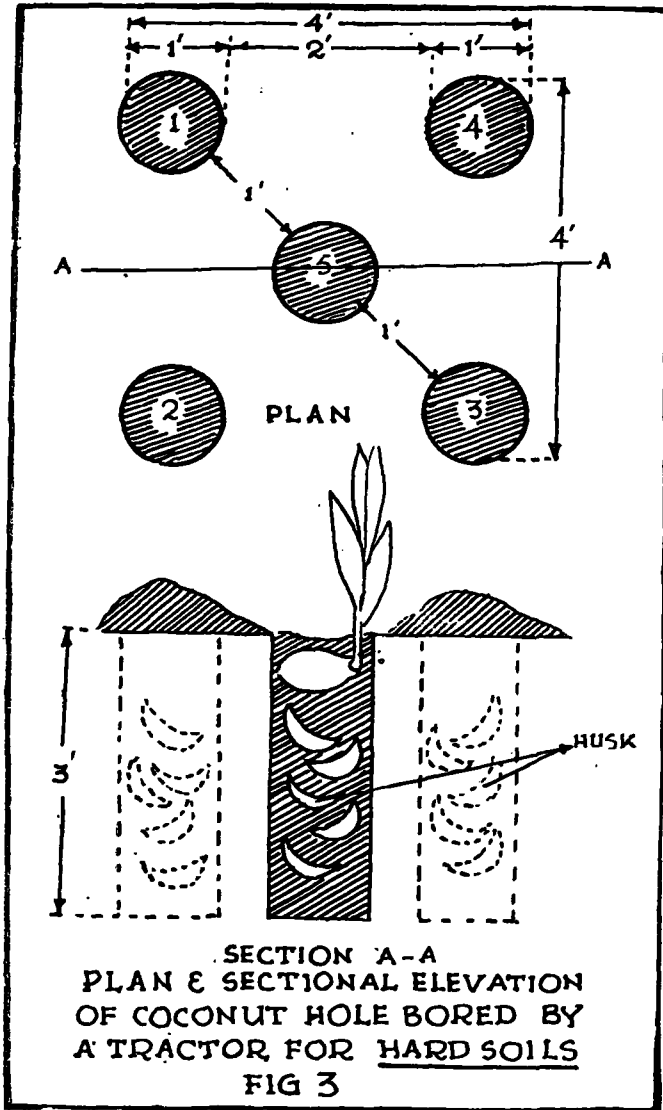
(b) **Husk Burial.**—Husk-burying also can be “mechanised,” either by boring holes down the centre of alternate avenues and filling them with husk, or by ploughing in slightly shredded and broken husks which have been spread and broadcast together with mixed fertiliser over the land.

It has been recently proved by the Coconut Research Institute that for mature palms broadcasting manures is as effective as ring manuring and it is certainly far cheaper and quicker.

(i) **Bunding.**—After the contour has been pegged out, contour bunds $1\frac{1}{2}$ to 2 feet high can be raised by dragging the disc ridger along the line of pegs once or twice: the cost of this bund being in the region of 20 cents per chain. The discs can be angled to make a deeper cut on the top-side of the bund in the fashion recommended by Dr. Gorrie, the former Soil Conservation Officer. The usual methods of building a contour bund cost around 60 cents a chain.



WINCHING



PLANTING COCONUT SEEDLINGS—USING THE POST-HOLE BORER

(j) **Other Estate Operations.**—The power-take-off shaft on the tractor, fitted with a special pulley can be used to work a water pump or a grinding mill or to saw timber. There is also a very useful winch attachment which is ideal for pulling down senile palms. The mounted winches of 20 h.p. tractors do not give much above a 5-ton pull which is sufficient in loose, sandy soils, but with the larger 40 h.p. tractors the pull is increased to around 10 tons which is quite enough for a coconut palm, in hard ground.

It will be realised from the above that the benefits of mechanisation are not only financial but also time-saving. An important consideration which must not be overlooked is that a tractor-drawn plough can work six times as fast as a bullock-drawn plough so that it is possible to take advantage of rainfall of short duration. Estates in regions of erratic or uncertain rainfall can thus be maintained in a high state of cultivation without trouble or anxiety.

Will Mechanisation Pay On My Estate ?

This is easily calculated and an example is given below of a 200-acre estate with palms planted 70 to the acre and yielding 3,000 nuts per acre.

Operations Now Mechanised	Annual Saving	Time Taken
Fertilising, alternate avenues annually 200 × 30/- ...	Rs. 6,000/- ...	20 days
Harrowing alternate avenues twice a year 400 × 8/- ...	„ 3,200/- ...	26 „
Collecting and transporting nuts 200 × 13/- ...	„ 2,600/- ...	6 „
Underplanting holes (equivalent of 4 acres per year)		
4 × 67/50	„ 270/- ...	4 „
Contour bunding (average of 100 chains per year)		
100 × -/40	„ 40/- ...	1 day
Totals ...	Rs. 12,110/-	57 days

The savings both in time and money, certainly appear staggering and indicate that the entire cost of a tractor and its implements will be paid off in a little over a year. As the tractor is only utilised 57 days of the year while affecting these savings, it can be hired out over the balance of the year to bring in even greater profits, or it can be used for other estate operations, as described.

With regard to the type of tractor, most suitable for coconut estates, my personal preference is for one of about 20 h.p. with rubber tyres. Some tractors use petrol, some kerosene, and others diesel oil, but for the average estate owner the kerosene tractor will be found more suitable unless there is near at hand someone who can carry out fuel injector repairs and the maintenance of a diesel engine and then only if the “diesel tax” is eliminated for land or agricultural vehicles. If so, the extra cost of purchasing a diesel tractor will be justified.

In conclusion, it may be added that in certain circles, mechanisation has rightly earned a bad name, but this has been clearly due to misguided methods and faulty application. The prejudice against mechanisation must be fought and won, because the future of our country depends on increased *mit* productivity, and on this, in turn, depends our standard of living.

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