COMPACT TRANSPORTER (CT) FOR FIELD SPRAYING OPERATIONS (CT-Spray)

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432

MPOB INFORMATION SERIES • ISSN 1511-7871 • JUNE 2008 MPOB TT No. 407

The oil palm industry is experiencing a chronic labour shortage, and is therefore trying to mechanize its operations. Field transport of harvested fresh fruit bunches (FFB) to the roadside for collection, fertilizer application and pesticide spraying are all operations that can be mechanized.

Weed control is one of the major tasks in the plantation requiring high labour. The present methods of control include manual and mechanical weeding, and chemical spraying, with the last being, by far, the most popular.

MPOB has developed a small in-field transporter - single chassis, compact but able to carry a load of 300 kg. The machine runs on four low-pressure tyres to minimize soil compaction and also to provide the necessary traction in all conditions in all terrains. It is thus, more versatile than a mini tractor or other off-road vehicles. With only minor changes, the machine can fitted out as a sprayer.

THE MACHINE

This compact transporter (see *MPOB TT No. 316*) can be fitted with a 200-litre tank, an electrical pump, two reels of 10-m hoses each complete with nozzles.

COMPACT TRANSPORTER-SPRAYER (CT-Spray)

The machine as sprayer is operated by a three-person team – the driver with a worker handling the hose on each side. The spraying attachment is meant for wide flat areas, with all the components

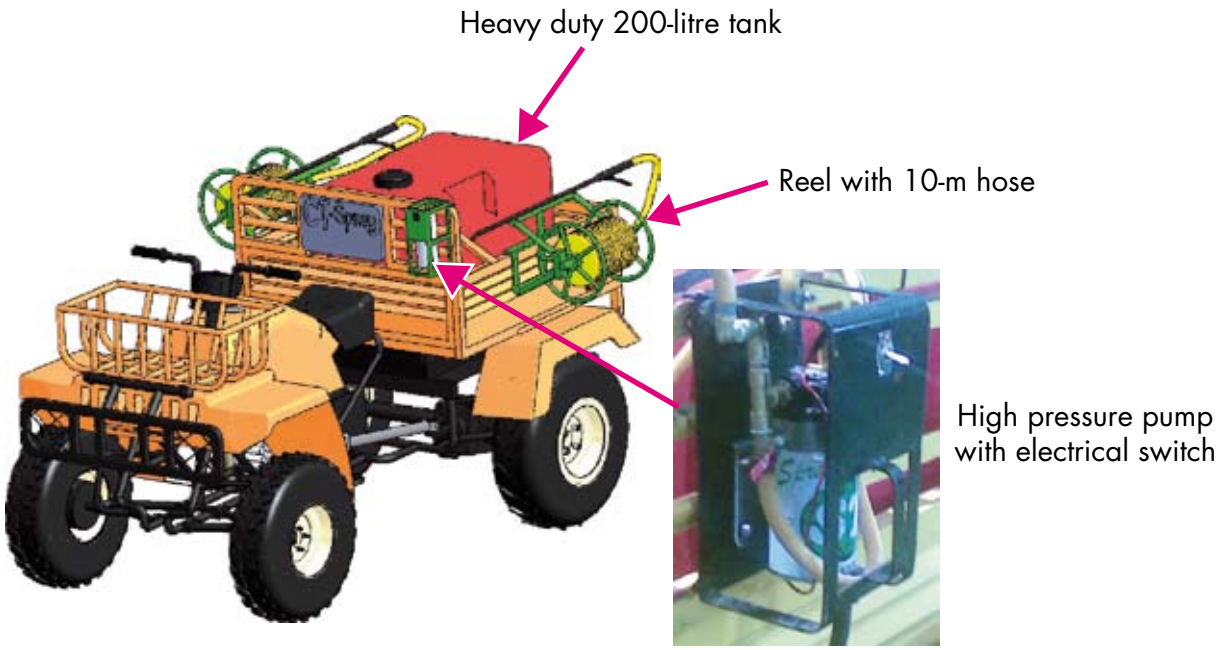

Figure 1. Multi-purpose transporter fitted as sprayer-CT sprayer.

ISSN 1511-7871
9 771511 787001

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Figure 2. CT-Sprayer operating in an estate.

(as listed in *Table 1*) specially designed and custom-made.

The machine is capable of working on all terrains. The tank of 200 litre is more than 10X the volume of the standard 18-litre knapsack sprayer, allowing more area to be covered in between fills. The nozzle can be changed from high to low volume application.

With the two hoses, spraying can be done on both sides of the vehicle covering a swathe of one one-palm row.

FIELD TRIALS

Field trials were carried out at MPOB/UKM Research Station, Guthrie Tanah Merah Estate, FELDA Lepar Hilir 11, Pahang, Sungai Terah Estate, Gua Musang Sedenak Estate, Kulai, Johor and a smallholding of gently rolling to undulating terrain. The machine was used to spray on both sides. In the trials, only circle spraying was done. The comparison between CT-Sprayer and manual (knapsack) spraying is shown in *Table 2*.

TABLE 1. GENERAL SPECIFICATIONS OF CT-SPRAYER

Prime mover	**Compact transporter (CT) with 250 cc, 4-stroke water-cooled petrol engine**
Sprayer	• 200-litre polytuff impact resistant tank; • 12 volt DC Shuflo pump rated at 6.81 l/min open flow @ 414 kPa (60 psi); • Two reels with 10-m hoses and nozzles; and • Simple connection of pump to 12 v DC power with electrical switch.

TABLE 2. COMPARISON OF PRODUCTIVITY: CT-SPRAYER *vs.* MANUAL (knapsack) SPRAYER

Sprayer	No. operators	Coverage (ha)
Knapsack (manual)	1	3.5
CT-Sprayer	3	15 - 18

ECONOMIC FEASIBILITY

The cost to produce one unit of the CT-Sprayer is about RM 16 000. If a required 'profit' of 30% - 40% is added, using a 10% discount factor, the investment in CT-Sprayer production is attractive with a payback period of 4.2 - 6.5 years (*Table 3*). As the B:C is >1, the NPV positive and IRR higher than the opportunity cost of capital (at various selling prices). Thus, the investment is financially feasible.

TABLE 3. FINANCIAL ANALYSIS OF CT-SPRAYER PRODUCTION AT 10% DISCOUNT RATE

Cost of prod. (RM)	Profit (%)	Selling price / unit (RM)	NPV (RM)	IRR (%)	B:C	Payback period (yr)
16 000	30	20 750	1 571 611	25.53	1.11	6.5
16 000	35	21 550	2 663 440	39.34	1.12	5.5
16 000	40	22 350	3 755 269	59.10	1.19	4.2

CONCLUSION

This compact transporter-sprayer offers considerable productivity improvement over manual spraying. The tank is more than 10X as large as that of the knapsack sprayer, reducing the frequency and time required for refilling. With the price of CT-Sprayer of RM 16 000 and output per day of 15 ha, the investment is financially feasible.

ACKNOWLEDGEMENT

We would like to thank the staff of Guthrie Tanah Merah Estate, FELDA Lepar Utara 11, Pahang, Sungai Terah Estate, Gua Musang, Kelantan and Sedenak Estate, Kulai, Johor for testing the machine and their invaluable constructive comments for improvement.

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