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**ENERGY REQUIREMENTS FOR AGRICULTURAL
PEST-CONTROL OPERATIONS**

By

YASSER EZZAT HASHEM MOHAMED ARAFA
B. Sc. (Agr. Mech.), Fac. of Agr., Ain Shams University, 1992

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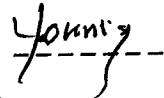
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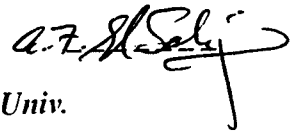
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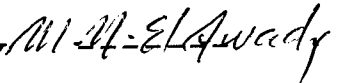
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ABSTRACT

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Some experiments were carried out in two locations to determine the energy consumption of wide varieties of sprayers. Firstly, at the Experimental Station of the Faculty of Agriculture, Ain Shams University at Shalaqan "شلقان", Kalubia Governorate. Secondly, at the Agricultural Mechanization Training Center, Ministry of Agriculture, El-Maamoura "المعمورة", Alexandria Governorate.

Ground spraying equipment (knapsack-hand-operated, knapsack-air-carrier, mounted-blower, mounted-boom and BLITZ.SSB hand-held battery) and aerial application (fixed and rotary wing planes) were evaluated by making comparative study to evaluate energy requirements and economical feasibility for computer modeling based on unit time and unit area.

A computer program was made for spraying machinery to select the optimum spraying equipment depending on several points regarding energy and management of these equipment via input required data in the program.

Important results of this investigation can be summarized as follows:

- 1- Fuel consumption rate (L/hp.h) was recorded for all spraying equipment. The observed data indicated that fuel consumption rate of knapsack-air-carrier (0.325 L/hp.h) was less than that observed for both mounted-boom (0.54 L/hp.h) and mounted-blower (0.68 L/hp.h) by 62.2 and 60.2% respectively as ground spraying. On the other

hand, for aerial application fuel consumption rate of rotary-wing plane (0.5 L/hp.h) were less than that obtained by fixed-wing plane (0.62 L/hp.h) by about 19.4%.

- 2- Fuel consumption per unit area "effective fuel consumption" (L/ha) data showed that mounted-boom (3.43 L/ha) were much higher than that observed by mounted-blower (2.64 L/ha) and knapsack-air-carrier (1.39 L/ha) by about 46.8 and 59.5% respectively for ground spraying. Meanwhile, with regard with aerial spraying data indicated that rotary-wing plane (1.67 L/ha) were much over than that with fixed-wing plane (0.79 L/ha) by about 11.4 %.
- 3- Results of manpower requirement indicated that there is no significant difference between all ground spraying machines. On the other hand, there is a significant difference in manpower requirement between aerial and ground spraying equipment.
- 4- There are significant energy losses due to not deviation from the manufacturer recommendations. The losses of hydraulic energy ranged from 4 to 34.4% at different operating pressures.
- 5- By one of various analysis procedures, the amount of energy cost required for ground spraying ranged from 3.89 to 30.08 LE/ha for hand-held-battery-operated and knapsack hand-operated sprayers respectively.
- 6- Computer programming aided in spraying equipment management in selecting the optimum spraying machine depending on several points of communication and management via input data to the program.

Keywords: Spraying, pest-control operations, agricultural mechanization, farm machinery, energy requirements, costs, economical feasibility, computer programming

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