

Farm Machinery Performance in Green-house Farms in Saudi Arabia

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ABSTRACT

A study of the machinery performance in greenhouse farms was carried out in the central region of Saudi Arabia. A survey was conducted during 1991-1992 where the collected information included machinery used in house operation and all the activities and their time were recorded; in addition to the houses arrangement and operational patterns.

It was found that plowing, cultivating, ridging, opening the middle of the row and spraying were the basic five operations performed inside the houses. The calculated averages operating speed of those operations were as follows: 3.28, 2.65, 1.95, 4.09 and 0.83 km/h respectively; while the averages field efficiency were: 60.7, 53.1, 57.1, 35.4 and 86.6% respectively. Those values were less by 60 to 80% than the values of the open field operations; except for spraying where the turning and nonproductive times were less. The other values were affected by some factors such as: improper size of tractor and machine, the orientation of the house, the operation pattern, and the obstacles inside the house. The analysis of variance test (ANOVA) showed that house width, operating speed, actual field capacity, turning time, and nonproductive time were significantly affected by house arrangement ($P > 0.01$). while the field efficiency together with the above parameters were significantly affected by the kind of machine operation inside the house ($p > 0.01$). There was a highly significant correlation between the house length (L) and field efficiency (FE). The best fit model between those two parameters could be expressed in the following form:

$$FE = a(L)^b, \text{ Where } a \text{ and } b \text{ are constants.}$$

The above relation might be considered as one of the design parameters when designing a greenhouse farm. Other recommendations of this study included the design of new farm machines more suitable for greenhouse use, using off-set hitch machines inside the house that could work beside house cover, and study the effect of the greenhouse orientation on the machinery performance.