Name of Candidate: Hosham Suliman Yousif **Degree:** M.Sc.
Title of Thesis: Mechanization of seedbed preparation for Sesame crop production
Supervisors: Dr. Gamal El- Deen Mohamed Nasr
Dr. Mohamed Naguib Rostom
Department: Agricultural Engineering **Approval:** / /

ABSTRACT

This study was conducted to study four seedbed preparation systems and three planting methods for sesame crop production. The experiment was performed in the experimental station Faculty of agriculture, Cairo University in clay loam soil. To achieve the goal of the work four seedbed preparation systems were tested to study the effect of these systems on some of these physical properties, performance of different systems (actual field capacity, total time consumed, fuel consumption), on length of fruiting zone and on yield production. The seedbed preparation systems were: (1) chisel plow (one pass) followed by disc harrow, land leveler and ridger, (2) chisel plow (2passes) followed by disc harrow, land leveler and ridger, (3) disc plow followed by disc harrow, Land leveler and ridger,(4) rotary plow followed by ridger. The results obtained from this study could be summarized as follows: disc plow produced the highest mean weight diameter (MWD), highest bulk density and lowest penetration resistance at the optimum working speed. The sequence of the different systems according to the total time consumed was found to be in the descending order: system 3 > system 2 > system1 > system 4. The sequence of the different systems according to the consumed energy k.W.h/fed was found to be in the descending order: system2 > system 3 > system1> system4. The sequence of the different systems according to the length of fruiting zone was found to be in the descending order: system2 > system 3 > system 4> system1. System 4(rotary plough followed by ridger) gave the highest value of yield production. The sequence of the different systems according to the costs L.E/fed was found to be in the ascending order: system $_4$ < system$_1$ < system $_2$ < system$_3$.It is recommended to perform seedbed preparation for sesame crop by applying the system 4 is the optimum system for seedbed preparation for sesame crop production followed by raw planting method.

Key words: Sesame, Seedbed, tillage. Soil physical properties, fuel consumption, and actual field capacity.

Name of Candidate: Ahmed Ragab Hamed Abou Elela **Degree:** Ph.D.
Title of Thesis: Agricultural Equipment Vibration Impact on Agricultural Labor Safety.
Supervisors: Dr. Ahmed El-Raie Emam Suliman,
Dr. Abd El Aal Zaki Taieb
Dr. Hesham A. Moneim Farag
Department: Agricultural Engineering **Approval:** / /

ABSTRACT

Vibration can produce wide varieties of different effects to the operators. Farm equipment operators are usually exposed to whole-body vibration, which is transmitted via the seat or via the floor and feet. This vibration contributes to operator fatigue and can have a detrimental effect on job performance and safety. The objective of the present work is to provide a comprehensive study about human body vibration and safety in the operation of agricultural equipment.

Data were collected during the years of 2008-2009 through periodic visits in nine selected farm mechanization stations belong to the ministry of agriculture (MOA), from five governorates; Sharkia, Kafer ElShiekh, Kalubia, Gharbia, and Ismaellia and Egyptian project for improving the main crops production in Sakha, and the local station in Gemeza. The governorates were selected on the basis of the highest number of labors who had back pain related to equipment and farm machines and the highest tractors and farm machines density in the region (Equipment and farm machinery bulletin, 2008). The selected farm machinery-servicing stations for the surveys were; Elkasasin (Ismaellia), Kafer Sakr, Hehya, Abokbeer (Sharkia), Sakha, Kellen (Kafer ElShiekh), Kotour (Gharbia), Toukh, and Benha (Kalubia). Data of the labors personal information and anthropometrics data measurements were taken for 337 subjects chosen randomly among farm machines operators, equipment operators, farm mechanistics, and farm labors working at the nine farm machinery-servicing stations. The sample included 28 subjects had chronic low back pain. Data were collected by interviewing persons using a questionnaire format. Data of the whole body vibration and occupational history related to equipment and farm machines were taken for 306 labors who operate different types of equipment and machines included with high vibrating mechanism, in different types of farm operations, chosen randomly among farm machines, and equipment operators. Data were collected by interviewing persons using a questionnaire format. WBV was measured in three axes, longitudinal (X), transverse (Y), and vertical (Z) axis for the deferent equipment types and farm operations. Data of the features of the most dangerous equipment and machines that cause injury were taken for 254 equipment and machines chosen randomly among tractor drivers, combine operators, and machines operators. 173 tractor drivers, 18 wheat combines operators, 29 rice combines operators, and 34 threshers operators were asked some questions according to a questionnaire format.

From the deep and through technical and statistical analysis the Nasr tractor is the most dangerous and accidents source among other farm equipment. A suspended seat was designed and manufactured depending on the maximum value of labor weight (115 kg) for the injured labors with low back pain and also the seat weight itself (30 kg). According to the distance to the half vertically under the seat, the length of the suspension units (springs) were designed and manufactured at (18 cm). The stiffness of steel helical coil spring, the steel leaf spring, and the rubber spring were (710, 1330, 1000 kg/m) respectively that to provide safely and suspended distance between the seat and the tractor block. Field experiments in the attendance of workers proved that the modification is accepted as it protects the worker spine besides it does not affect the performance of the tractor during primary tillage operation where it is the worst operation records high exposure limit value of whole body vibration. The tractor Nasr model after modification of the seat was presented to workers and users in a field day, they assured the significance of the added parts to the seat in the vision of safety considerations, the basic vibration measurement parameters for the x, y, z-direction and vector sum were not more than the threshold limit and not above the critical ratios. Rubber spring is better than helical coil and leaf spring so it is recommended to use it as a suspension spring under the seat The costs of all the modifications of the seat were considered low and maintenance of the added parts is very simple, easy and cheap.

Key words: Ergonomics, human factor engineering (HFE), low back pain (LBP), whole body vibration (WBV), body mass index (BMI).