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MINUFIYA UNIVERSITY
FACULTY OF AGRICULTURE
Shibin El-Kom
EGYPT

DEVELOPMENT OF A SIMPLE MACHINE FOR EXPRESSION OF SOME OILSEEDS

By

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ABSTRACT

The main objective of this study was to modify and improve a small and simple expression machine for extraction oil by cold pressing from most common oilseeds. The developed machine was designed and constructed locally at the workshop of Agric. Engineering Research Institute, (A En RI).

The important results, which were obtained from this study can be summarized as follows:

- The performance results of the modified expression machine is affected by many factors as screw speed, outlet clearance, screw type and oilseed moisture content.
- The meal oil content increased and the oil expression efficiency decreased with increasing the screw speed from 30 to 50, 70 and 90 rpm.
- The meal oil content increased and oil expression efficiency decreased when increasing the outlet clearance from 0.4 mm to 0.8 mm and 1.2 mm.
- The minimum value of feeding capacity was 50.9 and 50.7 kg/h for standard and tapered screw respectively at screw speed 30 r.p.m, 0.4 mm outlet clearance and 12% oilseed moisture content.
- The maximum value of feeding capacity was 102.57 and 101.47 kg/h for standard and tapered screw respectively at screw speed 90 r.p.m, 1.2 m outlet clearance and 6.3% oilseed moisture content.
- The maximum value of power requirement was 5.72 and 6.12 kW with the use of standard and tapered screw respectively at screw speed 90 r.p.m., 0.4 mm outlet clearance and 12% oilseed moisture content.
- The total costs of the machine were 3.73, 3.79 L.E/h for standard and tapered screw, respectively at the optimum conditions.
- The meal oil content decreased and the expression efficiency increased with the increase of the oilseed moisture content from 6.3 to 9%. On the other hand, the increase of oilseed moisture content from 9.0 to 12.0% tended to increase the meal oil content and decrease the expression efficiency.
- The tapered screw had given the lowest values of meal oil content and the highest values of expression efficiency compared with the standard screw.

LIST OF CONTENTS

INTRODUCTION

1. INTRODUCTION

Spreading food industrialization is one of the goals of industry in an agricultural country that needs a great care. The basis is to change the agricultural products or residues into industrial article that are easy to distribute in markets and ensure high repay adding a major contribution to the economy of the country.

Food industrialization helps in creating jobs to solve the problem of unemployment, increasing the income of the farmer, solving the problem of food shortage and contributing to the Egyptian village development.

Extraction of oil from oilseeds is one of the oldest industries in the world. It is one of the main food industry in the Arab Republic of Egypt.

The removal of oil from oilseeds can be achieved by extraction, expression or a combination of extraction and expression. Extraction is the process of separating a liquid from a liquid solid system with the use of solvents. Expression is the process of mechanically removing liquid contained in solids by the use of equipment such as screw presses, hydraulic presses, roll presses and mills (**Khan and Hanna 1983**).

In oil production, expression and solvent extraction are competitive; expression is less thorough but may yield both oil and meal products of high quality. Contrary to oil extracting systems using chemical solvents, the residue after pressing can be used directly for human/animal foodstuffs because there is no chemical contamination. It is also unnecessary to refine the oil, since expression process has no negative influence on the oil quality.

Although the solvent extraction process is more efficient than pressure extraction, solvent extraction equipment is expensive, there are fire and explosion hazards, and the technology is too complicated to be used on village level (**Singh, *et al.*, 1984**). So, the solvent extraction is not suitable for small and medium-size oil mills. The mechanical expression of oil from oilseeds is the most widely used method for oil extraction.

Linseed was used in the present investigation. It was selected on the basis of prevalence in Egypt and generally used for oil extraction. Linseed oil has been used for several centuries as a drying and it still the major one and is often mixed with other types of oils as sunflower and soybean oils in the manufacture of paint and varnish. It is also used for making linoleum, printer's ink, soap, antibiotics and other products. Linseed is good source of potassium, phosphorus, calcium and magnesium. Linseed cake is a very rich proteinaceous feed for livestock and quic-growing animals.

The main objectives of the present study were:

1- To modify and improve a small and simple expression machine for extraction of oil from most common oilseeds, suitable for the small Egyptian villages, and could be operated using the power available on village such as small tractors, motors.

2- To study of the design factors of the expression machine affecting expression efficiency and energy required for this process.

3- To evaluate the performance of the modified expression machine from the technological and economical points of view.

4- To make the necessary recommendations which are needed to design expression machine for extracting oil from oilseeds under local rural conditions.