4TH EDITION

E-EXTENDED

ABSTRACT

INTERNATIONAL AGROTECHNOLOGY INNOVATION SYMPOSIUM (i-AIS)

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INTERNATIONAL AGROTECHNOLOGY INNOVATION SYMPOSIUM (i-AIS)

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ABOUT FACULTY OF PLANTATION AND AGROTECHNOLOGY

The Faculty of Plantation and Agrotechnology was established in 2010 at Universiti Teknologi MARA (UiTM). The mission of the faculty is to play the vital role of producing well-trained professionals in all areas of plantation and agriculture-related industries at national and international levels.

Bachelor of Science (Hons) Plantation Technology and Management is a three-year program that strongly emphasizes the various aspects of Production Technology, Management, and Information Technology highly sought after by the agricultural and plantation sectors. Students in this program will be fully trained to serve as professionals in the plantation sector and related industries. They will have ample opportunities to fulfill important positions in the plantation industry such as plantation executives. This program provides a strong balance of technology and management courses essential for the plantation industry such as management of plantation crops, soil fertility, plantation management operation, plantation crop mechanization, and agricultural precision. As an integral part of the program, students will be required to undergo industrial attachment to gain managerial skills in the plantation industry.

The faculty is highly committed to disseminating, imparting, and fostering intellectual development and research to meet the changing needs of the plantation and agriculture sectors. With this regard, numerous undergraduate and postgraduate programs have been offered by the government's intention to produce professionals and entrepreneurs who are knowledgeable and highly skilled in the plantation, agriculture, and agrotechnology sectors.

PREFACE

International Agrotechnology Innovation Symposium (i-AIS) is a platform to be formed for students/lecturers/ staff to share creativity in applying the knowledge that is related to the world of Agrotechnology in the form of posters. This virtual poster competition takes place on the 1st of December 2022 and ends on the 8th of January 2023. This competition is an assessment of students in determining the level of understanding, creativity, and group work for the subject related to agrotechnology and being able to apply it to the field of Agrotechnology. The i-AIS 2022 program takes place from December 1, 2022, to January 8, 2023. The program was officiated by the Dean of the Faculty of Plantation and Agrotechnology, namely Prof. Madya Ts. Dr. Azma Yusuf. The program involves students from faculties of the Faculty of Plantation and Agrotechnology (FPA)and HEP participating in i-AIS 2022, namely, the Faculty of Education and Pre-Higher Education. This program involves the UiTM student and some of the non-UiTM students which come from the international university and the local university. Two categories are contested, namely UiTM and non-UiTM. To date, students from these programs have shown remarkable achievements in academic performance and participation in national as well as international competitions.

This competition is an open door for the students and lecturers to exhibit creative minds stemming from curiosity. Several e-content projects have been evaluated by esteemed judges and that has led to the birth of this E-Poster Book. Ideas and novelties are celebrated, and participants are applauded for displaying ingenious minds in their ideas.

It is hoped that such an effort continues to breed so that there is always an outlet for these creative minds to grow.

Thank you.

Dean
On behalf of the Organizing Committee
Conference Chair
Universiti Teknologi MARA
Faculty of Plantation and Agrotechnology
http://fpa.uitm.edu.my

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VACUUM LOOSE FRUIT COLLECTOR

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ABSTRACT -The purpose study is innovating the traditional method of loose fruit collection for oil palm. Currently, loose berries are collected by hand-picking or raking. This method is labor intensive, labor intensive and time consuming. Workers often have to bend down and stand up during the collection process, causing fatigue. On average, workers have to spend about 28% of the total harvest time collecting immature fruit. To ensure that the fruit is quickly sucked into the barrel and there is no risk of choking, we used greater suction power in this new design. The machine was able to collect 5-6 kg per minute with less than 15% waste. There was no damage to the fruit. We were able to manually pick between 0.7 and 1.4 kg of fruit per minute, depending on the number of loose fruits on each palm. I'm using. When the fruit is sucked in, the tubular shape creates a cyclone environment that causes less damage to the fruit. Lighter items such as dry leaves are sucked out of the system as the fruit circulates through the barrel/chamber, while heavier fruit falls to the bottom of the barrel. The creation of this loose fruit collection met the desired requirements. The machine generally works well where conventional wheel conveyors can be used, facilitating the collection of loose fruit.

Keywords: Loose Fruit Collection, Cyclonic Vacuum Concept, Oil Palm Machine, Loose Fruit Collector Machine, Suction Machine

INTRODUCTION

The term "loose fruit" refers to each individual fruit that has been cut loose from a ripe bunch, and the number of each fruit will indicate when a certain bunch is ready to be harvested. Depending on the corporate policy, there may be one to ten loose fruits removed from the bunch. Because they contain a lot of oil, these individual loose fruits that were separated from bunches should be gathered. It was noted that laboratory testing on fruits from the outermost layer of bunches contributed roughly 50% of the bunch's overall oil percentage. As a result, if the outermost layer of the bunch of fruit, which should be collected by chance, is not processed, it may result in a decrease in the oil extraction rate (OER).

Currently, loose fruits are gathered by hand picking or raking. This method is laborious in addition to requiring a lot of labour and time. The worker must frequently stoop and stand up throughout the collecting procedure, which wears them out. On average, the worker has to spend roughly 28% of the entire harvesting time collecting loose fruits. To guarantee that the fruits are quickly sucked into the barrel with less risk of choking, we applied greater suction force in this new design.

MATERIAL AND METHOD

Secondary data is the methodology we employed for this project. We use the information that we gather from the organizations for various purposes. This loose fruit collector was built using components that were readily available nearby. The engine component is the only moving item that has to be imported. In order to evaluate the productivity of this equipment to manual collection under similar palm height and harvesting rounds, field tests were conducted on a commercial oil palm estate. Raking and scooping the fruits into a bag or container served as the manual collecting method. The machine could collect 5 to 6 kg per minute with less than 15% trash. Fruits weren't harmed in the process. Depending on the number of loose fruits in each palm, 0.7 to 1.4kg min-1 of fruits could be picked manually.

RESULTS AND DISCUSSION

We employ the vacuum principle whereby loose fruits are drawn into a cylindrical container with a conical form at the bottom. When the fruits are sucked, the cylindrical form generates a cyclone environment with little damage to the fruit. The lighter elements, such dry leaves, will be sucked out of the system as the fruits circulate within the barrel/chamber, while the heavier fruits fall to the bottom of the barrel (as it loses energy) (Figure 1). In the vacuum chamber, this technique may also divide the gathered loose fruits and the debris into two layers, generating clean loose fruits at the bottom of the barrel.

A fan contained in its casing, whose output shaft is coupled to a 9 hp diesel engine through a network of pulleys and belts, generates vacuum, as shown in Figure 2. Utilizing a suction nozzle with a diameter range of 60 to 75 mm, the loose fruits are drawn in. The user must maintain control of the nozzle handle while directing the suction nozzle toward the loose fruits lying on the ground. Between 4 and 5 metres is an appropriate length for the suction hose to ensure a sufficient collection at each site.

When the barrel is full of loose fruits, the lever, which is mechanically attached to the gate opener with a spring mechanism, is released at the collecting point to transfer the contents into the beg.
The prototype loose fruits collecting machine in the field requires three workers, in example one to drive the machine and two workers to rake the scattered loose fruits into a heap to enable the suction process to be completed in less than 10 seconds. Based on these assumptions, the price of the machine is RM25,000. Meanwhile, the economic life of the machine is 5 years and labour cost is RM30/day per person. According to the latest fuel price, fuel cost per day for 15 litres is RM30.75. Assuming that the output of the machine is 1.5 with labour cost of RM 90 for three workers with 8 working hours per day, the operational cost of using the machine is RM 102.44. The payback period for the investment of this machine is within 14 months.

One of the benefits of this loose fruit vacuum cleaner is that the machine quickly sucks the loose fruit through the suction hose. Furthermore, because the collection work can only be done while standing, the worker's back pain can be reduced. As a result, many workers who collect manually suffer from back pain because of their work. As a result, many workers are unwilling to collect loose fruit. Furthermore, because there is no need to carry baskets to collect loose fruit, this machine can automatically reduce labour increase.

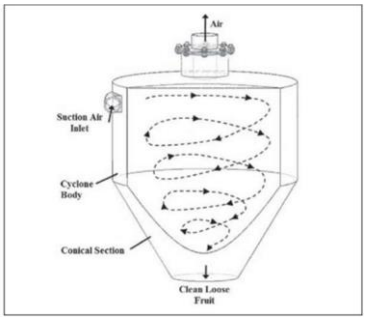

Figure 1: Cyclonic Vacuum Concept

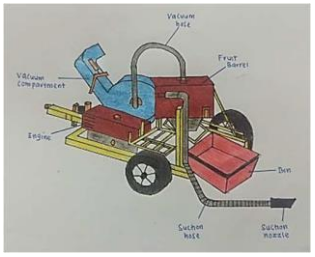

Figure 2: Drawing And Parts Of The Machine

Table 1: Specification Of The Components

Component	Units	Specification
Vacuum Hose	1	3m length @ 70mm
Engine	1	JD diesel 9.5 HP Single cylinder Water cooled
Fruit barrel	1	170 Litres
Suction hose	1	5m length @75mm
Tyre	2	7.5 x 16
Bucket	1	4.0 Cubic Feet capacity 8kg

CONCLUSION

The creation of this loose fruit collection satisfies the objectives' requirements. The machine generally performs effectively in locations where traditional wheel-type conveyors may operate, boosting the recovery of loose fruit. The collecting of loose fruits is more productive thanks to this gadget. Now that loose fruit can be transported to the factory with little risk of contamination, improved quality can be guaranteed while fewer manufacturing steps are required due to the current collecting methods.

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