

RESEARCH ARTICLE

Mechanical properties of areca nut

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ABSTRACT

India produced 7,43,220 tones of areca nut (*Areca catechu* L.) from 44,5000 ha during the year 2014-15 (APEDA). Areca nut is an important component of the religious, social and cultural celebrations and economic life of people in India. Areca nut is also used in ayurvedic and veterinary medicines. The edible part of arecanut is its kernel. The kernel is well protected inside a fibrous husk. This husk needs to be removed while obtaining the kernel. Being fibrous nature of the husk, it is difficult to de-husk. Hence, it was necessary to find out the force required for pierce the husk. It was observed that the average force required to break wet arecanut (freshly harvested) was 11.20 KN. Whereas the average force required to break dried arecanut was 10.62 KN.

KEY WORDS : Arecanut, Force, drying, UTM, Air oven

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INTRODUCTION

India produced 7,43,220 tones of areca nut (*Areca catechu* L.) from 44,5000 ha during the year 2014-15 (APEDA). Areca nut is an important component of the religious, social and cultural celebrations and economic life of people in India. Areca nut is also used in ayurvedic and veterinary medicines. The edible part of arecanut is its kernel. The kernel is well protected inside a fibrous husk. This husk needs to be removed while obtaining the kernel. Being fibrous nature of the husk, it is difficult to de-husk. Hence, it was necessary to find out the force required for pierce the husk. It is, therefore, an experiment was carried out to find the force required to break the arecanut.

EXPERIMENTAL PROCEDURE

The materials required for the experiment were arecanuts, dryer and universal testing machine (UTM).

The freshly harvested arecanuts of variety, shrivardhan, were procured from a local farmer.

The initial moisture content of the wet arecanut was determined with the help of Air oven. The samples of areca nuts were selected by randomization method. The fresh samples were taken to the laboratory where universal testing machine has been installed. The proper calibration of the UTM machine was done. The samples were placed on the platform underneath load cell with probe. Due care was taken so that the sample should not deviate from its firmly holding position. Then the pre-programmed UTM machine is allowed to be operated against the sample through load cell and probe. There were two observations recorded in the software viz., the force required to initiate breaking and peak force required during breaking.

After determining initial moisture content of remaining areca nut sample were placed in the tray dryer. The

drying operation was performed at an average temperature of 65 °C till reaching equilibrium moisture content of the areca nut. These dried samples were tested under UTM for find out the force to initiate the breaking and peak force required to break the husk layer completely.

EXPERIMENTAL FINDINGS AND ANALYSIS

The following results were obtained after performing the experiment.

It was observed from Table 1 that the force required to initiate breaking of freshly harvested arecanut was 3.13 to 5.00 KN (average force 4.25 KN). Similarly the force required to complete the breaking were from 10.63 to 11.25 KN (average 11.20 KN).

The force required to initiate breaking of dried arecanut was between 2.2 to 2.5 KN (average 2.47 KN) and to complete breaking the force required was between 9.38 to 11.25 KN (average 10.62 KN).

Table 1 : Force required to break the arecanut				
Arecanut				
Wet (Freshly harvested)			Dried	
Sr. No.	Force required to start breaking, KN	Force required to complete breaking, KN	Force required to start breaking, KN	Force required to complete breaking, KN
1.	3.75	11.25	2.5	9.38
2.	4.38	11.88	2.2	9.45
3.	3.13	10.63	2.5	9.38
4.	3.75	11.25	2.5	9.38
5.	4.38	11.25	2.5	11.25
6.	4.38	11.25	2.4	9.38
7.	4.38	11.25	2.4	10.87
8.	5.00	11.25	2.5	10.50
9.	4.38	11.25	2.5	10.75
10.	4.38	11.25	2.5	11.22
11.	4.38	11.25	2.5	11.25
12.	4.38	11.25	2.4	11.25
13.	4.38	11.25	2.3	10.87
14.	4.38	11.25	2.5	09.45
15.	4.38	11.25	2.5	11.25
16.	5.00	10.63	2.5	11.25
17.	3.75	10.63	2.5	11.25
18.	3.75	11.25	2.5	10.50
19.	4.38	11.25	2.5	11.25
20.	4.38	11.25	2.5	11.25
21.	3.75	11.25	2.5	11.25
22.	4.38	11.25	2.5	11.25
23.	4.38	11.25	2.5	10.50
24.	4.38	11.25	2.5	10.50
25.	4.38	11.25	2.5	10.95
Average	4.25	11.20	2.47	10.62



Fig. 1 : Universal testing machine

Conclusion:

The average force required to break wet (freshly harvested) arecanut was 11.20 KN. And the average force required to break dried arecanut was 10.62 KN.

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