

**Development of a Mahua (*Madhuca longifolia*) Seed Decorticator and Value Addition of Mahua Seed****F.M. Sahu<sup>1\*</sup>, S.H. Suthar<sup>2</sup>, V.K. Sharma<sup>3</sup>, H.T. Hegde<sup>4</sup>**<sup>1</sup>Centre of Excellence on Post Harvest Technology, ACH; <sup>2</sup>PFE, CAET, Dediapada; <sup>3</sup>AE, CoA, Waghai and <sup>4</sup>FP&U, CoF, Navsari Agricultural University, Navsari, Gujarat- 396450, India\*Email: [fmsphc@nau.in](mailto:fmsphc@nau.in)**Keywords:** Concave clearance, decorticator, Mahua seed moisture content, performance**1. Introduction**

Mahua (*Madhuca longifolia*) seed is a tree-borne oilseed and one of the important non-timber forest products of India. The seeds are primarily processed for their oil which is used in various food and non-food industries. Prior to extraction of oil, mahua seeds are manually broken to obtain mahua kernel. The manual decortication process is tedious and time consuming and labour-intensive process costly, low output and injurious to human being. To overcome this problem, present investigation was carried out to design and develop a mahua seed decorticator and its performance was evaluated.

**2. Materials and methods**

The decorticator was designed employing SOLIDWORKS 2020 and fabricated using standard procedure. The components of machine comprise of the main frame, feed hopper, decortivating casing, a mechanism for adjusting clearance between concave and rotor assembly and a power transmission unit etc. The performance parameters of the decorticator were tested and evaluated with independent variables, namely four levels of seed moisture content, i.e., 9, 12, 15 and 18 % (db), and four levels of concave clearance, i.e., 9, 11, 13 and 15 mm. With FCRD, there were 16 combinations which were considered as treatments and each treatment had three repetitions.

**3. Results and discussions**

The results revealed that independent parameters seed moisture content (M) and concave clearance (C) significantly affected the decortivating performance of mahua seed decorticator. At any particular concave clearance from 9 to 11 mm, per cent of whole kernel decreased as moisture content increased from 9% to 18% (db) while per cent of broken kernel and powder decreased as moisture content increased from 9% to 18% (db).

**Table 1.** Performance of mahua seed decorticator at different variables for factorial CRD design

Treatments	CC, mm	% of WC	% of BKP	% of PDS	% of UDS	DE, %	OME, %	Desirability
Seed moisture content (M <sub>1</sub> ), 9 % db								
T <sub>1</sub> (M <sub>1</sub> C <sub>1</sub> )	9	58.87	13.19	0.79	0.56	98.65	80.59	0.312
T <sub>2</sub> (M <sub>1</sub> C <sub>2</sub> )	11	67.25	7.26	1.03	0.79	98.18	88.63	0.932
T <sub>3</sub> (M <sub>1</sub> C <sub>3</sub> )	13	63.05	7.45	2.31	1.12	96.57	86.36	0.732
T <sub>4</sub> (M <sub>1</sub> C <sub>4</sub> )	15	61.26	6.33	2.62	2.13	95.25	86.34	0.615
Seed moisture content (M <sub>2</sub> ), 12 % db								
T <sub>5</sub> (M <sub>2</sub> C <sub>1</sub> )	9	58.12	12.83	1.14	0.91	97.95	80.24	0.080
T <sub>6</sub> (M <sub>2</sub> C <sub>2</sub> )	11	65.45	7.11	1.33	1.56	97.11	87.60	0.880
T <sub>7</sub> (M <sub>2</sub> C <sub>3</sub> )	13	64.13	6.67	2.69	2.27	95.04	86.09	0.679
T <sub>8</sub> (M <sub>2</sub> C <sub>4</sub> )	15	60.79	6.15	2.98	2.35	94.67	85.97	0.561
Seed moisture content (M <sub>3</sub> ), 15 % db								
T <sub>9</sub> (M <sub>3</sub> C <sub>1</sub> )	9	57.79	12.66	1.56	1.45	96.99	79.56	0.037
T <sub>10</sub> (M <sub>3</sub> C <sub>2</sub> )	11	64.67	6.45	1.81	1.93	96.26	87.53	0.828
T <sub>11</sub> (M <sub>3</sub> C <sub>3</sub> )	13	62.04	6.11	2.87	2.56	94.57	86.10	0.625
T <sub>12</sub> (M <sub>3</sub> C <sub>4</sub> )	15	60.38	6.00	3.12	2.61	94.24	85.72	0.496

Seed moisture content (M <sub>4</sub> ), 18 % db								
T <sub>13</sub> (M <sub>4</sub> C <sub>1</sub> )	9	57.12	12.4	1.65	1.57	96.78	79.52	0.134
T <sub>14</sub> (M <sub>4</sub> C <sub>2</sub> )	11	62.90	6.00	2.15	2.64	95.21	86.92	0.763
T <sub>15</sub> (M <sub>4</sub> C <sub>3</sub> )	13	60.93	5.90	2.70	2.65	94.40	86.07	0.553
T <sub>16</sub> (M <sub>4</sub> C <sub>4</sub> )	15	59.01	5.82	3.33	2.90	94.02	85.59	0.036

CC = Concave clearance WC =whole kernel; BKP = broken kernel and powder; PDS = partially decorticated seed; UDS = un-decorticated seed; DE = Decortivating efficiency and OME = Overall machine efficiency

Similarly, per cent of partially decorticated seed and per cent un-decorticated seed decreased as moisture content increased from 9% to 18% (db). At any particular concave clearance from 9 to 11 mm, decortivating efficiency (%) decreased with increased in moisture content from 9% to 18% (db) and decreased with increased in concave clearance from 9 to 15 mm. At any particular concave clearance from 9 to 11 mm, overall machine efficiency (%) decreased with increased in moisture content from 9% to 18% (db). But, at any particular moisture content from 9 to 18% (db), the overall machine efficiency (%) did not showed any particular trend with respect to concave clearance. Installed cost of developed mahua seed decorticator was Rs 32,000/- with a through put capacity of 100 kg/h. The best performance of mahua seed decorticator was obtained in treatment: T<sub>2</sub> (M<sub>1</sub>C<sub>2</sub>) i.e. at seed moisture content of 9% (db) and concave clearance of 11 mm which resulted in maximum percentage of whole kernel recovery of 67.25% with decortivating efficiency of 98.18% and overall machine efficiency of 88.63% having a desirability value of 0.932.

## References

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