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Performance and Economic Assessment of Green Pea Depodder

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A green pea depodder, developed by JNKVV, Jabalpur under the AICRP on PHET project, was evaluated at the Post-Harvest Engineering laboratory, AICRP on PHET, Department of Agricultural Engineering, BAU, Ranchi. The machine is composed of three functional sections: a feeding unit, a shelling unit, and a collection unit. To assess its performance, two local green pea varieties (short pea (*Arkel*) and long pea (*Komal*)) were tested under five different moisture content levels, measured at daily intervals. The depodder exhibited an average throughput capacity of 46.30 kg/h. Performance parameters included shelling efficiency (%), percentage of unshelled pods (%), and percentage of damaged peas (%). The short pea (*Arkel)* variety achieved the highest shelling efficiency of 97.780 ± 0.471% at a moisture content of 51.09%, with 2.220 ± 0.471% unshelled pods and 0.923 ± 0.119% damaged peas. The long pea *(Komal)* variety reached a maximum shelling efficiency of 93.247 ± 0.776% at 55.31% moisture content, with 6.753 ± 0.776% unshelled pods and 1.516 ± 0.144% damaged peas. The study clearly showed that decreasing moisture content led to improved shelling efficiency and reduced unshelled pods, while higher moisture content had adverse effects. A comparative economic analysis between mechanical and manual shelling methods revealed that the cost of shelling using the green pea depodder was found to be Rs. 6.57/kg, compared to Rs. 20.83/kg for manual shelling. The results highlight the green pea depodder as a cost-effective and time-saving solution, particularly beneficial for small-scale farmers.

Keywords: Economic analysis, Moisture content, *Pisum sativum*, Post-harvest machinery, Shelling efficiency

Introduction

Green pea (*Pisum sativum L.*) is one of the extensively grown winter season legumes crops that are highly nutritious. Green peas are known for being a vital source of protein, carbohydrates, dietary fibers, as well as essential vitamins such as A, C, and K, and minerals. They also have immense health benefits in treating diabetes, heart diseases, and different types of cancer, thus adding another aspect to food and nutritional security. India is among the major producers of green peas in the world. Green peas are produced in 590 thousand hectares annually with total production of 6.13 million tons.[1] Uttar Pradesh ranks first among other Indian states in producing green peas followed by Madhya Pradesh and Bihar. Another state with increasing vegetable production is Jharkhand which has planted 18.25 thousand hectares of green peas in 2023–24, producing over 356.94 thousand tons.[2] Despite the considerable volume produced, post-harvest operations including depoding continue to be tedious and uneconomical. Depoding, which refers to shelling, involves the removal of peas from the pod, a tedious process that takes much time and involves high labor costs. An individual can process only 3–3.5 kg of green peas per hour.[3] In addition, depoding becomes a constraint especially when there are large volumes of the crop harvested, thereby hindering value addition such as freezing or canning. Several researchers have attempted to mechanize the depoding process to reduce labor and increase efficiency. De-podding efficiencies ranging from 31.8% to 62.1% for a melon depodding machine were reported.[4] Researchers developed a power-operated sheller that attained up to 95.8% efficiency for blanched peas.[5] A power-operated sheller using a

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vibrating and continuous feeding mechanism, with notable success was developed.[6] Few green pod depodder machines were also developed.[7,8] However, many of these machines were either not evaluated under local agro-climatic conditions or did not consider the variability in local pea varieties and pod moisture content. Given Jharkhand's increasing role in green pea cultivation, there is an urgent need to test and adopt suitable mechanical depodders adapted to local conditions. Mechanization not only has the potential to reduce post-harvest losses and labor dependency but also offers a sustainable pathway to improve farm incomes and promote agri-based rural entrepreneurship.

To address these issues, the present study was undertaken to evaluate the technical and economic feasibility of a green pea depodder developed by JNKVV, Jabalpur under the AICRP on PHET project.[9] The machine, consisting of a feeding unit, shelling chamber, and collection system, was assessed at AICRP PHET BAU, Ranchi using two local pea varieties (*Arkel* and *Komal*) under varying moisture conditions. The green pea depodder evaluated in the present study was originally developed by Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur, Madhya Pradesh, under the All India Coordinated Research Project on Post-Harvest Engineering and Technology (AICRP on PHET). Although the machine has been evaluated under the agro-climatic conditions of Madhya Pradesh, its performance under the distinct agro-climatic conditions of Jharkhand characterized by higher humidity, cooler temperatures during the pea growing season, and locally cultivated varieties remain unreported. Since post-harvest machinery performance is known to be significantly influenced by location-specific factors such as variety characteristics, ambient temperature, relative humidity, and crop moisture content at harvest, direct extrapolation of results from one location to another may not be appropriate. Furthermore, the prevailing labour wage rates, operational costs, and market conditions in Jharkhand differ considerably from those in Madhya Pradesh, necessitating an independent economic evaluation for the region. Therefore, the present study was undertaken to evaluate the performance and economic viability of the green pea depodder under the specific agro-climatic and socio-economic conditions of Jharkhand, with the objective of generating location-specific data to facilitate informed adoption of the technology by farmers and post-harvest technologists in the region. This study aims to fill a crucial research gap by examining the performance of the depodder in terms of shelling efficiency, unshelled pods, and pea damage, as well as to compare its cost-effectiveness against manual depoding. The outcomes are expected to contribute toward developing a viable, low-cost, and farmer-friendly technology for the green pea value chain in Jharkhand and similar agro-ecological regions.

Materials and Methods

The performance evaluation of a green pea depodder developed by Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur, under the All India Coordinated Research Project (AICRP) on Post-Harvest Engineering and Technology (PHET), was carried out at the Post-Harvest Engineering laboratory, Department of Agricultural Engineering, Birsa Agricultural University (BAU), Ranchi, Jharkhand.

Raw Material Procurement and Experimental Design

Two local green pea varieties, Short Pea (*Arkel*) and Long Pea (*Komal*) were procured from the local market and tested under five levels of moisture content. Freshly harvested pods inherently lose moisture progressively after picking. Accordingly, pods were stored under ambient laboratory conditions and tested at daily intervals over five successive days. Rather than imposing artificial moisture levels, the study utilized natural post-harvest moisture loss as the basis for establishing five distinct moisture treatment levels. Before each trial, the moisture content was determined gravimetrically. The moisture content for *Arkel* cultivar ranged from 79.12% to 45.31% and for *Komal* cultivar from 81.32% to 43.12%. The experiment was laid out in a Completely Randomized Design (CRD). For each moisture level and variety combination, three replications were conducted for every dependent variable (shelling efficiency %, unshelled pea pod % and pea damage %) to ensure statistical reliability.

Determination of Moisture Content

The moisture content of fresh pea pods of both varieties (*Arkel* and *Komal*) was determined gravimetrically following the standard oven-drying method as per ASABE Standards.[10] Representative samples of approximately 25–30 g was taken in triplicate from each pod lot and placed in pre-weighed moisture dishes. The samples were dried in a hot air oven at 103 ± 2°C for 72 hours until a constant weight was achieved. The moisture content was calculated on wet basis (w.b.) using the following formula:

$$Moisture\ content\ (\%\ w.b) = \frac{W_i - W_f}{W_i} \times 100 \quad \ldots (1)$$

where, W_i = initial weight of sample before drying (g); W_f = final weight of sample after oven drying (g)

Description of the Green Pea Depodder Machine

The green pea depodder machine is a semi-automatic unit designed to facilitate the efficient shelling of green peas. The overall dimensions of the machine are 99 cm in length, 44 cm in width, and 133 cm in height (Table 1). It is structurally divided into three primary sections: the feeding section, the shelling or depodding section, and the collection section for peas and pericarp. Throughout all trials, a constant feed rate of 46.30 kg/h was maintained to eliminate feed rate as a confounding variable, ensuring that observed differences in shelling efficiency, unshelled pod percentage, and pea damage could be attributed solely to the effect of moisture content and pea variety. Since feed rate directly influences pod residence time within the shelling drum and the mechanical forces acting on pods, keeping it constant was essential to maintain experimental integrity and ensure comparability across all treatment combinations and replications, in accordance with standard post-harvest machinery evaluation protocols.[10,11] The machine was equipped with a 0.5 hp electric motor. The isometric view of the green pea de-podder was created using SketchUp 3D Design Software (Trimble, version 3.1), as shown in Fig. 1.

Table 1 — Dimensional specifications of the developed green pea depodder

Sl. No.	Component / section	Dimension description	Size
1	Overall machine	Total length	133 cm
2	Overall machine	Total width	57 cm
3	Overall machine	Total height	67 cm
4	Main body cabinet	Length	79 cm
5	Main body cabinet	Width	24 cm
6	Main body cabinet	Height	22 cm
7	Shelling section (cylindrical drum)	Length	38 cm
8	Shelling section	Diameter / height	23 cm
9	Feeding section	Length	38 cm
10	Feeding section	Feed inlet height	17 cm
11	Feeding section	Feed inlet width	13 cm
12	Feeding section mounting	Height above drum	20 cm
13	Power transmission section	Length projection	52 cm
14	Power transmission section	Width projection	44 cm
15	Supporting leg clearance	Bottom clearance	8 cm
16	Front extension / support	Horizontal extension	15 cm
17	Outlet opening	Pea grain outlet offset	10 cm
18	Pericarp outlet section	Outlet chamber length	10 cm
19	Pericarp outlet section	Outlet chamber height	22 cm
20	Drum support distance	Vertical support distance	18 cm
21	Feeding chute to drum center	Vertical distance	13 cm
22	Side projection distance	Side extension	99 cm

Frame of Green Pea Depodder

The machine frame is fabricated from mild steel angle iron and square tubing for durability and stability. The legs are each 15 cm tall, with a base spread of 99 cm × 44 cm to maintain balance during operation. The total height of the machine including the hopper is approximately 133 cm. (Fig. 1).

Feeding Section

The feeding section consists of a trapezoidal hopper mounted centrally on top of the drum. The hopper is 57 cm in length and 38 cm in width at the upper opening, tapering downward to 17 cm at the base, where it connects to the shelling drum. The height of the hopper is 23 cm. It is supported by two vertical rods for providing stability during operation.

Shelling Section

The basic element of the machine is a cylindrical shelling drum having a length of 67 cm and diameter 13 cm. The shelling mechanism extends beyond the sidewalls and is supported on either side with bearings fixed on the external frame. In the drum, there is a de-podding mechanism that rotates for separating peas from the pods. It is encased in a concentric cylinder housing having dimensions of 79 cm × 20 cm (length × diameter). Pulley and belt drive assembly, placed on the left-hand side of the machine, rotate the drum. The big pulley has a diameter of 18 cm and is connected to a small pulley with a diameter of 8 cm through a belt arrangement to vary the speed and torque ratio. There is a gap of 52 cm between two pulleys.

Pea and Pericarp Collection Section

Once the peas are separated, they fall through perforated sieves located at the bottom section of the drum. The collection chamber is divided to facilitate the separation of peas and pericarps. The front-facing pea outlet chute is 10 cm in width and 10 cm in

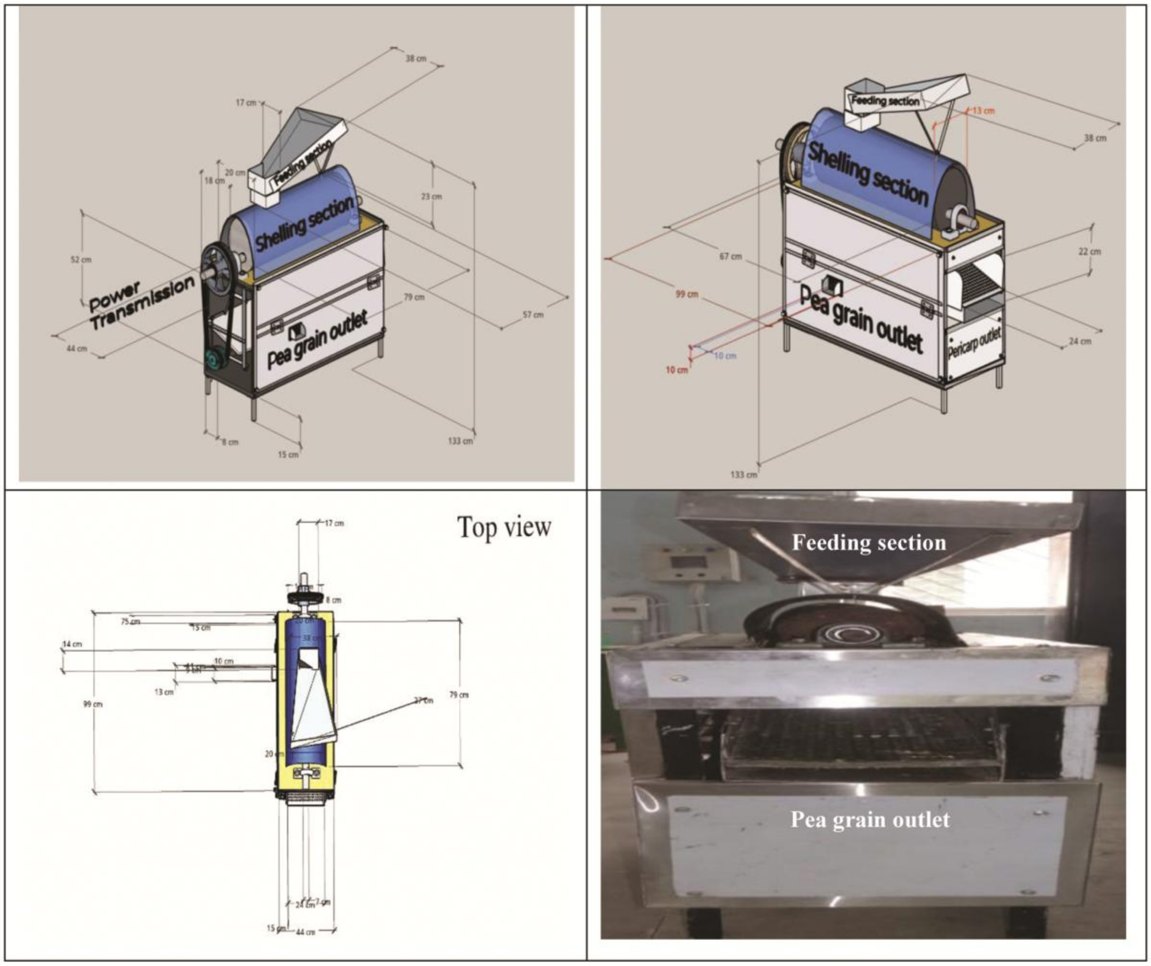

Fig. 1 — Isometric view (front and rear) of green pea depodder

Fig. 2 — Depodding of green pea using the pea depodder: (a) Green pea pods with different moisture content, (b) Feeding through hopper, (c) deseeded pods, (d) green pea after depodding

height. The pericarp outlet, fitted with a mesh sieve of dimensions 24 cm × 22 cm, allowing finer residue to pass while retaining larger husk particles. The outlet arrangement ensures efficient segregation of the shelled peas and pod residues for easy collection and disposal.

Performance Evaluation of the Green Pea Depodder

Performance tests for the green pea depodder were conducted in a controlled laboratory environment inside the Post-Harvest Engineering Shed, Department of Agricultural Engineering, BAU, Ranchi (Fig. 2). In each experiment, a batch weight of 500 grams of fresh peas (*Arkel* or *Komal*) was measured on a digital weighing scale (least count 0.01 g) and fed manually and slowly into the trapezoidal hopper with a fixed and constant feed rate of 46.30 kg/h. Before conducting each test, the machine was run under no-load conditions for about 2–3 minutes to allow it to stabilize and for the shelling drum to attain its predetermined speed prior to the commencement of the process of introducing the pods to the machine. The separated peas, pods, pericarp and damaged peas were collected separately from their individual outlet chutes and storage bins as shown in Fig 2. Each of these fractions was then weighed separately using the digital weighing scale. The test was done at five different moisture contents on a daily basis, for each variety, with three replicates for each moisture and variety combination. The machine was cleaned in between each replicate to avoid contamination of the fraction weights during the experiment. This experiment was carried out by one operator only, to avoid any differences in results due to different operators.

To evaluate the operational efficiency of the green pea depodder, several parameters were recorded, including the weight of shelled peas (g), unshelled pea pods (g), pericarp (g), and damaged peas (g). Fractions' weight data collected from the replicates was then used to compute shelling efficiency (%), percentage of unshelled pods (%), and damage (%) using the formulas stated below Eqs (2–4). These measurements were taken for each treatment combination and across all replications to ensure consistency and reliability of results. Based on these recorded values, the machine's performance was assessed using three primary indices:

$$\text{Shelling efficiency (\%)} = \frac{\text{Weight of Shelled Pea}}{\text{Total mass of pea pod}} \times 100 \qquad \dots (2)$$

$$\text{Unshelled pea pod (\%)} = \frac{\text{Mass of unshelled pea pod}}{\text{Total mass of pea pod}} \times 100 \qquad \dots (3)$$

$$\text{Pea damage (\%)} = \frac{\text{Mass of damaged Pea}}{\text{Total mass of pea pod}} \times 100 \qquad \dots (4)$$

Cost Economic Evaluation of Green Pea Depodder

An economic feasibility analysis was carried out to compare mechanical green pea depodding with manual shelling methods based on prevailing local operational conditions in Jharkhand during the study period. The cost of shelling per kilogram, payback period and annual profit were estimated based on actual operational and labor cost data. The following assumptions were considered for the cost calculations: the machine was operated for 8 hours per day over 100 working days annually, labour wage rate was assumed as Rs. 500 per day for one operator, electricity and operational expenses were included in the machine operating cost, the processing capacity of the depodder.

Results and Discussion

The performance of the green pea depodder was evaluated with two locally grown pea varieties (*Arkel* and *Komal*) under varying moisture content conditions Fig. 2. Key parameters analyzed included dimension characteristic of pea varieties, shelling efficiency, unshelled pod percentage and pea damage. The experimental results are presented in Table 2 and illustrated in the figures.

Dimensional Characteristic of Long and Short Peas

The dimensions of both pea varieties were measured using vernier caliper and represented in Table 3. Long pea (*Komal*) pods exhibited larger size attributes, with an average length of 96.83 ± 4.60 mm and width of 10.85 ± 0.30 mm, compared to 67.03 ± 3.58 mm and 7.97 ± 0.69 mm in Short Pea *(Arkel)*. Interestingly, pod thickness in Short Pea (*Arkel*) was

Table 2 — Effect of moisture content on performance indices of green pea depodder in short and long pea varieties

Variety	Moisture content (%)	Shelling efficiency (%)	Unshelled pod (%)	Pea damage (%)
Short pea *(Arkel)*	79.12	78.667 ± 2.634^{e}	21.333 ± 2.634^{e}	1.860 ± 0.175^{a}
	67.02	85.470 ± 1.422^{cd}	14.530 ± 1.422^{cd}	1.360 ± 0.270^{ab}
	51.09	97.780 ± 0.471^{a}	2.220 ± 0.471^{a}	0.923 ± 0.119^{bc}
	46.34	91.287 ± 0.731^{b}	8.713 ± 0.731^{b}	0.577 ± 0.027^{cd}
	42.12	84.000 ± 1.617^{cd}	16.000 ± 1.617^{cd}	0.227 ± 0.067^{d}
C.D. (5%)	—	5.012	5.012	0.500
C.V. (%)	—	3.110	21.655	27.403
Long pea *(Komal)*	80.12	74.000 ± 1.400^{d}	26.000 ± 1.400^{d}	2.853 ± 0.116^{a}
	68.42	80.310 ± 0.691^{c}	19.690 ± 0.691^{c}	1.747 ± 0.429^{b}
	55.31	93.247 ± 0.776^{a}	6.753 ± 0.776^{a}	1.516 ± 0.144^{bc}
	49.36	90.027 ± 1.102^{b}	9.973 ± 1.102^{b}	1.320 ± 0.184^{bc}
	45.52	87.780 ± 0.588^{b}	12.220 ± 0.588^{b}	0.935 ± 0.106^{c}
C.D. (5%)	—	3.061	3.062	0.733
C.V. (%)	—	1.953	11.130	23.766

Table 3 — Physical and weight characteristics of long (komal) and short pea (arkel) pods

Dimensions	Long pea	Short pea
Length (mm)	96.83 ± 4.60	67.03 ± 3.58
Width (mm)	10.85 ± 0.30	7.97 ± 0.69
Thickness (mm)	10.23 ± 0.84	10.76 ± 0.40
Weight (g per pod)	4.567 ± 0.47	2.363 ± 0.45

higher than Long Pea (*Komal*) (10.76 ± 0.40 mm). Pod weight in Long Pea (*Komal*) was 4.57 ± 0.47 g, twice that of Short Pea (*Arkel*) (2.36 ± 0.45 g). These differences suggest that pod dimensions may influence shelling outcomes, consistent with findings by Singh.[9] In addition to pod dimensions, individual pea grain dimensions were measured using a vernier caliper across 30 randomly selected peas per variety. The Geometric mean diameter (Dp) were 6.94 ± 2 to 10.85 ± 2 mm for both the cases. The pods of both varieties were harvested at the green mature stage, corresponding to 70 to 75 days after sowing for *Komal* and 60 to 65 days after sowing for *Arkel* under Jharkhand agro-climatic conditions. The performance evaluation followed AICRP-PHET standard test codes. The machine was originally developed at JNKVV, Jabalpur, achieving 92 to 95% shelling efficiency and 1.2 to 2.0% pea damage. The present trials at BAU, Ranchi yielded 97.78 ± 0.47% shelling efficiency and 0.923 ± 0.119% pea damage for *Arkel*, and 93.25 ± 0.78% and 1.516 ± 0.144% for *Komal*, respectively (Table 2). The improved performance at BAU, Ranchi may be attributed to variety-specific characteristics and the cooler, humid agro-climatic conditions of Jharkhand, thereby validating the need for location-specific performance evaluation.

Effect of Moisture Content on Performance Indices of Green Pea Depodder in Pea Varieties

The performance evaluation of the green pea depodder across varying moisture contents revealed statistically significant differences ($p \leq 0.05$) in shelling efficiency, unshelled pod percentage, and pea damage for both Short Pea and Long Pea varieties (Table 2). The variations in these parameters were analyzed with reference to Critical Difference (CD) and Coefficient of Variation (CV) values, indicating the reliability and consistency of the observations.

Effect of Moisture Content on Shelling Efficiency

The shelling efficiency of the depodder ranged from 78.67% to 97.78% in short pea *(Arkel)* and 74.00% to 93.25% in long Pea (*Komal*) as shown in Fig. 3(a). The highest efficiency was observed at 51.09% moisture content in short Pea *(Arkel)*(97.78 ± 0.47%), and 55.31% in long Pea (*Komal*) (93.25 ± 0.78%). The CD at 5% level for shelling efficiency was calculated to be 2.15, indicating that these differences are statistically significant. The CV for shelling efficiency ranged between 0.47% and 2.63%, which is considered low, reflecting high experimental precision and repeatability (Table 2). These findings corroborate the results of Kumar *et al.*[11] who also reported that optimum shelling performance occurs at intermediate moisture levels due to improved pod brittleness and effective threshing. Shelling efficiency increased with decreasing moisture content up to an

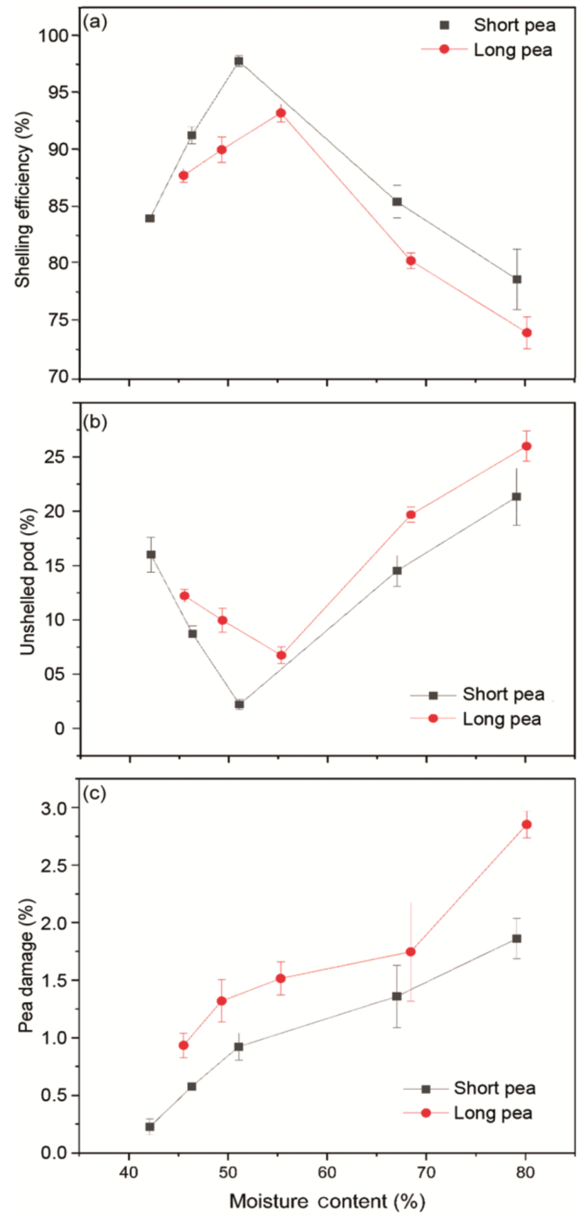

Fig. 3 — Effect of moisture content (%) on: (a) shelling efficiency (%), (b) unshelled pod (%), (c) pea damage (%) in pea varieties

optimum, followed by a decline at excessively low moisture. The bell-shaped pattern is attributed to enhanced brittleness at moderate moisture, enabling easier pod rupture (Fig. 3a).

Effect of Moisture Content on Unshelled Pod Percentage

The percentage of unshelled pods displayed an inverse trend with respect to the shelling efficiency, with 2.22% to 21.33% in short Pea (*Arkel*) and 6.75% to 26.00% in Long Pea (*Komal*) as shown in Fig. 3(b). The minimum percentage of unshelled pods (2.22 ± 0.47%) was recorded in short Pea (*Arkel*) having moisture content of 51.09%. On the other hand, the minimum percentage of unshelled pods in Long Pea (*Komal*) was found to be 6.75 ± 0.78% at a moisture content of 55.31%. The CD value for percentage of unshelled pods is reported to be 2.20, whereas the CV was found within the range of 0.47% to 2.63%, indicating the statistical reliability and consistency of the results obtained (Table 2). In addition, the results revealed the significant effect of moisture in rupturing of pods, which is evident from the findings of Naik *et al*.[12] emphasizing the importance of controlling moisture content for improved performance of threshers in pulses. An inverse relationship existed between the moisture content and unshelled pod percentage (Fig. 3b). A very high (≥79%) and extremely low (≤42%) moisture content led to low shelling efficiency.

Effect of Moisture Content on Pea Damage Percentage

For pea damage percentage, values decreased with lowering moisture content as shown in Fig. 3(c). In short Pea (*Arkel*), the lowest damage (0.23 ± 0.07%) occurred at 42.12% moisture, whereas in Long Pea (*Komal*), minimum damage (0.94 ± 0.11%) was recorded at 45.52%. The highest damage percentages, 1.86 ± 0.18% (*Arkel*) and 2.85 ± 0.12% (*Komal*), were observed at high moisture contents of 79–80%. This may be due to the increased seed coat rupturing and pea damage at high moisture levels due to reduced resistance of the seed structure to mechanical forces. The CD for pea damage was 0.29, and CV values ranged between 0.07% and 0.43%, reflecting statistically sound and consistent measurements (Table 2, Fig. 3c). These results align with Bormuth[13] who reported high moisture made peas more susceptible to crushing, while moderate dryness enhanced resilience.

Economic Viability of Green Pea Depodder in Comparison with Manual Shelling Method

From the comparison made between manual shelling and that done by using the green pea depodding machine (Table 4) below, it is evident that there were several benefits derived from the use of the machine as opposed to manual processes. The green pea depodding machine was able to process 46.30 kg/h while the manual method managed 3 kg/h; this meant that in one day the depodder produced 370.4 kg and annually 37,040 kg against 24 kg and 2,400 kg of the manual method. Although both incurred the same labor costs of Rs. 50,000 over 100 working days, the cost of producing a kilogram of peas from the machine dropped from Rs. 20.83 to Rs. 6.57 while profits realized stood at Rs. 682,933.14/y. These findings are consistent with previous studies[14,15], highlighting mechanization's role in improving profitability, saving labor, and enhancing efficiency. It also noted that such technologies reduce drudgery and support timely post-harvest operations.[16] Similarly, a research conducted on cost economics study on a power-operated pea depodding machine and reported that the machine, with a net weight of 47 kg, had a cost of Rs. 10,965 and an operational cost of Rs. 5/kg. The benefit-cost ratio was 1.38, breakeven point was 1,465 kg, and the payback period was 354.2 hours.[7] The economic appraisal carried out for this study was performed independently at BAU, Ranchi. As mentioned by the original inventors at JNKVV, Jabalpur, the cost of shelling was around Rs. 7.20/kg, and the payback period was between 8 to 9 months under Madhya Pradesh conditions. Comparatively, this study resulted in a relatively lower cost of shelling Rs. 6.57/kg, and the payback period was 7 months due to increased productivity and higher labor wages in Jharkhand, thus proving the economic feasibility and adoption potential of the machine.

Table 4 — Comparison of manual pea shelling vs. green pea depodder machine

Sl. No.	Factor	Manual shelling	Green pea depodder machine
1	Processing capacity	3 kg/hr	46.30 kg/hr
2	Daily processing (8 hrs)	24 kg/day	370.4 kg/day
3	Annual production	2400 kg	37040 kg
4	Labour cost (100 days)	Rs. 50000	Rs. 50000
5	Pea shelling cost per kg	Rs. 20.83	Rs. 6.57
6	Total revenue	Rs. 120000	Rs. 1852000
7	Annual profit	Rs. 70000	Rs. 682933.14
8	Payback period	No capital investment	7 months

Conclusions

The use of green pea depodder machinery was an excellent choice for pea shellings. It showed efficiency, effectiveness, and saved time, especially when the pod moisture content is within the optimal range. Short pea (*Arkel*) performed better than Long pea (*Komal*) in all indexes used. Since it demonstrated high shelling efficiency and low percentages of unshelled pods and damage at the same moisture levels, it is expected that it will perform better during pod shelling because of its small-sized pods and thickness. Therefore, using this machinery will bring immense advantages to small-scale farmers in Jharkhand and other regions of similar agricultural climate, particularly in cutting down labor costs and processing efficiency. It can be concluded from the experimental results that moisture content and variety have considerable impact on the efficiency of operation of the green pea depodder. The optimum moisture content was found to be 51.09% for Short Pea (*Arkel*) which gave the highest shelling efficiency (97.78 ± 0.47%). The maximum shelling efficiency was obtained (93.25 ± 0.78%) for Long Pea (*Komal*) with moisture content of 55.31%. Thus, the optimum operating parameters vary from variety to variety. It is recommended that the moisture content during depodding be optimized in accordance with the variety for achieving high shelling efficiency and minimum pea damage. The present work will definitely contribute to better harvesting and post-harvest handling of green peas in Jharkhand region and similar agricultural belts. The future scope of the work includes further improvement of machine design parameters such as drum speed, feed rate, and geometry of the shelling mechanism in order to increase the shelling efficiency and minimize pea damage for various varieties of peas. Moreover, automatic feeding and grading system can also be incorporated in the machine.

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Conflict of Interest

The authors have no conflict of interest to declare.

Authors Contribution

Md. Irfan Ahmad Ansari was worked on data collection, resources, Parv Nayak contributed on data analysis, writing, validation, methodology, Lalit Bal worked on conceptualization, validation, Shubhajit Sarkhel worked on reviewing, incorporation of reviewer comments, editing the manuscript, Vandana Choubey contributed on statistical analysis and Chhaya had supervised and facilitated the research work, Robin Kumar Mahoto used sketch up software to design the isometric view of green pea depodder.

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