

MECHANIZATION FOR COCOA BEAN EXTRACTION

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In Andhra Pradesh cocoa is grown in an area of 24,156 ha. Area under cocoa is increasing for the last 10 years, as it is one of the remunerative inter crop in coconut. Productivity in Andhra Pradesh was increased from 192 kg ha⁻¹ in 2009-10 to 550 kg ha⁻¹ in 2016-17. There was increase in area and production but, there exists a scarcity of manual labor availability for timely bean extraction in cocoa plantations. In Andhra Pradesh, cocoa peak harvesting period is in the months of March, April and May (70% of the pod harvest will be done in these 3 months). In peak season, sequence of pod harvest's have to be done at 7-8 days interval. Apart from labor shortage, production cost was also more with manual method. Mechanization is one option to reduce drudgery with manual bean extraction and also to reduce cost of production. Presently, there is a trend towards mechanized agriculture to overcome manual labor shortage and in minimization of production cost.

In agriculture machine's were developed for different crops but field level utilization was not up to mark due to different and wide varied farming in Indian conditions. In many crops for different agricultural operations like harvesting, threshing, postharvest handling, storage and processing are the major areas where there is large scope for mechanization. These are some operations contributing to major production cost and also wastage of produce in agriculture and horticulture due to untimely field operation with manual work force.

Cocoa pod production

- In Andhra Pradesh cocoa give's continuous flowering throughout the year because it was grown under irrigated conditions. Productivity of cocoa was high in Andhra Pradesh when compared to other cocoa growing states in India. Each cocoa plant produce 40 to 100 pods per year. 70% of pods will be harvested in 3 months (march-April



and May). In peak season 12-14 sequence harvests occur in 7-8 days interval 20% of pods harvested in January, February and June months 10% of pods will be produced in off season. In peak season, each harvest give 400-450 pods per acre

Problems at present in manual bean extraction from cocoa pods

In cocoa, peak pod production occurs during March, April and May months during this peak period some crops like acid lime, cashew nut and maize cob harvests will co-inside which leads to increase in demand for labor, in-turn cerate's labor shortage and also more wage rates in this 3 months which increases the production cost. During these 3 months NRGES works will be co-inside so timely availability of labor will be less, more over while bean extraction fingers of women labor get damage due to high acidic nature of cocoa pod mucilage(Juice) if they work continuously for 3-5 days.

- At present mechanization is one of the option to reduce the production cost and also for timely completion of field operations. With machines we can save time and also large size plantations can be easily managed with less manual labour.





Table: 1 Cost of production for cocoa (2017-18) in Andhra Pradesh

| S.No. | Particulars | Unit/ Quantity/acre | UnitRates (Rs.)/acre | Total Amount(Rs.) |
|---------------------------|--|---------------------------|----------------------|-------------------|
| A. Input component | | | | |
| 1. | Manures | One tractor load | 3200 | 3200 |
| 2. | Fertilizers | One bag Urea | 300 | 300 |
| | | One bag SSP | 360 | 360 |
| | | One bag MOP | 550 | 550 |
| | | Zinc | 10kg | 300 |
| 3. | Chemicals | Pesticides and fungicides | — | 2000 |
| | | | A Total | 6710 |
| B. Labor Component | | | | |
| 1. | Pruning and Heaping (yearly twice) | Men | 6@Rs 300/Day | 2700 |
| | | Women | 6@Rs 150/Day | |
| 2. | Manure and fertilizer application | Men | 1@Rs 300/Day | 1050 |
| | | Women | 5@Rs 150/Day | |
| 3. | Spraying | Men | — | 500 |
| 4. | Harvesting and Heaping | Men | 5@Rs 300/Day | 6000 |
| | | Women | 30@ Rs 150/Day | |
| 5. | Pod Breaking and bean Extraction | Men | 3@Rs 300/Day | 2550 |
| | | Women | 11@ Rs 150/Day | |
| 6. | Fermantation | Women | 2@ Rs 150/Day | 300 |
| 7. | Drying | Women | 2@ Rs 150/Day | 300 |
| 8. | Irrigation maintenance | — | — | 200 |
| | | | B total | 13600 |
| | | | A+B Total | 20310 |





Table: 2 Bean extraction cost details

| Manual : 3000 Pods/day (6.5 Working hours) | | | | | | |
|--|----------------|---------------|------------------------|--------------------------------|------------------|-------------------------------|
| Particulars | Wages | Amount | Dry Bean Recovery/ Day | Dry Bean Extraction cost (Rs.) | Yield/year/ acre | Difference amount/ year/ acre |
| Men 1 | @Rs.300/Day | Rs.300 | | | 3000 kg | |
| Women 3 | @Rs.150/Day | Rs.450 | | | @Rs.8.30/kg | |
| | Total | Rs.750 | 90 kg | Rs.8.30/kg | Rs.2490 | |
| Machine: 15,600 pods/Day (6.5 Working hours) | | | | | | |
| Women 2 | @Rs.150/Day | Rs.300 | | | 3000 kg | |
| Fuel | @4.9 l/6.5 hrs | Rs.390 | | | @Rs.1.29/kg | |
| | Total | Rs.690 | 540 kg | Rs.1.27 | =Rs.387 | =Rs.2103 |

In manual method of pod breaking and bean extraction labor requirement is double to machine method. Minimum speed of the machine 42 pods/min Maximum speed of the machine 100 pods/min, In one day(6.5 working hours) 3 women + one men can do 3000 pods with a dry bean recovery

of 90 kg but with machine 2 women can do 15600 pods per day with dry bean recovery of 540 kg.

In field level for one kg of dry bean extraction manual method costs about Rs.8.30/kg bean while with machine one kg dry bean extraction costs to Rs.1.27. One machine can support work for 100-120 acres. □□

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