

## **Primary Processing of Black Pepper, Cardamom and Coffee can add flavours to lives of Tribal farmers of Eastern Ghats**

### **Abstract**

Krishi Vigyan Kendra, Namakkal is being implemented Paramparaghat Krishi Vikas Yojana (PKVY) and ICAR –Tribal Sub Plan Schemes at Elangiyampatti and Ariyur Nadu villages of Kollihills, Namakkal District, Tamil Nadu since 2019. This tribal village is bestowed with Black pepper, Cardamom, Coffee and Hill banana more than 500 acres under cultivation. Usually the tribes follow the traditional method for threshing, pulping and cleaning of spices and plantation crops. So the tribes got minimum returns due to poor quality produce. To solve this issues KVK supplied primary processing machineries to tribal farmers group for doing primary processing in time, getting better quality produce and good net income. Because of this intervention, nearly 524 tribal farmers were benefitted in and around Elangiyampatti. In the year 2021-22 alone, 42.5 tonnes of black pepper, 55.2 tonnes of coffee and 2.01 tonnes of Cardamom were processed by the tribes from Elangiyampatti with the help of primary processing machines viz., Pepper threshing machine, Pepper dust extractor, Pepper grader, Cardamom dryer and Coffee pulping machine supplied under ICAR- Tribal Sub plan Scheme and also got an additional income of Rs.82500/ household /year.

### **Key words**

Black pepper- Cardamom – Coffee – Primary Processing – Kollihills

### **Introduction**

Kolli hills is a small mountain range located at the tail end of the Eastern Ghats in Namakkal District of Tamil Nadu at an altitude of 1200m. Kollihills is home to approximately 50,400 people living in 305 small villages and 14 village panchayats, primarily belonging to the Malayali tribal community. It is bestowed with spices, plantation, fruit crops, medicinal plants and minor millets. Among the spices and plantations, Black pepper, Cardamom, Cinnamon, Nutmeg, Clove and Coffee is being cultivated by tribes more than 2000 ha. The black pepper from Kolli Hills is known for being spicy, black, and hard. Usually the tribes follow the traditional method of threshing, cleaning by winnowing and drying especially for black pepper, cardamom and coffee. This practices allows more labour involvement which leads to high cost of production mainly for doing post-harvest practices. In addition to that the quality of the product is questionable, which is not graded and admixtures are also there. So the tribes could fetch low net income for their produce. To solve these issues, KVK, Namakkal has implemented Paramparaghat Krishi Vikas Yojana and ICAR - Tribal Sub Plan Scheme at Elangiyampatti and

Ariyur Nadu villages, Gundurnadu panchayat of Kollihills since 2019. The main focus was given on organic farming in spices, plantations, fruits especially in hill bananas and primary processing of spices and plantation crops by machineries during the implementation of above said schemes.

## **Materials and methods**

The KVK Masila PKVY farmers group consisting of 21 tribal farmers covering in an area of 20 ha for organic cultivation has registered in PGS portal under Ministry of Agriculture and Farmers Welfare, Government of India and also obtained registration number LG 1800049279. Then KVK, Namakkal has established a primary processing unit with Pepper spike separator, Cardamom dryer, Disc type coffee pulping machine, Grader under Tribal Sub Plan project at Elangiyampatti village, Kollihills which has been maintained and operated by this tribal farmer group. Furthermore, training on primary processing and value addition of spices, condiments and plantation also given to tribal farmers then and there. Hence the tribes' could effectively do the primary processing, value addition of spices and plantation crops by using these machineries since 2021 with the following objectives

- To minimize more labour involvement and reduce the cost of production.
- To make primary processing of spices and coffee in time by involving machineries and enhance the quality of the produce.
- To increase the net income of tribal farmer

## **Result and Discussion**

### **Pepper threshing**

The maturation period of pepper berries varies from 7- 8 months in Eastern Ghats. In Kollihills of Tamil Nadu, the matured pepper berries were harvested from December to January. Usually the tribes of Kollihills could follows trampling method for despiking of black pepper. In this method, the pepper have been separated from its spikes by spreading the pepper spikes on a cement floor and stamping them manually with bare feet, until the pepper separates from the spikes. Furthermore this traditional method of despiking is crude, tedious and unhygienic. The threshed and dried black pepper has extraneous matter like spent spikes, pin heads, stones, and soil particles etc., mixed with it. After separation of pepper, cleaning is done by winnowing which removes some of the impurities. But it is very much time consuming process and it also requires more labour involvement.

**Table.1. Pepper threshing efficiency – Manual vs electrically operated pepper threshing machine**

Particulars	Manual threshing	Pepper threshing machine (Electrically operated)
Labour cost per day	Rs.500/-	Rs.500/-
Working hours	8 hrs	5 – 6 hrs
Pepper threshing and cleaning per hour	5 kg	500 kg
Total pepper threshing per day	40 kg	2000 kg

By manual threshing method, the farmer could spent an amount of Rs.500/-as labour cost towards threshing of 40 kg of black pepper per day. Whereas by using the power operated pepper threshing machine, 500 kg of pepper could be threshed per hour. In an average, nearly 2 tonnes of pepper can be threshed per day and the tribes charged Rs.2/kg as threshing cost (Table.1). So the tribes could earned the income of Rs.4000/- per day. Apart from time consumption, the tribes also got the end product free from dust and unwanted materials etc., In addition to that, the machine can be easily move from one place to another and the threshing operation of black pepper harvested from 200 acres is achieved within a month. This is in accordance with the findings of Wasim Savalg *et al* .,2021.



**Fig.1. Pepper threshing by using electrically operated pepper threshing machine**



**Fig.2. Drying of threshed pepper**

**Table.2. Pepper dust extractor & grader**

<b>Particulars</b>	<b>Manual</b>	<b>Pepper dust extractor &amp; grader</b>
Pepper extractor	100 kg/day	100 kg / (1/2 hour)
Cost involved	Rs.300/100 kg	Rs.200/100 kg
Time	Laborious	Quick
Quality	Dust present	Clean (100% dust free)
Grading	Average by naked eye	3 grades based on size
Rate	Rs. 550 /kg	A- Rs.650/kg B - Rs.600/kg C - 550/kg

The dried black pepper has extraneous matter like spent spikes, pin heads, stones, soil particles, etc. mixed with it. Cleaning and grading are basic operations that enhance the value of the produce thus helps to get higher returns. Normally the tribes adopt winnowing and hand picking to remove most of these impurities. By using machineries for pepper dust extracting and grading (Table 2), the farmers felt that in half an hour, 100 kg of pepper being graded in 3 grades with removal of impurities by using Pepper dust extractor and grader than manual means (100 kg/day). This is in conformity with the findings of Heartwin and Korikanthimath, 2003 and Biju Babu,2020.

Because of this intervention, farmers could save up to Rs.100/100 kg. Normally the grader is used to grade the black pepper in to 9 grades *viz.*, Malabar Garbled (MG), Malabar Un Garbled (MUG), Tellicherry Garbled Black Pepper Special Extra Bold (TGSEB), Tellicherry Garbled Extra Bold (TGEB), Tellicherry Garbled (TG), Pin Heads (PH Grade special and Grade 1), Garbled Light Pepper (GL Special, GL Grades 1 and 2), Ungarbled Light Pepper (UGL Special, UGL Grades land 2) and Black Pepper (Non specified). But the tribes used only 3 grades for marketing. Further the graded berries fetched better prices based on various grades and sale at a price of Rs.650/kg for Grade A, Rs.600/kg Grade B and Rs.550/kg for Grade C than the ungraded bulk berries @ Rs.550/kg. The rate may differ accordingly prevailing market price.



**Fig.3. Removal of dust by manual means**



**Fig.4. Performance of Pepper dust extractor**



**Fig.5. Pepper grading by Pepper grader**



**Fig.6. Graded pepper by using pepper grader**

### Cardamom dryer

In Kollihills, 90% of the tribes cultivating Cardamom var.Njallani as mixed crop /intercrop in Pepper and coffee plantation with a spacing of 10 x 10 feet and maintains the plant population of 250 nos/acre, remaining 10 % of the farmers cultivating cardamom as sole crop with same spacing. This variety starts commercial bearing 4 years after planting with a yielding capacity of 15 kg/plant and produces 1 tonne of green capsule yield per acre.

Traditionally the tribal farmer, dry the cardamom capsules by spreading the capsules uniformly in a thick layer of 15 – 20 cm on a bamboo mat placed over the frames of fire wood pit which is built either in outside of the house or in the field itself. By this method, capsules are dried by the combined effect of heat and smoke generated by burning of the wood in the fire wood pit. It took 24 - 28 hrs and frequent racking is very essential to make uniform drying of capsules. However, this method of drying causes blackening of capsules with cracks and smoky flavour. To prevent this situation, KVK installed flue pipe cardamom dryer under ICAR - Tribal Sub Plan scheme for the benefit of tribal farmers of Kollihills at Elangiyampatti village.

In this flue pipe cardamom dryer, the capsules should be dried at 45-50<sup>0</sup>C for 18 hours. Initially, the harvested capsules approximately 200 kg were placed in the drum. In that, the cardamom capsules are spread thinly and stirred frequently to ensure uniform drying. The dried cardamom capsules are rubbed by hands to confirm uniform drying. After drying, they are winnowed to remove any foreign matter. Then capsules are sorted according to size and colour and stored in black polythene lined gunny bags to retain the green colour during storage. This is in conformity with the findings of Prem Ranjan *et al.*,2018 and Rejo Daniel *et al.*,2020.

**Table.3.Drying of Cardamom capsules**

Particulars	Manual	Cardamom dryer
Cardamom	100 kg/ 2 days	200 kg /day
Labour saving	Rs.600/day	Rs.800/ 200 kg
Time	Laborious	Quick
Quality	Blackened capsules with split or crack and smoky flavour	Uniform and green colour capsules without smoky odour
Rate	Rs.500 /kg	Rs.1600/kg

By using flue type Cardamom dryer (Table 3), totally 200 kg of Cardamom capsules were dried scientifically per day with retained colour, proper shape, uniform drying and minimum labour involvement when compared to manual method of drying (1 labour for 2 days by using traditional method). The price fixed for drying of cardamom capsule is Rs.30/kg. The output ratio is 5:1. Further these capsules fetched a premium price of Rs.1600/kg than the capsule which was dried by traditional method (Rs.500/kg).



**Fig.7.Drying of Cardamom capsules by using Cardamom dryer**

**Table.4.Coffee pulping machine**

Particulars	Manual	Electrically operated Coffee pulping machine
Drum capacity	-	10 kg of coffee fruit
Time requires for pulping	10 kg /2 hours	10kg /15 minutes
Pulping of coffee beans	80 kg/day	400 kg /day
Labour cost	Rs.600/Men/day Rs.250/women/day	Rs.600 /day
Time	Laborious	Quick
Quality	Peels and broken beans present	Clean
Output ratio	4:1, For depulping of 10 kg coffee fruit gave 7 kg beans and 3 kg peel, pulp etc., 2000 kg fresh – 500 kg coffee beans	
Rate	110/kg	150/kg

Traditionally, the tribes depulp the coffee beans with the help of grinding stone. But the quality of coffee beans is not much appreciable in this method. In addition to that it is laborious (25 labours), time consuming (25 days) and expensive (Rs.15000/-) when compared to electrically operated coffee pulping machine (5 days, 5 labour and Rs.3000/-) for pulping of 2000 kg coffee fruit. Some extraneous matter such as peels, dust and sand also present. In addition to the above, farmers also did the coffee processing by using coffee pulping machine (Table.4), which removes the pericarp from coffee beans @ 400 kg / day as against 80 kg/day by manual method and sale the machine pulped coffee beans @ Rs.150/800 gm. This may be due to quality and appearance of coffee beans. This is in accordance with the findings of Jackson *etal.*,2016, Ogunjirin *etal.*,2021 and Kiromim Baroroh *etal.*, 2023 . The tribes charged Rs.20 for depulping of 10 kg coffee beans by using coffee pulping machine.



**Fig.8.Pulping of coffee beans by using electrically operated mobile coffee pulping machine**

### Branding, packing and marketing

The primary processed spices and plantation crops are packed in good quality packing covers with various quantities starting from 250 gm to 1 kg pack. The produce are sale in the brand name of KVK PKVY - MASILA ORGANIC PRODUCE. The farmers group could sale their produce at farmers market, Kollihills and shops in nearby town viz., Namakkal, Salem, Trichy and Erode Districts. Furthermore, sales outlet also opens in tourist places of Kollihills. Apart from these, the farmers group also got order through social media, based on this, they supplies the produce throughout Tamil Nadu. Because of packing and branding, the tribes could earn extra income of Rs.75 -100/kg.



**Fig.9.Tribal farmers with Organic certification**



**Fig.10.Packed processed spices for sale**

### Outcome

Because of this intervention, nearly 524 tribal farmers were benefitted in and around Elangiyampatti village of Kollihills. In the year 2021-22 alone, farmers from Elangiyampatti village, Gundurnadu panchayat of Kollihills were processed 42.5 tonnes of black pepper, 55.2 tonnes of coffee and 2.01 tonnes of Cardamom by using the primary processing machines viz., Pepper threshing machine, Pepper dust extractor, Pepper grader, Cardamom dryer and Coffee pulping machine supplied under ICAR- Tribal Sub plan Scheme. Because of this intervention an additional income of Rs.82500/ household /year has been earned through primary processing. In

addition to that, tribal farmers from neighboring panchayat also utilized these machineries on cost basis and done the primary processing of their produce.

## **Conclusion**

The promotion of primary processed Black pepper, Cardamom and Coffee beans has increased the acceptability, contributing to the growth of the local economy and the tourists also interestingly buy the primary processed spices and plantation produce. This approach has proven to be highly effective because not only does it help the tribes make sustainability in income generation, but also encourages them to use of machineries against traditional method for primary processing and ensures good results for their efforts.

## **COMPETING INTERESTS DISCLAIMER:**

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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