



Contribution of stone flower (*Permotrema perlatum*) to the cash income of Khasi-Community in Meghalaya

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ABSTRACT

The Meghalaya state has variation of species composition due to which it gives rise to a unique lichen species called as black stone flower. It is also referred to as *Permotrema perlatum*. It is typically found growing on trees, walls and other stone surfaces which is collected by scraping the surface it's grown on, but is particularly prevalent in mountainous and forested areas. It is a type of lichen with a mild woody fragrance which is not yet cultivated. It is identified as spice products as well as to be Non-Timber-Forest-Product. An attempt has been made to study the contribution of black stone flower to generations of the cash income to Khasi community in the Eastern-West-Khasi Hills district of Meghalaya. The study showed that month wise collection of stone flowers in a year in which the total collection was 159.32 kg. The total cost involved was ₹20580 per year for the collection of stone flowers. The gross income was ₹39830 per year. It showed that there is positive contribution of stone flowers to strengthen the livelihood of the area eradicating poverty and contributes to women empowerment in the area.

1. Introduction

According to the Indian state of forest report, 2021 North-East region occupies nearly 7.67 per cent of the geographical area of India and forest resources in North Eastern states account for 23.75 per cent of total forest cover in India. Floristically, Meghalaya is a part of the Indo-Malayan realm. Bio-geographically, the area is located in zone-8, the North-East India Zone (Rodgers and Panwar, 1988). Out of the two separate biota provinces in this region, the area is situated in Province-II i.e. Assam hills. Based on the physical features, Meghalaya has been divided into three zones viz. Garo, Khasi and Jaintia hills. These zones show considerable variation in the species composition which gives rise to a different unique species. It also gives rise to growth of lichen species called *Parmotrema perlatum*, also referred to as stone flower or black stone flower. The term "stone flower" for lichen species is used in English, "Kalachu" in Karnataka, "Patthar ka phool" in Hindi, "Kalpasi" in Tamil, "Shilapushpa" in Sanskrit, "Dagad phool" in Marathi, and "Richamkamari" in Urdu (Hale, 1961). It belongs to the Parmeliaceae Family. It is a type of lichen with a mild woody fragrance which is not yet cultivated. It is wild in nature and people of Meghalaya

used it as a source of subsidiary. *Parmotrema perlatum* in Meghalaya is typically found growing on trees, walls and other stone surfaces which is collected by scraping the surface it's grown on, but is particularly prevalent in mountainous and forested areas. It is a type of lichen with a mild woody fragrance which is not yet cultivated. It is identified as spice products as well as to be Non-Timber-Forest-Product. According to the FAO Forestry department "A product of biological origin other than wood derived from forests, other wooded land or trees outside forests is termed as Non-Timber-Forest-Products".

The people of Meghalaya do agriculture as main livelihoods, but in Eastern-West-Khasi-Hills there was contribution of activities like forestry, fishery, and horticulture. The region's major production of area included areca nuts, oranges, betel leaves, jackfruit, bay leaves, honey, and broom grass. The Khasi people, a tribal group with a long history of forest preservation, live in the area. In forests, people collect a wide range of delicacies, such as frogs, crustaceans, mollusks, bush meat, tubers, and wild vegetables. Non-timber forest products and medicinal and aromatic plants collected were *Cinnamomum tamala*, *Piper*

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peepuloides, *Phrynium capitatum*, *Bambusa species*, honey, mushrooms, tubers, edible worms, insects were all collected processed and sold by people.

The Khasi community pursued financial revenue and subsistence-generating enterprises to varied degrees from the forest. These jobs of the area include wage work (such as harvesting cash crops through *jhum* cultivation), contract work (plantation), odd jobs (head loading cash crops to the roadside, working in a shop, participating in the MNREGA (Mahatma Gandhi National Rural Employment Guarantee Scheme), and Non Timber Forest Product Collection. The communal forest provided Non Timber Forest Product such as all varieties of leaves, fruit producers, seeds, nuts, legumes and spices. Therefore an attempt has been made to study the cash income generated by the spice (stone flower) in the area. The paper demonstrates the contribution of the Stone flower to the livelihood of the people of the study area

2. Area of the study

The paper is based on a case study conducted in the Eastern-West-Khasi Hills of Meghalaya where Mairang block and Mawthadraishan block were selected. After the pilot survey in the area and discussion with the traders of Mawiong Regulated Market of Meghalaya the study area was chosen. Depending upon availability of stone flowers the number of 60 collectors in the blocks namely Mairang and Mawthadraishan was chosen for the study. The villages selected were Tengri, Mawlieh Laitdom from Mairang block and Nonglait, Myriaw village, from Mawthadraishan block based on information provided by the traders.

3. Analytical techniques

(i) Calculation of costs

Total cost: Total cost refers to the overall cost of production, which includes both fixed and variable components of the cost.

Total Variable Cost: Total Variable cost is the cost that changes (increases or decreases) based on the number of goods produced by a company or the service requirement of the producer.

Total Fixed cost: It is the cost that is constant. In other words, these are the costs that remain the same, irrespective of the number of units that are being produced.

$$TC = TVC + TFC$$

Where,

TC = Total cost

TVC = Total Variable Cost

TFC = Total Fixed Cost

(ii) Calculation of the cash income

Total revenue or Gross return: It is to multiply the total amount of products or services sold by the price of those total costs of per unit sold.

$$\text{Gross Return} = \text{Number of Units Sold} \times \text{Cost per Unit}$$

Net return: It is the income which is left with the firm after deducting total cost from gross return.

$$\text{Net return} = \text{Gross Return} - \text{Total Costs}$$

Benefit cost ratio: The benefit-cost ratio is an indicator showing the relationship between the relative costs and benefits of a product, expressed in monetary or qualitative terms. If a product has a BC ratio greater than 1.0, the product is expected to deliver a positive return.

Returns of rupee expenditure: The return on rupee expenditure is the income incurred after dividing the net return with total cost

4. Results and discussion

Socioeconomic characteristics most commonly as age, education, social class and income were studied in the area which had a direct relation with the income.

Age of the respondents

The age of the decision maker can generally create differences in socio-economic transformation and adoption of innovation results are presented in Table 1.

The study revealed that maximum respondents in Eastern-West-Khasi Hills district were in the age group of middle age which was 35-50 years (40%) followed by the age group which was below 35 years (33%) and age group above 50 years (27%). Most of the sample farmers were younger to middle age that were active labourers and influence the collection of stone flowers.

Table 1. Distribution of respondents according to age

| Age group (years) | Below 35 | 35-50 | Above 50 | Total |
|-------------------|----------|-------|----------|-------|
| (No.) | 20 | 24 | 16 | 60 |
| | (33) | (40) | (27) | (100) |

Note: Figures in parentheses are percentage of the total

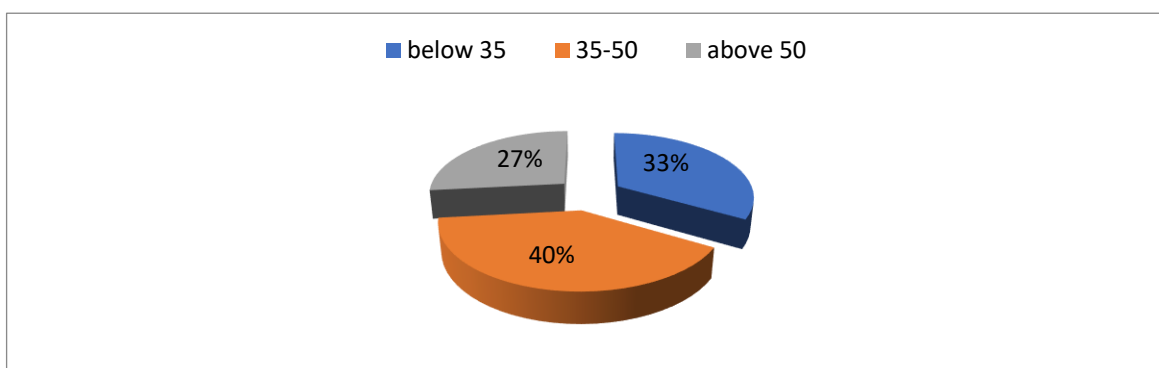


Figure 1. Age of the respondents

Educational status of respondent farmers

The Educational status of the collectors may help us know about the background the farmers are growing up. The educational background was very crucial in the adoption of technology and education status helps the collectors to gain awareness about recent demand and supply. Most of the stone flower collectors have only primary education which was 67 per cent followed by illiterate which was 13 per cent. In Table 2 it can be seen that around 10 per cent were middle school, followed by high school and graduate which was 7 per cent and 3 per cent. Stone flower was a high value crop but most of the collectors were not aware about the product's price and its value. Awareness program should be prepared in a manner keeping in mind the education level of the collectors.

Table 2. Distribution of respondents according to educational level

| Particulars | Illiterate | Primary school | Middle school | High school | Graduate | Total |
|-------------|------------|----------------|---------------|-------------|----------|-------|
| No. | 8 | 40 | 6 | 4 | 2 | 60 |
| | (13) | (67) | (10) | (7) | (3) | (100) |

Note: Figures in parentheses are percentage of the total

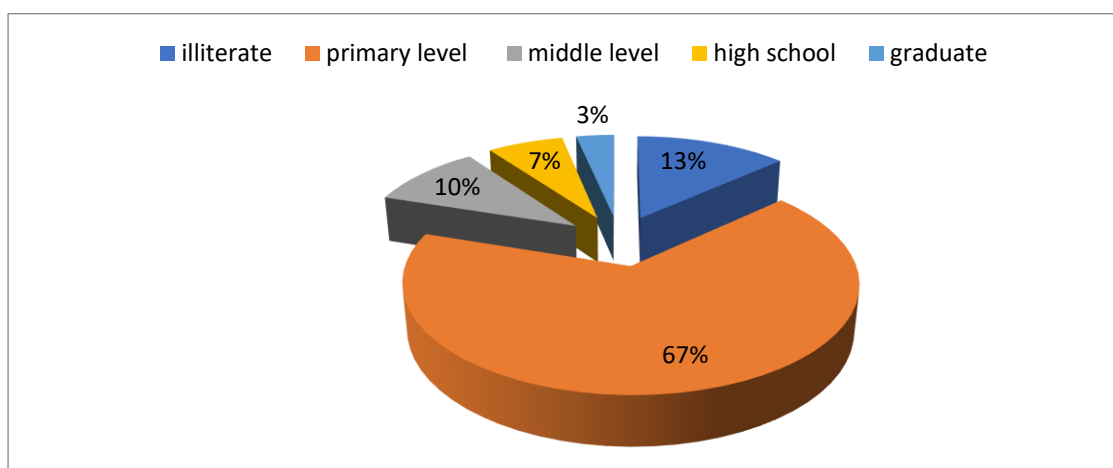


Figure 2. Education level of the of the respondents

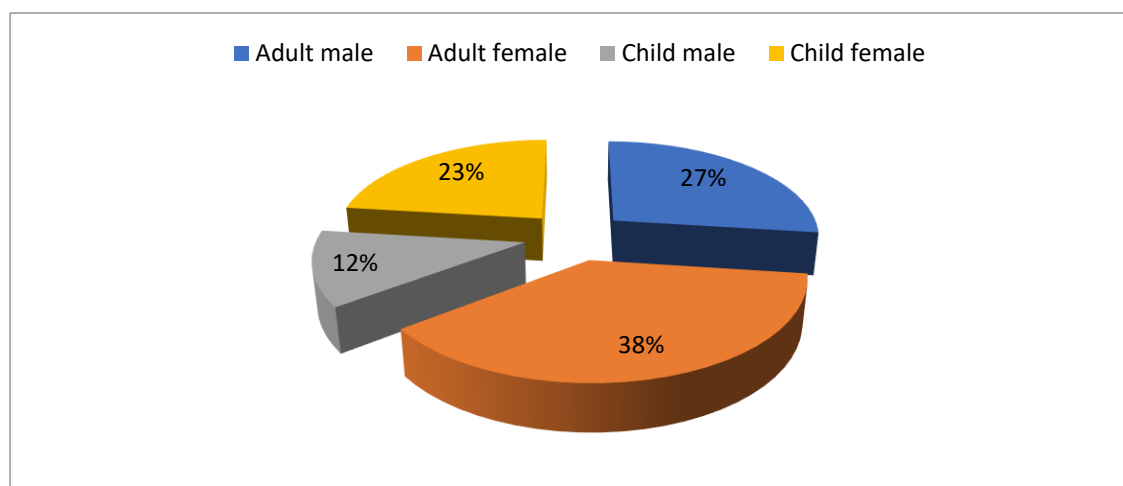
Family composition of the respondents

Most of the respondent's family consists of adult female (38%) which was followed by adult male (27%) as given in Table 3. Most of the family had a greater number of adult females in the composition of the respondents and for stone flower collection in the study area mostly women are involved in the activity and adult man are engaged in agriculture mostly.

Table 3. Family size of respondent

| Particulars | Adult male (≥ 18 years) | Adult female (≥ 18 years) | Child male (< 18 years) | Child female (<18 years) | Total |
|--------------------|----------------------------------|------------------------------------|----------------------------|-----------------------------|-----------------------------|
| No | 1.33 (22) | 2.37 (38) | 0.77 (12) | 1.45 (23) | 6.29 (100) |

Note: Figures in parentheses are percentage of the total

**Figure 3.** Family size of the respondents

Occupation of the family members

The collection of stone flowers was a source of subsidiary income for the collectors. They collect it during the rainy season from the month of April to September. The occupation of the family was listed in Table 4 below.

Table 4. Occupation of respondent's household members

| Particulars | Adult male (≥ 18 years) | Adult female (≥ 18 years) | Child male (<18 years) | Child female (<18 years) | Total |
|--------------------|----------------------------------|------------------------------------|---------------------------|-----------------------------|---------------|
| Agriculture | 1.03 (36) | 1.03 (36) | 0.26 (9.21) | 0.5 (17.7) | 2.82 (100) |
| Service | 0.19 (73.07) | 0.07 (26.9) | - | - | 0.26 (100) |
| Business | 0.27 (67.5) | 0.13 (32.5) | - | - | 0.4 (100) |
| Labour | 1.02 (53.1) | 0.9 (46.8) | - | - | 1.92 (100) |
| Others | 0.01 (2.3) | 0.03 (7) | 0.34 (80.9) | 0.04 (9.5) | 0.42 (100) |

Note: Figures in parentheses are percentage of the total

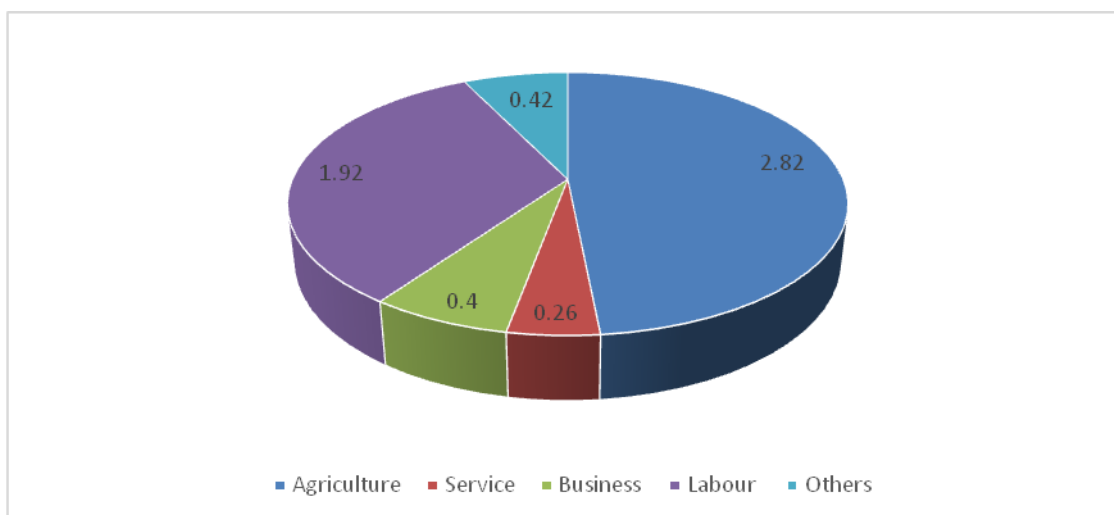


Figure 4. Occupation of respondent's household members

Source of annual income of the respondents

The source of income was presented in Table 5, where it can be seen that agriculture was the major source for the respondents which was 47.4 percent followed by piggery which was 25 per cent.

Table 5. Source of annual income of the respondents

| Agriculture | Livestock | Piggery | Poultry | Service | Business | MGNREGA | Stone flower collection | Total |
|-------------|-----------|---------|---------|---------|----------|---------|-------------------------|----------|
| 100562.5 | 911 | 53087.5 | 6437.5 | 3000 | 2400 | 6700 | 38640 | 211738.5 |
| (47.4) | (0.43) | (25.0) | (3.04) | (1.41) | (1.13) | (3.16) | (18.24) | (100) |

Note: Figures in parentheses are percentage of the total

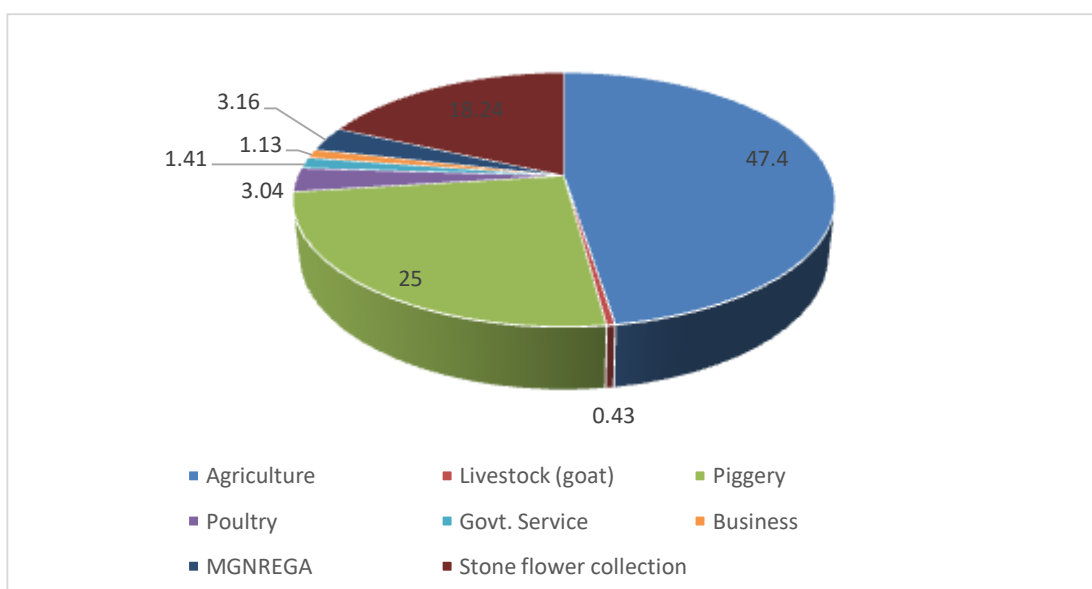


Figure 5. Source of income of the respondents

Month wise collection of Stone flower in the area

The month wise collection of stone flowers was presented in Table 6. It is usually collected from the month of April-September with the onset of Southwest monsoon in India. The branch of southwest monsoon blowing over the Bay of Bengal Sea influences heavy rainfall in hills of Meghalaya which give rise to the unique species of stone flower every year. The difference in pressure gradients in the Indian subcontinent becomes high during the months of May to September which gives rise to its growth. Thus, the results showed an increase in harvest quantity every month. From Table 6 it can be seen that collectors were engaged with a collection of stone flowers with 22.5 kg in the month of April. With increase in rainfall the collection of stone flowers increases to 32 kg in the month of September. The total days where collectors are engaged in the activity also increases per month. Thus the spatial distribution of natural vegetation of Meghalaya gives the opportunity to the collectors of stone flowers a fulfilling way of subsidiary income. The collectors are engaged in this activity to collect the produce around sixteen days per month. The collectors in the study area are mostly women as the men of the area are mostly engaged in agriculture activities. It gives a description of how energy availability of the women can result in women's empowerment in the area. The energy that sparkled in the women's daily lives through the stone flower collection was seen; they added they were earning a livelihood especially for serving food for their families. The women were able to feel the sense of self-worth and their ability to determine their

own choices with their earnings. Thus the collectors seemed to be motivated to collect stone flowers from the forest. It can also be seen the wage rate in the area was ₹180 per day. The collectors invest around four days per week for collection of the stone flower. The standard cost of labor was found by multiplying the wage of man days involved to collect a total quantity of 22.5 kg per month in April, which was found to be around ₹2880. For the month of May the total collection was found to be 23.07 kg per month where the standard cost of labour was ₹2880. As the amount of rainfall increases through June the total quantity collected gradually increases and man days involved increases. Thus, the standard cost of labour for 23.68 kg was found to be of ₹3060 per month. Therefore, it can be seen that in the month of September total standard cost was ₹3600 for collecting 32 kg of stone flower in a month. In the study area there were no hired labour taken for the produce, all we're doing for individual purposes. The total imputed cost of labour was calculated to be ₹19260 for 159.32 kg per year. There was a negligible amount of activity of the collection of stone flowers found after the monsoon set. In the study area the collectors were involved in disposal to the markets per month after they dry the produce. If the produce is not dried they get rot easily. But if the produce is dried the produce can have a shelf life of 6 months at least. If the produce is processed the produce can have a shelf life of up to 2 years. Thus there is no issue of diseases and damages to the produce. The increasing trend of the quality per month was also given in the figure 6 below which are followed by Table 6.

Table 6. Month wise total collection of stone flower

| Months | Quantity (kg) | Man days | Wage (₹/man-days) | Cost of labour (₹/month) |
|--------------|--------------------------|----------|-------------------|--------------------------|
| April | 22.5 (14.12) | 16 | 180 | 2880 |
| May | 23.07 (14.47) | 16 | 180 | 2880 |
| June | 23.68 (14.86) | 17 | 180 | 3060 |
| July | 26.99 (16.94) | 19 | 180 | 3420 |
| August | 31.08 (19.50) | 19 | 180 | 3420 |
| September | 32 (20.08) | 20 | 180 | 3600 |
| Total | 159.325 (100) | | | 19260 |

Note: Figures in parentheses are percentage of the total

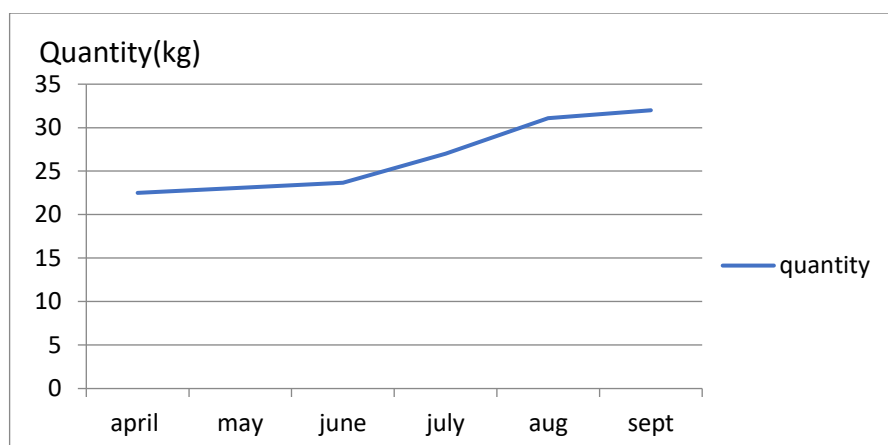


Figure 6. increasing trend quantity collection of stone flower per month

Cost incurred in collection of stone flower

The cost involve in collection of stone flower was measured in Table 7. Cost of a commodity is the sum of cost incurred on various inputs that were used in products of commodity. Hence, the correct identification of these inputs is essential for assessment of cost incurred in produce of the commodity. Accurate knowledge of cost is crucial for farmers in decisions of allocation of scarce resources in the efficient way to receive the highest possible return on investment. The variable costs taken into consideration were transportation costs and labor cost. The collectors dispose of the product for around sixteen days per month. Therefore, the total transportation cost for a year was calculated to be ₹970 per year at 10 per cent interest in working capital where the total quantity disposed was 159.32 kg per year. The imputed cost of family labor was calculated based on wages paid to attach family labor. The cost of family labor is really the cost for which no money is actually spent. The cost is calculated to contribute towards the cost of the product for labor which might be hired. In the study area there was no labor, which was hired for the collection, but Proper evaluation of such items in terms of money equivalent was important for correct assessment of the crop collection/ crop production. Family labor was therefore an essential component of business. Such

costs are assessed using imputed value of the cost. The average wage rate in the area was used to impute the cost of family labor. The collectors invest around four days per week for collection of the stone flower. The standard cost of labor was found by man days involved to collect a total quantity of 22.5 kg per month in April was around ₹2880. For the month of May the total collection was found to be 23.07 kg per month where the standard cost of labour was ₹2880 which increased up to ₹3600 for 32 kg/year. Thus, the total collection for six months, the imputed cost was calculated to be ₹19,260 per year. Similar study was done for improving managerial accounting and calculation of labor costs in the context of using standard cost, which showed one of the most important components of cost in the industry, was labour costs (Ocneanu and Cojocaru, 2013). Further the total cost was calculated which was the sum of total variable cost and total fixed cost. The fixed cost was the cost of implements of knives and spoons. The cost incurred for license to the permission to the field was ₹100 on a yearly basis. Thus, the total fixed cost incurred was found to be of ₹350 per year. The total cost incurred in the whole process was around ₹ 15,620 per kg. Similar study was conducted for cost analysis of medicinal and aromatic plants in Andhra Pradesh and Telangana states (Kumar and Vani, 2020).

Table 7. Cost incurred for collection of Stone flower per year

| Particulars | Amount (₹/year) |
|----------------------------|-----------------|
| Variable cost | |
| Transportation cost | 970 (4.71) |
| Total variable cost | 970 (4.71) |
| Fixed cost | |
| Depreciation on fixed cost | 250 (1.21) |

| | |
|-------------------------------|------------------|
| Imputed cost of family labour | 19260 (93.58) |
| License fee | 100 (0.48) |
| Total fixed cost | 19610 (95.28) |
| Total cost incurred | 20580 (100) |

Source: Household survey

Income received from the collection of stone flower

An attempt had been made for calculation of gross income and family level income of stone flower collection which is given in Table 8. The total collection involved per year was 159.32 kg. The cost of the stone flower was ₹250 per kg. Thus, the gross income per year for a total of 159.32 kg was found to be ₹39,830. The net return was calculated to be ₹20,580 per year. Net return excluding imputed labour cost was found to be ₹38,510. As, mentioned earlier the cost of family labor is really the cost for which no money was actually spent, therefore the net return excluding imputed labour of cost was important measure to calculate to know the actual cash income of the study area. The benefit-cost ratio is an indicator showing the relationship between the relative costs and benefits of a product, expressed in monetary or qualitative terms. If a product has a Benefit Cost ratio greater than 1.0, the product is expected to deliver a positive return. Thus, the Benefit Cost ratio was found to be

1.9 which showed a positive return to the cost invested in the product. The return on rupee expenditure is the income incurred after dividing the net return with total cost which was found to be 0.9 which indicates a positive result to the cost invested. Thus all the factors have shown positive results to the income earned from the stone flowers.

5. Conclusion

It can be seen that the income earned by stone flower collectors of the Khasi community can help to build a profitable business. The net cash income earned was higher than the cost involved which shows that stone flowers contributed to the livelihood of the study area. The overall benefit exceeded the cost in the area. The revenue generated impacts livelihoods in two areas such as there are shifts in portfolios of livelihoods and adjustments to the production and consumption habits of households. It may be effective in reducing poverty locally. What emerges in the end is social

Table 8. Income from Stone flower collection per year

| Particulars | Amount (₹/year) |
|--|-----------------|
| Total collection (Kg) | 159.32 |
| Cost per kg | 250 |
| Gross return | 39,830 |
| Total Cost | 20,580 |
| Net return | 19,250 |
| Net return excluding imputed labour cost | 38,510 |
| Benefit cost ratio | 1.9 |
| Returns of rupee expenditure | 0.9 |

Source: Household survey

justice. If each society of the Country does not have an equal share in income, no society can be fair or stable. Moreover, stone flower collections open up new possibilities for labour market in the area. As mentioned most of the stone flower collectors are women which strengthen women empowerment in the Country. Ideally, when income increases there is economic growth in the area. The cash income generated from the stone flower leads to positive economies of scale to the study area.

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