

Livelihood Improvement through Sustainable Large Cardamom Cultivation in North Sikkim

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Abstract- Large cardamom (*Amomum subulatum* Roxb.) belongs to family Zingiberaceae and order Scitaminae is the most suitable cash crop for the hilly terrain of the state of Sikkim. Likewise a large section of farmers in North Sikkim and most parts of Sikkim are engaged in large cardamom cultivation. For years cardamom has been the single most crucial cash crop to these stakeholders. However recent times have shown a steep decline in the land holdings, as well as productivity under large cardamom. Although not evident apparently, it has drastically affected the livelihood of a large section of the rural population. In Dzongu, North Sikkim where Indian cardamom Research institute in collaboration with ICAR has launched the National Agricultural Innovation Project (NAIP) component -III, from 2007. The project has been able to experience and identify certain aspects which need closer attention and evaluation, if large cardamom as a cash crop or simply as a horticultural crop is to be cultivated in the State of Sikkim towards sustainable source of livelihood. The NAIP initiated, with the objective of development of improved farming systems in large cardamom plantation in Dzongu, North Sikkim.

Index Terms- *Amomum subulatum* Roxb., Large Cardamom, Livelihood, NAIP, Sustainable.

I. INTRODUCTION

The NAIP (SRLS) Components-III project “livelihood improvement and empowerment of rural through sustainable farming system in North East India” been implemented in Dzongu in the North District of Sikkim. Ethnic tribes known as Lepchas are the main inhabitants of the areas. The main source of livelihood is agriculture and animal husbandry. Farming is considered as primary profession, where maize, millets, wheat are staple crops. As is a known fact that large cardamom is the important cash crop for the hilly terrain of the state of Sikkim. North Sikkim consisting of Dzongu region is known for cultivation and production of *Dzongu golsey* and *Ramsey* cultivars of large cardamom. *Dzongu golsey* is very much location/region specific in nature. In the recent past area, production and productivity of large cardamom in entire Sikkim particularly in Dzongu area is diminishing at an alarming rate. Major reason for decline in area production and productivity of large cardamom in Dzongu area are menace of *Colletotrichum* blight, *Chirkey*, *foorkey*, pest incidence, cultivation of large cardamom in open area, lack of phytosanitary measures and irrigation during dry periods. North Sikkim contribute major portion of large cardamom production from the state of Sikkim. Its local name is Alainchi in Nepali and Bada elaichi in Hindi,

Sthulaila, Bhadraila in Sanskrit, Bara Ilachi in Bengal, Peralam in Malayalam, Periya elam, Kattelam and Perelam in Tamil Nadu, Pedda Yelakaya in Telegu and didda yelakki in Kannada (V.K. Bisht, 2011). Roxburgh (1820a) was first to describe this plant in his ‘Plants of the Coast of Coromandel’ and in ‘Flora Indica’ (1820b). During base line survey it was observed that there has been decline in the large cardamom production due to various factors such as diseases incidence, methods of agricultural practices, lack of quality planting material, socio-economic conditions, lack of phytosanitation, and absence of proper shade management, lack of irrigation facilities and lack of scientific methods of cultivation.

After the base line survey report and interaction with the community main focus for NAIP, ICRI was the large cardamom, under which nurseries, replantation, gap filling, phytosanitation, plants protection measures, development of agro forestry system, i.e.; by *alnus* sapling plantation, irrigation facilities, ICRI modified *bhattis*, were the main focus that was indicated in the areas. Importance of Scientific methods of propagation through suckers, shade management, phytosanitation, plants protection methods and manureing was given by organizing farmers training programmes. And others cash crops like ginger, garlic, citrus seedling have also been benefited for the farmers for logistic and technical supports. To restore and rejuvenate the damaged plantations and to save large cardamom cultivation in Dzongu area, National Agricultural Innovation Project (NAIP) intervention started 2007 with the following objectives.

- Evaluation and validation of indigenous and improved farming system models for enhancing production in agro ecosystem of disadvantage areas of NEH regions for sustainability, profitability and competitiveness.
- Addressing the constraints of disadvantage to deliverables to facilities the community/people to harness optimum benefits from agriculture sector.
- Capacity building, Skill upgradation, information access and promotion of activity specific SHGs.
- Employment generation through agro-processing and value addition including storage, packaging, transportation and marketing of the produce.

II. METHODOLOGY

The methodology for the project includes the selection of the target area, implementation and stakeholder participation, forming of SHGs and farmers clubs.

Table 1. Name of the Villages within the Project Clusters:

Sl.No	Gram Panchayat Unit	Village
1.	Tingbong	1. Tingbong 2. Nung 3. Namprick 4. Kussong 5. Payal 6. Lingkoo
2.	Passingdang	1. Mentam 2. Passingdang 3. Panang 4. Laven 5. Rukloo 6. Kayam 7. Lingthem 8. Sangkalang

The baseline survey was done during 2008 at the project site. Data was collected from 111 households within two GPU viz., Passingdang and Tingvong (Table 1). Under Passingdang GPU 42 household with population of 293 individuals (137 male and 156 female) and Tingvong GPU with 70 household which has population of 514 individuals (268 male and 246 are female) was surveyed. Total house hold under NAIP Project Clusters within two GPU is 155 numbers with the total population of 807 where male population is 405 and female population is 402 with total area covered of 293.32 ha and the whole population is schedule tribe.

To manage the menace of large cardamom diseases at Dzongu area integrated approach of crop husbandry was adopted. The work plan consisting of establishment of large cardamom sucker nursery, replanting/gap filling in the plantation followed by strict phyto-sanitary measures, managed the problem of the intervention site. Through NAIP intervention and linkage with Spices Board Development division, zonal office Mangan, sucker nurseries were established. Establishment of nurseries was able to address one of the most critical issues that farmers were facing. The farmers generated enough quantity of quality planting material required for planting season. Thirty ICRI improved *bhattis* having capacity of curing 400 kg fresh capsule was constructed as per the design of ICRI, Spices Board, Tadong.

Silpaulin lined water storage tank were tank constructed for the irrigation of large cardamom during the dry seasons. To safe guard the farmer's livelihood security, additional crop component (Citrus, ginger, garlic, radish, pea and raisag) was taken as intervention near silpaulin lined water storage tank site. Productivity rate of 1:6 and 1:8 was observed in ginger and garlic respectively with generation of additional income.

III. RESULT AND DISCUSSION

From two GPU's 100 certified nurseries were established with approximate production of 2, 50,160 suckers. Linkage programme was established with Spices Board (Dev.) Zonal office Mangan North Sikkim. From this intervention assurance of supply of quality planting material was materialized with

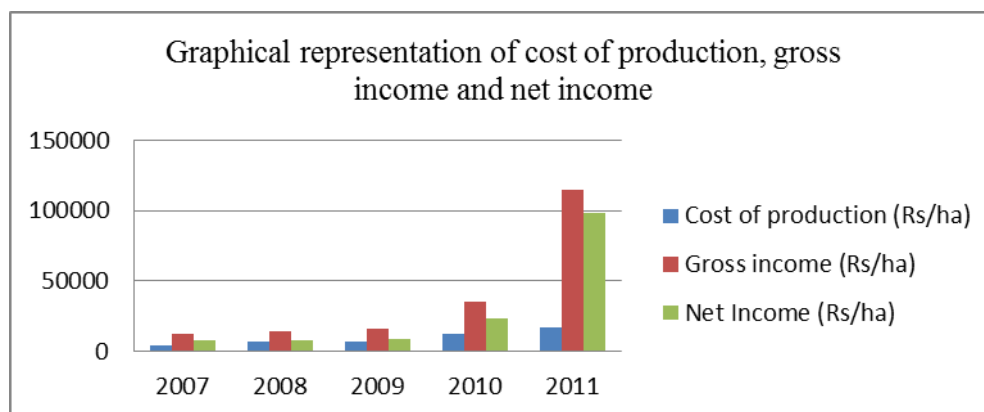
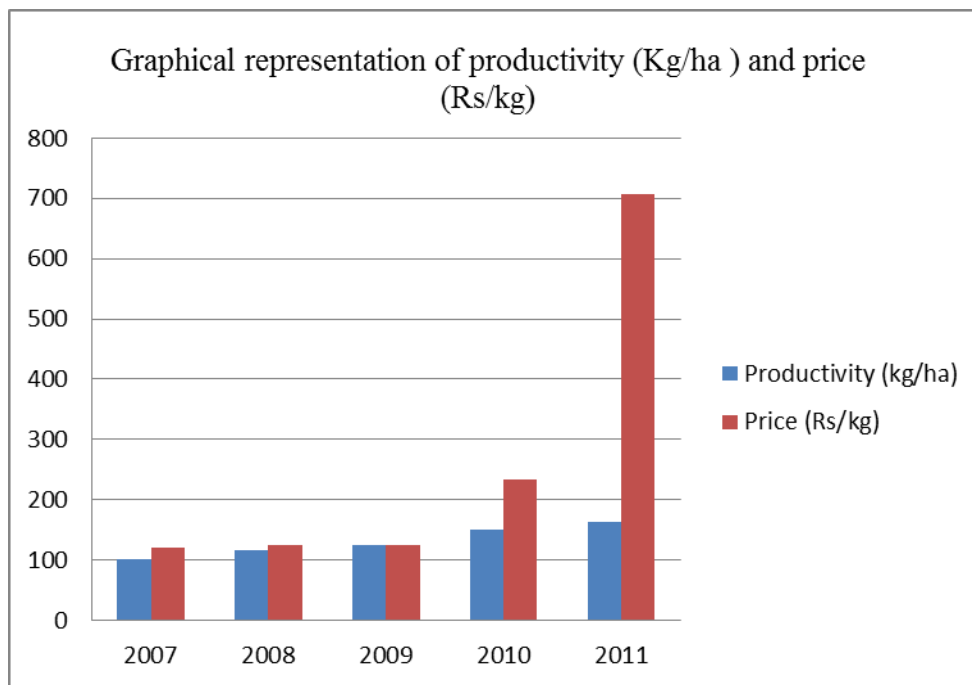
achievement in expansion of area under new planting and replantation to the tune of 65.22 ha. However an increase in trend of productivity of capsule (14.26 kg/ha) was recorded from the rejuvenation area. More over by selling excess suckers by the beneficiary farmers had earned additional income. Totally 160 ha of large cardamom plantation was brought under phytosanitation work with due application of bioagents viz., *Pseudomonas fluorescens* & *Bacillus subtilis* to 24.5 ha. 47% of crop loss was minimized due to adoption of this plant protection strategy. In traditional *bhatti* capsules were directly heated to remove excess moisture. Due to this direct heating natural aroma and colour is lost during the process of curing. On the other side in ICRI improved *bhattis* cardamom capsule can be cured through indirect heating. As a result natural colour, aroma and flavor is retained in the capsule. ICRI improved *bhattis* were also used to cure other agriculture products. Thirty ICRI improved *bhattis* having capacity of curing 400 kg fresh capsule was constructed as per the design of ICRI, Spices Board, Tadong. Since the end produce had retained its quality criteria capsules fetched 50-100 Rs/kg more price than capsules cured in traditional *bhatti*. Silpauline water harvesting tanks lined with silpauline sheet and one concert tank having storage capacity of 15000 liters was constructed at the intervention site. Apart from it water source modification by installing of PVC drum of 200 liter capacity. Moreover 11 drip irrigation systems were also installed for ensuring irrigation supply to cardamom sucker nursery (Table 2). Assistance through this type of physical supplementation of inputs certainly helps in improving farm productivity and farmers livelihood status. With adoption of scientific method of large cardamom cultivation in holistic approach even with increase in cost of production the farmers realized higher net income and BC ratio for their premium product. Productivity level was increased to the tone of 58% and with realization of Rs. 98196 as net income with BC ratio of 7.0 (Table. 3) (Deka et al, 2012).

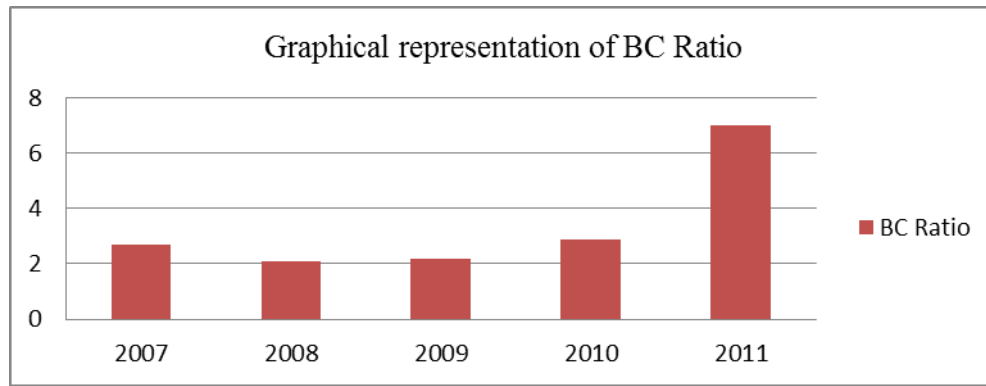
Table 2. Area covered under different intervention

Sl. No.	Interventions	Area covered
1	Large cardamom nursery	10 ha
2	Replantation and rejuvenation	65.22 ha
3	Phytosanitation	160 ha
4	Plant protection	10 ha
6	Irrigation	30 ha
7	ICRI improved bhatti	30 nos.

Table 3. Economics of large cardamom at NAIP intervention site

Sl. No.	Year	Productivity (kg/ha)	Price (Rs/kg)	Cost of production (Rs/ha)	Gross income (Rs/ha)	Net Income (Rs/ha)	BC Ratio
1	2007	102	120	4500	12240	7740	2.7
2	2008	116	125	7000	14500	7500	2.1
3	2009	124	125	7000	15500	8500	2.2
4	2010	150	234	12000	35100	23100	2.9
5	2011	162	708	16500	114696	98196	7.0





IV. CONCLUSION

The NAIP (SRLS) Components-III project “livelihood improvement and empowerment of rural through sustainable farming system in North East India” been implemented in Dzungu in the North District of Sikkim. Ethnic tribes known as Lepchas are the main inhabitants of the areas. Total house hold under NAIP Project Clusters within two GPU is 155 numbers with the total population of 807 where male population is 405 and female population is 402 with total area covered of 293.32 ha and the whole population is schedule tribe. After the base line survey report and interaction with the community main focus for NAIP, ICRI was the large cardamom, under which nurseries, replantation, gap filling, phytosanitation, plants protection measures, development of agro forestry system, i.e.; by *alnus* sapling plantation, irrigation facilities, ICRI modified *bhattis*, were the main focus that was indicated in the areas. Importance of Scientific methods of propagation through suckers, shade management, phytosanitation, plants protection methods and manureing was given by organizing farmers training programmes. And others cash crops like ginger, garlic, citrus seedling have also been benefited for the farmers for logistic and technical supports. From two GPU’s 100 certified nurseries were established with approximate production of 2, 50,160 suckers. Linkage programme was established with Spices Board (Dev.) Zonal office Mangan North Sikkim. 65.22 ha brought under replantation and gap filling, 160 ha under phytosanitation, 10 ha under plant protection and 30 ha area brought under irrigation through the construction of silpauline tank, and 10 drip irrigation system.

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REFERENCES

- [1] Bisht V.K., Negi J.S., Bhandari A.K. and Sundriyal R.C. 2011. *Amomum subulatum* Roxb: traditional, phytochemical and biological activities-An overview. Vol. 6(24), pp.5386-5390.
- [2] Deka T.N., Harsha.K.N, Gupta U, Gudade B.A., Bhattarai N.K. and Vijayan A.K. 2012) subsistence to sustainability in large cardamom cropping system. Book of extended summaries of the national seminar on Livelihood options for Small and Marginal Farmers in Fragile Ecosystems: 112-114.
- [3] Roxburgh W (1820a). Plants of the Coast of Coromandel. Vol. 3. Mission Press, Serampore.
- [4] Roxburgh W (1820b). Flora Indica. Vol. 1. W. Bulmer and Co., London.

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