



Organic Farming at Eastern Ghat Hill: A Boon to Tribal Farmers

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Kollihills is a small mountain range located at the tail end of the Eastern Ghats in Namakkal District of Tamil Nadu. Krishi Vigyan Kendra, Namakkal is being implemented Paramparaghat Krishi Vikas Yojana (PKVY) scheme at Elangiyampatti and Ariyur Nadu villages of Kollihills, Namakkal District, Tamil Nadu since 2019. Local group formed in the name of KVK Masila PKVY Farmers group with 21 tribal farmers covering in an area of 20 ha. The crops covered under organic farming are Black pepper, Cardamom, Hill banana, Coffee, Vegetables, Tapioca and Millets. Initially 12 capacity building programmes were conducted to the tribal farmers on organic farm management, organic input production for soil fertility management, adoption of PGS standards in field practices and PGS certification. The tribal farmers started organic cultivation by using vermicompost, panchakavya, IISR Tricho capsules, bio fertilizers and waste decomposer application produced by their own. They did primary processing of organic spices and plantation crops by using primary processing unit established by KVK under TSP scheme and maintained by these farmers group. After completion of 3 years organic farming practices, all the tribal farmers got organic certification. They harvested 1370 kg of black pepper, 145 kg of Cardamom, 1700 kg of coffee beans, 625 bunches of hill banana, 9.1 tonnes of vegetables and 1.4 tonnes of millets per 0.4 ha area and sold the organic produce with brand name to nearby markets in Namakkal, Salem, Karur and Erode. They realized a net income of Rs.301500 from black pepper, Rs.317050 from caradamom, Rs.93700 from coffee, Rs.155400 from hill banana, Rs.112580 and Rs.23930 from Millets each in an area of 0.4 ha.

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1. INTRODUCTION

Kolli hills is a small mountain range located at the tail end of the Eastern Ghats in Namakkal District of Tamil Nadu. Situated between 11.10' and 11.23' North latitude and 78.17' and 78.28' East longitude, the mountains are at 1000-1300m height covering approximately 418.5 Km². There are 14 Villages [Nadus/ revenue villages] and 275 hamlets inhabited predominantly [>95 per cent] by scheduled tribes. The total population of Kollihills is 33888 living in 6840 households. Out of the 38678 people 36080 are tribals and the rest have been declared as scheduled caste. The Malayali Malai Vazh Makkal is the major scheduled tribes peoples living in this area.

The main occupation is agriculture and cattle rearing. Black pepper, Hill banana, Coffee, Pine apple, Tapioca, Paddy, Minor millets like Foxtail, Finger millet and Little millets are the major crops cultivated in Kollihills in an area of 1200 ha under rainfed condition. But the farmers got low yield due to non-adoption of ICM practices with reference to organic farming, pest and disease incidence in all major crops, improper soil fertility management. In addition they also not followed the scientific management practices towards livestock rearing. Hence the farmers got poor returns both from agriculture and animal husbandry activities. In order to address these issues in farming practices in Kollihills, KVK, Namakkal has implementing a research project to achieve the strategies through diverse perspectives.

1.1 Objectives

1. To promote organic farming practices in tribal areas.
2. To reduce the cost of farming, increase the yield and net income.
3. To sustainably produce chemical free nutritious food for human consumption.
4. To increase the soil fertility status.

2. MATERIALS AND METHODS - TECHNOLOGICAL INTERVENTIONS

2.1 Group Formation and Data Collection

Krishi Vigyan Kendra, Namakkal is being implemented Paramparaghat Krishi Vikas Yojana

(PKVY) scheme at Elangiyampatti and Ariyur Nadu villages of Kollihills, Namakkal District, Tamil Nadu since 2019. Initially local group formed in the name of KVK Masila PKVY Farmers group by involving 21 tribal farmers covering in an area of 20 ha. The group also registered in PGS portal under Ministry of Agriculture and Farmers Welfare, Government of India and also obtained registration number LG 1800049279. Farmer's history and last 3 years crop status in Kharif, Rabi and Summer season was collected from all the farmers through Interview schedule & Focus group discussion and the same was uploaded and got approval from the concerned authority.

2.2 Capacity Building to Tribes

The tribes of Kollihills are mainly doing traditional farming practices for the past 30 years. Since Kollihills having protected environment, Krishi Vigyan Kendra has provided technology backstopping relevant to Organic farming practices mainly in Spices (Black Pepper, Cardamom, Clove, Nutmeg, Cinnamon), Plantation crops (Coffee), Fruits (Hill banana var. Namanan – Native species of Kollihills, Pine apple, Blimbi), Vegetables (Chow-chow, Beans, Coriander, Tapioca) and Cereals through 15 on and off campus training programmes since 2019. Mainly the tribes were focussed with organic farm management, organic input production for soil fertility management, pest and disease management, adoption of PGS standards in field practices and PGS certification at group level.

2.3 Peer Inspection

Peer inspection / field inspection at yielding stage by scientists of Tamil Nadu Agricultural University, Krishi Vigyan Kendra's & State Department of Horticulture was conducted at every cropping season in the farmer's field to assess the yield potential of above mentioned crops.

2.4 Soil Analysis

Soil and water samples were collected in all fields before initiating the programme. Based on soil analysis report, the soil is red lateritic in nature 19 soil samples are non- calcareous in nature with neutral pH, have low to medium organic carbon content, medium available Nitrogen content, medium to high available Phosphorus and available Potassium.

Table 1. Soil analytical report (Pretreatment) – High OC, Medium N, Medium to high P & K

S.No.	Particulars	Calcareousness	pH	EC (dSm ⁻¹)	OC (%)	Aval. N (kg ha ⁻¹)	Aval. P (kg ha ⁻¹)	Aval. K (kg ha ⁻¹)	Aval. S (mg ha ⁻¹)	Aval. Zn (mg ha ⁻¹)	Aval. B (mg ha ⁻¹)
1	Field Number 1	Non-calcareous	6.62	0.021	0.85	263	25.9	174	16.98	1.09	0.39
2	Field Number 2	Non calcareous	6.65	0.017	0.89	288	41.0	356	19.65	1.08	0.44
3	Field Number 3	Non calcareous	6.50	0.018	0.79	263	40.2	423	23.58	1.09	0.58
4	Field Number 4	Non-calcareous	6.51	0.017	0.84	276	46.7	658	27.36	1.39	0.53
5	Field Number 5	Non calcareous	6.47	0.018	0.79	288	52.9	174	17.54	1.48	0.47
6	Field Number 6	Non calcareous	6.54	0.019	0.95	263	45.5	501	18.24	1.36	0.69
7	Field Number 7	Non-calcareous	6.55	0.020	0.94	263	45.2	592	15.20	1.01	0.58
8	Field Number 8	Non-calcareous	6.57	0.017	0.87	263	45.9	212	18.32	1.22	0.47
9	Field Number 9	Non calcareous	6.59	0.021	0.82	263	33.4	665	17.24	1.39	0.61
10	Field Number 10	Non-Calcareous	6.64	0.012	0.78	238	31.2	604	17.05	1.04	0.47
11	Field Number 11	Non-calcareous	6.67	0.016	0.87	263	40.3	293	18.36	1.98	0.87
12	Field Number 12	Non-calcareous	6.63	0.039	0.94	276	43.5	120	14.35	1.09	0.47
13	Field Number 13	Non-calcareous	6.60	0.021	0.79	276	43.6	171	21.21	0.98	0.41
14	Field Number 14	Non-calcareous	6.64	0.020	0.82	263	38.9	757	14.68	0.87	0.57
15	Field Number 15	Non-calcareous	6.58	0.014	0.76	238	19.9	802	17.21	0.74	0.74
16	Field Number 16	Calcareous	6.60	0.022	0.84	263	33.5	879	17.39	1.08	0.54
17	Field Number 17	Slightly calcareous	6.67	0.024	0.86	276	38.6	792	19.38	1.65	0.74
18	Field Number 18	Non-calcareous	6.63	0.050	0.87	276	18.8	745	23.58	1.54	0.48
19	Field Number 19	Non - calcareous	6.42	0.012	0.88	279	20.4	322	12.74	0.82	0.32
20	Field Number 20	Non - calcareous	6.51	0.015	0.85	268	23.7	270	13.68	0.85	0.30
21	Field Number 21	Non- calcareous	6.60	0.014	0.90	271	19.2	212	12.77	0.86	0.37

2.5 On farm Organic Input Production Units

Further the farmers were constructed permanent structures viz., Vermicomposting unit, Panchakavya production, Waste decomposer production unit, Apiary unit and Drip irrigation by using incentives provided to them @ Rs.12000 / ha. Totally 2.4 lakhs provided to 21 farmers. Because of this intervention, the farmers could produce sufficient quantity of organic soil amendments such as vermicompost, panchakavya, waste decomposer and applied to their fields continuously for soil nutrient status enhancement.

2.6 Mechanization and value Addition

The tribes were trained by using aluminium ladder instead of using bamboo pole for harvesting of berries from black pepper vines for efficient harvesting as well as drudgery reduction. Also established primary processing unit with Pepper spike separator, Cardamom dryer, Disc type coffee pulping machine, Grader, pepper powder making machine under Tribal Sub Plan project. Hence the tribes' value added the spices and plantation crops by using these machinaries.

2.7 Facilitates for Getting Organic Certification, Branding, Packing and Marketing

After every cropping season the yield related data collected from each farmer was uploaded in the portal. After thorough verification of the data's, group certification was issued by the concerned authority. Then the farmers were trained for primary processing by using machinaries supplied under Tribal Sub plan Project.

3. RESULTS AND DISCUSSION

With respect to soil nutrient status (Table 2), before and after implementation, organic carbon content is slightly increased from 0.85 to 0.92 % in three years. Similarly available N, P, K, S, Zn and B also increased from the base year. This might be due to continuous application of organic inputs such as vermicompost, waste decomposer, bio fertilizers and plant cake thus improves the soil fertility status and it is also stated that vermicompost has higher N availability and the supply of several other plant

nutrients such as phosphorus (P), potassium (K) and sulphur (S) were significantly increased by adding vermicompost as compared to conventional farming in the same soil.

This is in accordance with the findings of Anjana Thakur et al [1], Gayathri et al [2] and Richa N and Baburam K [3] In addition to that application of panchagavya at regular intervals has resulted higher microbial population around the root zone. This may be attributed to the fact that panchagavya is a rich source of beneficial microorganisms like N-fixers and P- solubilizers which in turn increases the soil nutrient status. Similar observations were made by Devakumar et al [4], Somdutt et al [5], Chunchu and Gurpreet [6] and Natarajan [7].

Recorded enhanced yield of Black pepper (1551.3 kg), Cardamom (153 kg), Coffee (1670 kg), Hill banana (658.7 bunches), Vegetables (9151.7 kg) and Cereals (1457.5 kg) from the Organic farming field than the traditional farming field (Table.3). This might be due to supplementation of soil with vermicompost develops plant growth by increasing humic acid content and consequently increases plant growth hormones and other beneficial symbiotic microorganisms. Besides, it helps the availability of plant nutrients by improving soil structure and microorganism activity and also this way increases plant growth and yield. Further application of vermicompost, waste decomposer and panchakavya not only makes plant healthy and productive; it also regulates plant development with humic acid and hormones. More importantly, it contributes in soil fertility and quality by increasing microbial activity and microbial biomass levels and also prevents destruction of soil borne pests and diseases and increases the yield potential of the crop. This is in conformity with the findings of Alper Durak et al. [8], Lal Gopal et al. [9] and Kevin Muyang et al [10].

The economic analysis (Table 4) revealed that the farmers received a maximum net income of Rs.3,01,500 in black pepper, Rs.3,17,050 in Cardamom, Rs.93,700 in Coffee, Rs.1,55,400 in Hill banana, Rs.1,12,580 in Vegetables each in an area of 0.4 ha/year from the organic farming practiced field. The increased net profit might be due to organic certification for their produce as well as proper grading, packing, branding and marketing of the produce by utilizing the machinaries supplied by KVK under Tribal Sub Plan scheme to the PKVY farmers group. In

Table 2. Soil nutrient status - Before and after implementation of Organic farming in 21 tribal farmer's field in an area of 50 acres

Status	OC (%)	Aval.N (kg ha ⁻¹)	Aval. P (kg ha ⁻¹)	Aval.K (kg ha ⁻¹)	Aval.S (mg ha ⁻¹)	Aval.Zn (mg ha ⁻¹)	Aval.B (mg ha ⁻¹)
Before (2019)	0.85± 0.06	265.81± 12.71	37.90± 8.62	492.29± 238.36	19.68± 3.92	1.29± 0.33	0.56± 0.12
After (2022)	0.92± 0.07	300.86± 16.47	47.10± 8.86	560.90± 235.62	28.38± 5.56	1.58± 0.47	0.88± 0.21
T value	3.65	7.71	3.41	0.94	5.85	2.34	6.11
P value	0.00036**	0.00001**	0.00075**	0.17	0.00001**	0.012*	0.00001**
Level of significance	P< .01	P< .01	P< .01	NS	P< .01	P<.05	P< .01

Table 3. Yield of Spices, Fruits, Plantation, Fruits, Vegetables and Cereals before and after implementation of Organic farming

Yield	Black pepper	Cardamom	Coffee	Hill banana	Vegetables	Millets
Before (2019)	899.7± 185.9	84.5 ± 14.6	959.3± 102.41	432.0± 34.72	7163.2± 496.3	1050.8± 70.2
After (2022)	1551.3± 231.4	153.0± 31.9	1670.6± 82.97	658.7± 30.63	9151.7± 176.9	1457.5± 45.9
T value	10.06	8.95	24.72	22.42	17.29	22.19
Level of significance	P< .01	P< .01	P< .01	P< .01	P< .01	P< .01

Table 4. Economics under Organic Farming

S.No	Particulars (Rs/0.4 ha/yr)	Black pepper	Cardamom	Coffee	Hill banana	Vegetables	Millets
1	Cost of cultivation	107500	116200	92500	94600	69820	18070
2	Cost of primary processing	2000	1700	800	-	-	-
3	Total expenditure	109500	117950	93300	94600	69820	18070
4	Yield (Kg)	1370	145	1700	625 bunches	9120	1400
5	Gross return	411000	435000	187000	250000	182400	42000
6	Net return	301500	317050	93700	155400	112580	23930
7	BCR	3.8	3.7	2.0	2.6	2.5	2.3

addition to farmer's market at Semmedu and Tourist places of Kollihills, the tribes sale the produce in surrounding towns such as Namakkal, Salem, Erode, Karur and Trichy Districts of Tamil Nadu in the brand name of KVK Masila PKVY Organic produce. So the tribes got extra income of Rs.100 - 150/kg than the normal produce.

4. CONCLUSION

The outcome of the whole programme is that if the farmers grow spices, fruits, plantation, vegetables and millet crops by way of organic farming using standardized technology then there is an ample scope to increase the quality of the produce and income per unit area of production and also found better remuneration for their produce in their local, district and state level markets. Because of KVK interventions, a total of 524 tribal farmers from Elangiyampatti village, Gundurnadu Panchayat of Kollihills got benefitted with organic farming technologies for the past three years. So far 42.5 tonnes of pepper, 55.2 tonnes of coffee beans and 2.1 tonnes of cardamom were organically produced and sold by the tribes and realized an average net income of Rs.82500/household/year. Based on the demand of organic produces, now the PKVY group farmers opened organic shop at Kollihills for spices sale outlet for tourists.

CONFERENCE DISCLAIMER

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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