

Case Study

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## Self-Sustainability of Farming Community through Promotion of Organic Agriculture: A Case Study of KVK, Bagalkot, India

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### ABSTRACT

It is said that, organic agriculture is the future of Indian Agriculture. With the impact of green revolution on soils and water, we are in the fear of facing soil degradation. This paper is aimed to throw lights on the experiences of Krishi Vigyan Kendra (KVK), Bagalkot, Karnataka, India in the production and sale of organic inputs. Inputs such as vermicompost, earthworms, vermiwash, azolla, *Metarrhizium*, *Pseudomonas* and *Trichoderma* promotion of apiculture by demonstrating honey bee colonies are the major components, which KVK is producing and selling. In the present paper the year wise production and sales of organic inputs are taken into account to derive the total area and economic impact thereof. The receipts of produce sold at laboratories served as the source of information to the study. The results indicate that, the sale of inputs is on rise, so also the farmers who are adopting these technologies in their own field are also more. People are approaching KVK for these technologies. To increase the production of organic inputs KVK, Bagalkot is imparting the technologies of Vermicompost production (Biradar, 2006). The follow up of the results of the training conducted in this regard also showed that, nearly 80 per cent of the trainees have adopted these techniques of producing these inputs. Though the economics are not comparable, the quality of the soil matters in this regard. Hence more comprehensive studies are required to analyze the impact of these technologies on the soil quality characteristics.

#### Keywords

Metarrhizium,  
*Pseudomonas* and  
*Trichoderma*

#### Article Info

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### Introduction

KVK Bagalkot was sanctioned by the Indian Council of Agriculture during the year 2005, and started functioning under the aegis of University of Agricultural Sciences, Dharwad. Since then, it has contributed in its own way to the development of district agriculture. A special feature of this district is that, it is blessed with two irrigation, hence there is large scope and potentiality for the

development of agriculture. There is a total of 50 lakh ha of net sown area for agriculture, of which 50 per cent irrigation. Major crop of the district being sugarcane, consumes 50 per cent of water and is cultivated in an area of 20 percent of the cultivated area. Though very recently there is increase in area under redgram and other crops, people opt for sugarcane i.e., a cash crop. Parallel to this there is increase in the use of pesticides and insecticides.

The days are not far from becoming the lands converted into unproductive ones as the heavy irrigation accompanied with high dose of pesticide, weedicides and fertilizer application. Along with soils becoming problematic, there may also be stagnation or reduction in yield levels. This fact has been established through many studies, and declining soil fertility of Punjab is a live example for all of us. According to a recent report it has been established that, the unsustainable management practices in Punjab have damaged soil fertility and health, leading to promotion of chemical fertilizers which too is inefficient to the desirable level, according to the Soil Fertility Atlas recently published by the Food and Agriculture Organisation (FAO) of the United Nations. Keeping this view in mind KVK Bagalkot is involved in demonstration, production of and promotion of organic inputs.

On an average earthworm presence in agro ecosystems leads to a 25% increase in crop yield and a 23% increase in above ground biomass. The magnitude of these effects depends on presence of crop residue, earthworm density and type and rate of fertilization. The positive effects of earthworms become larger when more residues is returned to the soil, but disappear when soil nitrogen availability is high. This suggests that earthworms stimulate plant growth predominantly through releasing nitrogen locked away in residue and soil organic matter (Willem J. *et al.*, 2014).

### **Materials and Methods**

This paper exploits the secondary data on production and sale of organic inputs and bioagents maintained at Krishi Vigyan Kendra, Bagalkot for two years. Major inputs are vermicompost, earthworms, vermiwash, *Metarrhizium*, *Pseudomonas* and *Trichoderma*. Production of these inputs since

2016-17 has been taken into consideration for analysis. The procedure mentioned by Biradar *et al.*, (2007) and Biradar and Shaila (2005) were followed for the production vermiculture related products. This paper analyses the total organic inputs produced by KVK and its impact on district agriculture. For the convenience of analysis, the products have been divided into two groups viz., 1. Vermiculture related products and 2. Biocontrol agents. The records of trainings conducted by Krishi Vigyan Kendra were also served as the source of information. Simple frequency and percentages were calculated to arrive at conclusion.

### **Results and Discussion**

This table 1 indicates the total production of vermicompost and other related products produced and sold to the farmers in this district. Another important tool in the vermiculturing is training related to vermicomposting. There are regular schedule of trainings are being conducted to the farmers in the preparation of vermicompost, vermiwash and earthworms. There are totally 10-15 trainings conducted in the area of organic agriculture. During the year 2016-17 there was a paid training was organized on Dairying and vermiculture exclusively. All the trainees who have undergone this training are practicing the organic agriculture. The impact of this training was analyzed by getting the feedback through telephone interview. The results are as follows

One kilogram of worms numbering about 600 to 1000 can convert 25 to 45 kg of wet waste per week. The compost recovery would be around 25 kg per week under well managed conditions.

One kilogram of earthworms produces a minimum of 2000 and a maximum of 5000 cocoons per week. The viability of cocoons

will be around 60 per cent and incubation period is about 2 weeks. However with preservation, the viability can be retained upto 3 months. They become sexually matured in about 6 to 8 weeks. Each matured earthworm lays eggs at 7 to 10 days interval and with the period of 12 months, each earthworm produces 247 worms.

The young worms take about 90 days to attain maturity and reproduction capacity. They have tremendous rate of growth if the conditions are congenial and feed is good. About 1 kg

biomass equivalent earthworms can become 20 kg in 4 months and 200 kgs in another 4 months (Anon. 2017 and Kumar, 2018). A general thumb rule is that, Earth worms eat half of their body weight. Hence, if we apply the rule of conversion, the calculation goes the following way (Table 2–4).

One kilogram of earth worm gets converted to 20 kg in 4 months and 200 kg in 8 months

During 2016-17: - 150 kg become 3000 kg in 4 months and 30,000 kg in another 4 months

**Table.1** Production of vermicompost and related products at KVK, Bagalkot

Particulars	2016-17		2017-18		Total	value (Rs.)
	qty	value (Rs.)	qty	value (Rs.)		
Vermicompost (q)	143	78070	211.5	135360	354.5	226880
Vermiwash (lit)	875	66325	965	82025	1840	156400
Live earthworms (kg)	151	38800	233	69900	384	115200

**Table.2** Quantity of the vermicompost produced by the trainees at their fields

Sl. No.	Name of the farmer	Qty (Tones)	Amount generated (Rs.)	Area under organic farming (Ac)	Amount saved through fertilizers (Rs.)
1	Vinod R Katwa	10	64000	3	6000
2	Chandrashekar S vadeyar	18	115200	12	24000
3	Shivanadan Choudari	12	76800	6	12000
4	Pratap B Chandanshu	15	96000	15	30000
5	Dharyappa M Siddapur	16	102400	10	20000
6	Laxamana R Kanabur	8	51200	4	8000
7	S. R. Horatti	10	64000	6	12000
8	Basavaraj Muttappa Gaddi	15	96000	10	20000
	TOTAL	104	665600	66	132000

**Table.3** The composition of vermicompost

Macronutrients (%)		Micronutrients(mg/kg)		Microbial compositions/g	
N	1.10	Cu	52.0	Fungi	2.60x10 <sup>4</sup>
P	0.86	Fe	930.0	Bacterial	11.37x10 <sup>7</sup>
K	0.98	Zn	186.60	Actinomycetes	10.43x10 <sup>4</sup>

(Anon. 2017)

**Table.4** Production of Bio-agents during the year 2016-17 and 2017-18 at KVK Bagalkot

	2016-17		2017-18		Total quantity(Kg)	value (Rs.)
	qty(kg)	value (Rs.)	qty(kg)	value (Rs.)		
<i>Trichoderma</i>	564	57120	372	48360	936	121680
<i>Metarhizium</i>	379	76100	508	127000	887	221750
<i>Pseudomonas</i>	385	39650	440	66000	825	123750

***Trichoderma harzianum***

Crops	No. of Farmers benefitted	Yield of the crop with disease(t/ac)	Yield of the crop without disease	Savings/ha	Savings to the district economy
Banana	30	18.48	24	4416	5,51,116
Watermelon	80	55.20	60	3840	4,79, 232
Onion	200	15.30	18	2700	3,36,960
				Total	1367308

Price of *Trichoderma harzianum* is Rs. 130/kg. Recommended for seed treatment and soil borne diseases in all crops @7.5kg/ha.

Area covered (ha): 124.8

***Metarhizium anisopliae***

Crop	No. of Farmers benefitted	Yield of the crop with infestation	Yield of the crop without infestation	Savings/ha	Savings to the district economy
Sugarcane	300	105 t/ha	139.58 t/ha	48257	3424316

Price of *Metarhizium anisopliae* is Rs. 250/kg. Recommended for Root grub management in sugarcane @12.5kg/ha.

Area under sugarcane is 1 lakh ha,

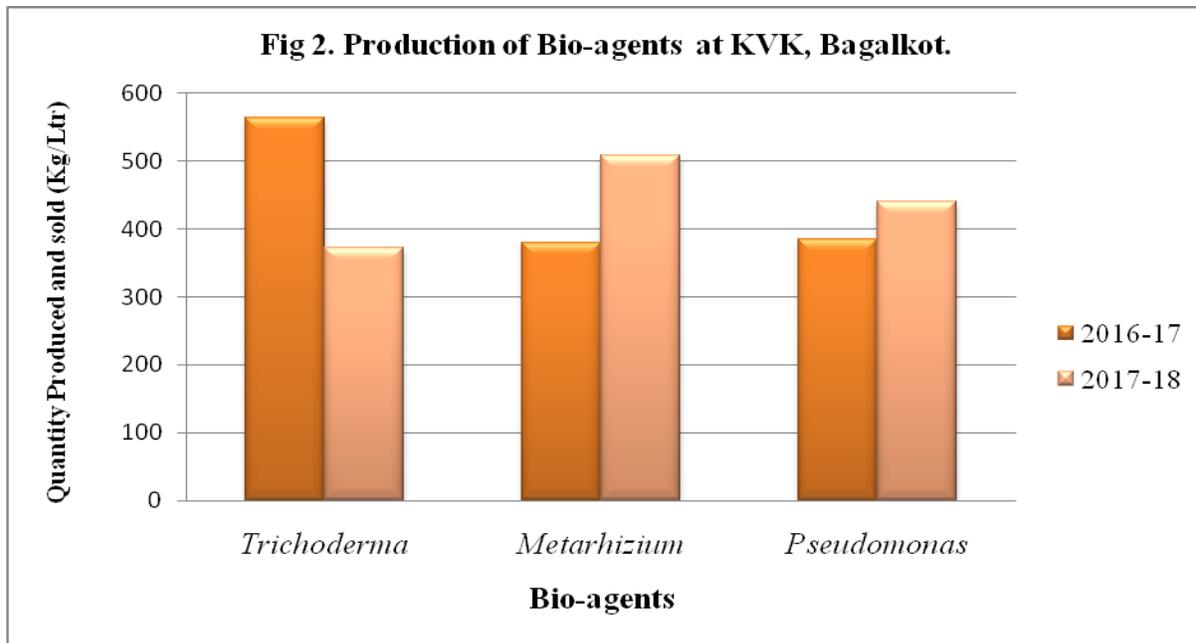
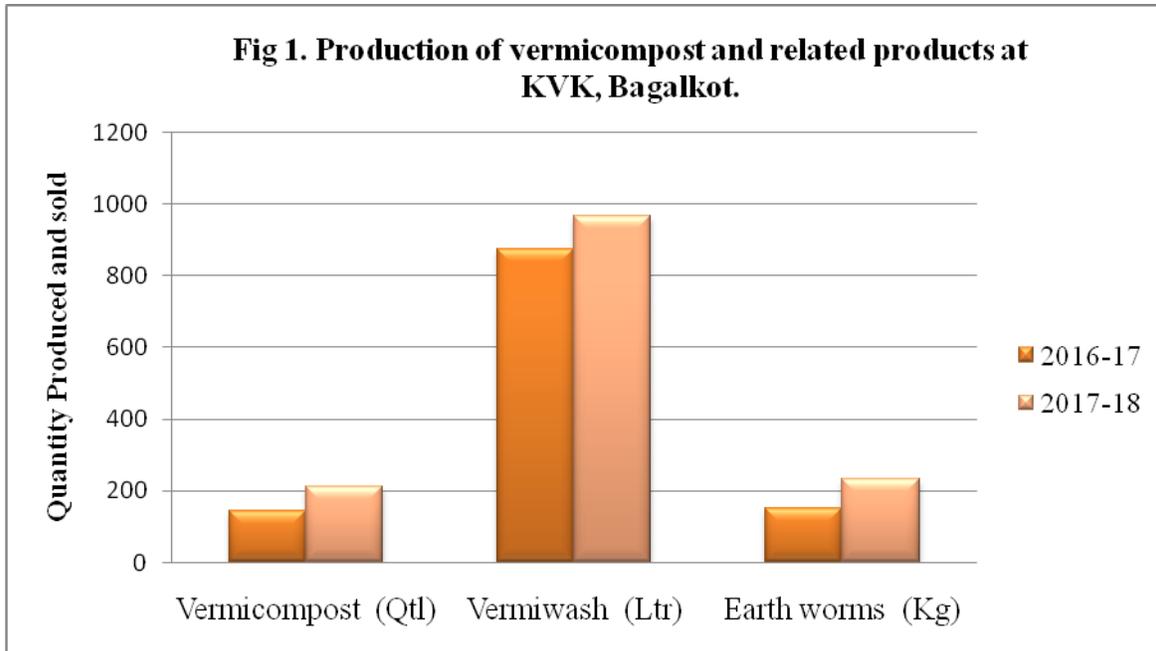
Area covered with *Metarhizium*: 70.96

***Pseudomonas fluorescens***

Crop	Area under crop (ha)	No. of Farmers benefitted	Yield of the crop with disease	Yield of the crop without disease	Savings/ha	Economics
Pomegranate	2298	200	8.16t/ha	10.89t/ha	2,73,000	3,00,30,000

Price of *Pseudomonas fluorescens* =Rs. 150/kg. Recommended for bacterial blight in Pomegranate @ 7.5kg/ha.

Area Under Pomegranate: 2298 ha, Area covered (ha) 110



30000 kg become 60,000 kgs in 8 months and 60,000 kgs in another 4 months 1200000 kg/year. = 150 kg become 1200000kg

During 2017-18: - 233kg earth worm become 1864000 kg in 12 months.

Hence, totally (2016-17 and 2017-18):- 1200000+1864000=3064000kg of worms are

produced with the spread of this technology apart from training. If they eat around 50 per cent of their body weight = 1532000 kg of the trash has been converted into vermicompost

About 936 kg of *Trichoderma* has been produced and sold by KVK, Bagalkot introducing the concept of seed treatment and soil application to overcome seed borne

diseases and 887 kg *Metarhizium* has been produced and sold to farmers by control of Root grub in different crops. And 825 kg of *Pseudomonas* has been produced and sold to farmers by controlling bacterial disease of Pomegranate and other crops.

Apart from production demonstrations and awareness through literature is also being created among the farmers.

The impact analysis of these products on the district economy was carried out at KVK Bagalkot using the secondary data and has been published in the annual report, 2017-18 (Anon. 2018).

The increasing trend in production and sale of bio-agents and vermicompost, earthworms and vermiwash indicates that organic farming is going to be the future way of agriculture. Slowly and steadily the soil health is going to gain its original composition.

The stakeholders in agriculture may be made responsible in popularizing practices of organic agriculture through various activities, more and more programmes on organic agriculture may also be planned in this direction.

A special wing in Krishi Vigyan Kendra or Other institute with outreach activities may be set up to make organic agriculture sustainable and profitable venture.

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