PRODUCTION AND MARKETING MANAGEMENT OF ORGANIC INPUTS IN DHARWAD DISTRICT

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INTRODUCTION

Green revolution has brought spectacular increase in production as well as productivity of crops in India. However, after the initial success, it showed the undesirable effects on natural resources, such as soil, water, biodiversity and human health. The soil degradation has been taking place due to soil erosion; salinization etc. Water resources have been over exploited and polluted due to excessive requirement of irrigation water for high yielding varieties and intensive use of agro chemicals.

In simple terms, organic farming is a way of farming which depends mostly on natural inputs and systems of agricultural production, while barring the usage of synthetic fertilizers, pesticides and genetically modified plant organisms. Crop rotation, biological pest control, and use of green manure are some of the corner stone's of organic agriculture. Livestock is also an important part of organic farming system, because they use crop residues as fodder and return back the manure and enrich soil.

In India, farmers were basically organic farmers before the advent of inorganic fertilizers and chemical pesticides. Over the time, the use of these synthetic inputs has increased to the level of causing a concern to the environment and human health. Consequently, it is felt necessary to advocate the use of age old practices of organic farming not only to ensure uncontaminated food production but also to sustain the agriculture by keeping the land fertile. In the recent past, this has become a major concern where the consumers started demanding the organically grown produce. To make organic farming successful, it is essential that eco-friendly technologies, which can improve the agricultural productivity, have to be developed and made available to the farmers.

Most of the India's arable land is under traditional agriculture, where no synthetic inputs are being used. Although, the products grown under such systems have so far not been defined as organic products but by all means they are genuine organic products. In view of their wide availability there is an urgent need to ensure premium prices for the produce grown in these regions. Unfortunately, these farmers are so involved in their struggle for survival that they have no time to figure out what is organic and what is not. These organic products are sold to the middleman and are being marketed along with other chemically grown products. It is the lack of awareness among the consumers in our country. Sometimes, the chemically grown product which looks healthy and attractive fetches higher prices than the poorly looking organic products, even though chemically grown products having alarmingly high level of pesticide residues.

In India, area under organic farming has grown many-fold in last six years on the back of thrust given to the chemical-free mode of cultivation. From 42,000 ha area under organic certification in 2003-04, increased to more than 4.4 mha area was under organic certification in the country as on March-2010, according to an official statement (FiBL-IFOAM survey-2012). For quality assurance, India has internationally acclaimed certification process in place for export, import and domestic markets.

During 2008-09, India produced about 18.78 lakh tons of certified organic products. Of this, nearly 54,000 ton food items worth Rs.591 crore were exported. Currently, India exports about 86 products worth over 100 million USD to the world certified organic market registering a growth of over 30 per cent (FiBL-IFOAM survey-2012).

Certified organic products including all varieties of food products namely basmati rice, pulses, honey, tea, spices, coffee, oil seeds, fruits, processed food, cereals, herbal medicines and their value added products are produced in India. Apart from edible sector, organic cotton fiber, garments, cosmetics, functional food products and body care products are also produced. Banana, pomegranate, pineapple, grapes, amaranthus, ginger, cardamom, sweet fennel, peanut, onion, sugar and jaggery are other commodities which will emerge as significant organic commodities produced in India in near future.

In 2007-08, global organic cotton production increased by 152 percent to 145,872 metric tons or 668,581 bales. The area under cotton cultivation increased to 161,000 ha in top organic cotton-producing countries like Syria, India, Turkey and China (FiBL-IFOAM survey-2012).

The ministry of agriculture is promoting organic farming in the country under National Project on Organic Farming, National Horticulture Mission, and Technology Mission for North-East and

Rashtriya Krishi Vikas Yojana. National Project on Organic Farming is being implemented since Oct-2004 through National Center of Organic Farming institute at Ghaziabad and six regional centers located at Bangalore, Bhubaneswar, Hissar, Imphal, Jabalpur and Nagpur. The project supports organic input production infrastructure, technical capacity building of stake holders, human resource development through training, statutory quality control of organic inputs, technology development and dissemination, market development and awareness.

Across the globe, organic farming industry is growing at a substantial pace. The demand of organic food products is especially high in north America and European Countries due to increasing health awareness and concerns regarding environmental pollution and conservation. Presently, the global organic food market is estimated around 40 billion USD and growing at a rate of 13 percent. Organic food is outpacing conventional food industry in terms of growth across the world. Presently, Europe, Japan and USA are the largest market of organic food products. European organic food market was estimated around 12 billion USD in 2005 and is growing at a rate of 15-20 percent annually, while US market alone is estimated to generate sales worth 32 billion USD by 2009.

Global market for organic food and beverages is estimated to increase to 104.5 billion USD by 2015 (Markets and Market Estimate in 2011). Organic farming is being practiced in 120 countries of the world (FAO, 2002). However, the area of organic land is less than 1 percent of the total agricultural land of the world. The proportion of organically managed land to conventionally managed land is the highest in Europe. Latin America has the maximum number of organic farms.

Organic farming has been embraced on a wide scale across various Latin American countries, Asia and Africa. Already China, Turkey and Brazil have become the key suppliers of organic ingredients such as nuts, beans and seeds, while India, Ethiopia and Paraguay have emerged as key suppliers of herbs and spices. Other Asian and African countries have also emerged as key suppliers of fruits and other horticultural products.

Principles of organic farming

1. To produce food of high quality and in sufficient quantity.
2. To encourage and enhance biological cycles within the farming system involving micro-organisms, soil flora, plants and animals.
3. To maintain and increase the long term fertility of soil.
4. To create a harmonious balance between crop production and animal husbandry.
5. To produce fully bio-degradable organic products.
6. To minimize all forms of pollution.
7. To promote the healthy and proper use of water & its resources.

Benefits of organic farming include different parameters like agriculture, environment, social conditions, economic conditions and organizational or institutional benefits. The parameter agriculture includes increased diversity, long term soil fertility, high food quality, reduced pest or diseases, self reliant production system and stable production, where as environment parameter includes reduced pollution, reduced dependence on non renewable resources, negligible soil erosion and wild life protection, resilient agro-eco system, compatibility of production with environment.

The social conditions parameter includes improved health, better education, strong community, reduced rural migration, gender equality, increase in employment, good quality work where as economic conditions parameter includes stronger local economy, self reliant economy, income security, increase returns, reduced cash investment and low risk. The organizational or institutional benefits parameter includes cohesiveness, stability, democratic organizations, and enhanced capacity.

Organic agriculture originated as a response to a growing awareness that the health of land is linked to the health and future of the people. It is a holistic and philosophical approach to agriculture, which has its own goal in protection and conservation of the land for future generations, production of high quality food, return to many traditional agricultural methods and the harmonious balance with a complex series of ecosystems.

The organic agriculture being cultivation without the use of chemicals requires a completely new set of options for inputs in agriculture. Morarka foundation beginning with vermi-culture

technology development has enjoyed significant advantages in this field. The underlying scientific principle of Kisan Probiotic Shakti is that when natural minerals are fermented under controlled conditions, metabolites are produced. The fermentation process makes the minerals available to the plants as free ions which can be directly assimilated by the plants. 'Kisan Probiotic Pratirodh': a package of pest management solutions which are in harmony with nature and its process. It consists of pesticide extracts from plant parts, non chemical and naturally occurring pesticide materials such as silica, vinegar, soap formulations, diatomaceous earth and many others which increase the effectiveness of botanical extracts.

In India, the agricultural sector has been dominated for past 40 years by the industrial production model inherited from the green revolution which was aimed at dramatically increasing productivity and production to achieve self-sufficiency. Even though the term “organic” has become fashionable recently, in reality organic farming happens to be the most ancient form of farming. Farmers had no petroleum based chemicals and instead used techniques such as crop rotation and biodiversity to maintain the soil nutrients free from erosion.

One of the models for sustainable organic agriculture is natural farming which was first developed by a Japanese Manasobu Fukuoaka. In India, Subhash Palekar, popularly known as *Krishi ka Rishi* (sage of agriculture), is a famous exponent of natural farming and a tireless promoter of the concept of “Zero Budget Natural Farming” (ZBNF). He hails from Amravati (Maharashtra) but was born in the village of Belora, in the Vidarbha region of Maharashtra, which has been sadly notorious for its high percentage of farmer’s suicides these past two decades. Today, Subhash Palekar, who is still cultivating various crops on his 34 acre dry land farm, dedicates himself to the propagation of his method all over India. About 30 lakh farmers have already successfully adopted natural farming over 10 mha. Subhash Palekar thus developed a natural “catalytic agent” known as Jeevamrutha to promote the formation of humus in the soil by encouraging the multiplication of micro-organisms that decompose the dried biomass of the soil and make it available as nutrients for the plants.

The components of Jeevamrutha are entirely natural: water, cow dung, cow urine, and jaggery. On the same pattern, he designed a seed treatment formula to protect them from various diseases and insects, without using any pesticides. Beejamruta is a natural mixture of water, cow dung, cow urine, and lime. Other mixtures aimed at managing insects and pests (natural pesticides and fungicides) contain tobacco, green chilli, garlic, neem and various fruits such as custard apple, guava, *Lantana Camera*, papaya, white dhatura and pomegranate.

These natural catalysts, protections and treatments ensure the quality of the soil, underground water and the crops. Preventing any deterioration or pollution of the environment and maintaining the productivity at a very good level on the long term, natural farming can thus be equated with sustainable agriculture. Organic food means the food cultivated without the use of chemicals either pesticide, fertilizers or of any kind, but the fertilization is achieved with maintaining soil fertility and balance. Even the land used for cultivation of organic food must be free from such chemicals for minimum about 3 years. We are nurturing crops, plants and trees by creating optimum growing conditions, greatly lessen the chance of crop damage caused by pests.

Codex Alimentarius Commission, a joint body of world health organization [WHO] defines organic agriculture as holistic food production management system, which promotes and enhances agro ecosystem health, including biodiversity, biological cycles and soil biological activity. It emphasize the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adopted systems. This is accomplished by using agronomic, biological and mechanical methods wherever possible, as opposed to using synthetic materials, to fulfill any specific function within the system.

The present area under organic cultivation in world is estimated to 37.2 mha spread over 141 countries. India exports 175 organic products under 18 categories. According to national programme for organic products in 2007-2008, cotton was the major product exported from India in the form of textile under the brand “made from certified organic cotton” which contributes 43 percent of total volume of organic exports followed by basmati rice (15%), honey (11%) and tea (8%). The export of Indian organic product was 0.06 metric ton during 2009-2010. India ranks first in terms of number of organic products and seventh in terms of organic farming area in the year 2009 with 1.18 metric ton (FiBL, IFOAM AND SOEL, 2011).

India ranks 33rd in terms of total land under organic cultivation and 88th position for agriculture land under organic crops to total farming area. The cultivated area under land certification is around 4.43 mha (2010-2011). As per report, there were around 1.6 million organic producers reported to be

spread across the world in 2010. Among the organic products exported from India in 2010, cotton (10,887 ton) tops the list followed by basmati rice (5250 tons), processed foods (1834 tons), sesame (1396 tons), spices (1182 tons) and medicinal & herbal plants (1686 tons) (Survey report, 2012). Indian agriculture as a whole accounts for around 160 mha of land, of which land under certified organic production is negligible with the share of being just around 0.0015 percent of total area.

International certifiers for organic products are INDOCERT, SGS India private ltd., SKAL, USOCA, NOCA, BVQI, One cert Asia Agric. certification private ltd., Natural organic certification Association, Pune and Lacon, ICEA, IMO etc. The global market for organic food reached US$ 59 billion in the year 2010 expanding over three folds since 2000 (US$ 17.9 billion). Globally, 61 standards are available for organic products. In India there are 11 certification agencies with national accreditation board. IMO (Netherland), SGA (Switzerland) and LACON (Germany) are some of the international agencies. The total number of certification organizations in the world is 468. The total cultivated area under certification process in India during 2009-2010 was 4.54 mha (FiBL-IFOAM Survey 2012).

Organic inputs

In promotion of organic farming, use of organic inputs has assumed an important position. Contrary to conventional farming where synthetic inputs are used to feed the crop and protect the crop by direct action, while in organic farming, organic inputs are used to feed the soil and to create an environment which can collectively keep the pests below economical threshold limit (ETL). In this endeavour, although quantity may not be an important issue, but quality of input is of prime importance. In the recent years efforts have been made to promote appropriate production methods among farmers for effective conversion of organic waste into nutrient rich compost and for preparing botanical extracts for pest management. Mass adoption of vermi-compost technology and use of neem seed kernel sprays by farmers is an indicative of the usefulness of such strategy.

The awareness of organic matter and concept of sustainable agriculture is gaining impetus among our farmers in recent years to produce good quality consumable agricultural produce. In this context, recycling of available bio-wastes of different sources is helpful and can reduce the environmental pollution. Vermi composting is an important component of organic farming without much financial involvement, which can convert rural and urban bio-wastes into nutrient rich organic manures. Vermi composting through organic farming is the pathway that leads us to live in harmony with nature. Vermi composting is the secure system for agriculture. Use of this vermi composting with increased efficiency by developing various methods which do not change the originality of the process, i.e. use of earthworms for sustainable and secure system, should be adopted. Several reasons have been emphasized for the need of organic agriculture including vermi composting, like limited land holdings, poor socio-economic condition of farmers and rise in input cost. The broadest view shows two major reasons *viz.,* population and environment, emphasized the ultimate need for eco-friendly technologies through vermi composting.

In the past ten years these agencies in India have prompted farmers and institutions to switch from conventional chemicals to the organic fertilizers and vermi compost. Noted for its ability to increase organic matter and trace minerals in soil, vermi culture has been the primary focus in India. In 1985 a small plant was established to manufacture vermi compost from agricultural waste. Those involved in it believed that a successful commercial venture based on regenerative principles might convince others to adapt sustainable practices. Farmers have reduced their use of chemical fertilizers by 90 percent by using vermi compost as a soil amendment for growing grapes, pomegranates and bananas. Similar work is underway on mangoes, cashews, coconuts, oranges, limes, strawberries and various vegetable crops.

Production of organic inputs

Production of organic inputs like farm yard manure, sheep manure, goat manure, oilseed cake manure, and vermi-compost. Vermi compost production involves less investment. In one gunta of land (1/40 acre), we can produce 14 to 15 tons of vermi compost. It costs Rs.1000 to 2000 per ton. Presently, the market value of vermi compost is around Rs.2500 to 4000 per ton, which means that one gunta of land, can fetch a return of Rs.30,000 to 60,000 per year. In addition, 50 to 100 Kg of earthworms can be sold per gunta of land at Rs.200 to 250 per kg. This can yield an additional income of Rs.10,000 to 20,000 per gunta.

Farm yard manure also involves less investment. It costs around Rs.800 for production of one ton FYM. Presently the market value of farm yard manure is around Rs.1500 per tractor load. Sheep

manure involves an investment of around Rs.1200 per ton. The market value of sheep manure is around Rs.2000 to 2500 per ton. Goat manure production costs around Rs.1500 per ton. The market value of goat manure is around Rs.2250 per ton. Poultry manure production costs around Rs.1500 per ton. The market value of poultry manure is around Rs.3000.

Jeevamrutha production costs around Rs.50 per litre. The market value of Jeevamrutha is around Rs.75. Beejamruta production costs around Rs.40 per litre. The market value of Beejamruta is around Rs.75. Oil cake manure production costs around Rs.1800 per ton. The market value of oil cake manure is around Rs.2500 per ton.

Marketing of organic inputs

The production and marketing of organic inputs and its application to the crops has been assuming increasing importance in present day when the problems like degradation, loss of soil fertility and rising cost of chemical fertilizers are besetting the farm sector. Though all the three aspects mentioned above are of paramount significance, much of the work done on vermi composting relates to the production of this organic input and its effect on crop productivity, to the exclusion of economics involved in vermi compost production and its application to the crops. Further, farmers in general produce vermi compost primarily for the use of their own land. Though the sale of this organic input to the fellow farmers and certain organizations can be seen in a few instances, its marketing on commercial scale is rare. The marketing of organic inputs are like farm yard manure, sheep manure, goat manure and vermi compost.

In the green revolution areas (irrigated lands and well endowed water regions), conversion to organic agriculture usually leads to almost identical yield. In traditional rainfed agriculture (with low external inputs), organic agriculture has shown the potentials to increase the yield. A number of studies have shown that under drought conditions, crops in organic agriculture systems produce significant and sustainable higher yields than comparable conventional agricultural crops, often out yielding conventional crops. The impact of organic agriculture on natural resources favors interactions within the agro-ecosystem those are vital for both agricultural production and nature conservation.

There is no adequate information available on practices as well as production of different organic inputs being followed by organic farmers in Dharwad district. None of the previous studies have reported about production and practices of different organic inputs being followed by organic farmers. There is a need of proper study on cost and returns involved in organic input production. This detailed study also emphasize on problems encountered by organic farmers in marketing of organic inputs. Keeping this in view, following objectives were considered.

Specific objectives

1. To identify and document the organic inputs produced in Dharwad district.
2. To estimate the demand for selected organic inputs in the study area.
3. To analyze the cost and returns in the production of organic inputs.
4. To study the marketing management of major organic inputs in the district.
5. To identify the problems in marketing of organic inputs and to suggest an appropriate policy measures.

REVIEW OF LITERATURE

Farmers are facing problems like land degradation, loss of soil fertility, heavy price of chemical fertilizers and food adulteration because of use of chemical fertilizers. To overcome these problems, the concept of sustainable agriculture and organic farming has gained importance in recent years among the farming community to produce good quality agriculture produce. Use of different organic inputs like vermi compost, farm yard manure, goat manure, sheep manure, oilcake manure, poultry manure, Beejamruta, Jeevamrutha, panchagavya, green leaf manure, pig manure have shown an improved yield and its attributes in different crops and thus became an common practice among farmers nowadays. Production cost of organic inputs is lower compared to chemical fertilizers production because of recycling agriculture and agro-industrial wastes and it also improves soil fertility and quality of the produce. As such, the literature reviewed for the present work consists primarily of the studies conducted on marketing management and production of organic inputs.

The review of literature is presented under the following heads.

2.1 Production of organic inputs and its economics

2.2 Marketing management of organic inputs

2.3 Constraints in marketing of organic inputs

2.1 Production of organic inputs and its economics

Mitchell and Edwards (1997) studied production of *Siena fetida* and vermi compost from feed-lot cattle manure. Significant reductions in total mass of feedlot cattle manure were obtained by the intensive activity of the earth worms. The process yielded two products: residual vermi compost and an increase in earth worm biomass. Different methods of manure application were made to a prepared bedding (or support material), the most successful being a surface (vertical) application which resulted in a reduction of 30 percent of the initial manure (dry mass) and the production of live earth worms to 4.95 kg of the initial manure mass (dry weight). The increase in earthworm biomass represented extraction of 7, 18, 7 and 2 percent of initial total C, N, S and P respectively from the manure.

Sunitha *et al.* (1997b) examined the effect of mulches on the activity of earthworm, *Eudrilus eugeniae* (Kinberg) and vermi compost production in black and red soils. Field trials were conducted at two locations at the Main Research Station, UAS, Dharwad during Oct-Dec (1994). Earthworms were more effective in the presence of thick mulch cover compared to composting beds with no mulching. Among the various mulches tried, sugarcane was excellent mulch with highest population growth (2188.6 and 1904.8 kg) and biomass production (2333.10 and 2748.40 kg) and vermi compost production (51.11 and 41.40 kg) in black and red soil profiles respectively. Paddy straw and gunny cloth as mulch covers proved to be the next significantly less production of vermi compost (8.90 and 6.10 kg) in composting beds without mulch.

Sunitha *et al.* (1997a) attempted evaluation of methods of vermi composting under open field conditions. This study, conducted during Oct-Dec (winter) 1994, aimed to evaluate methods of vermi composting under open field conditions. Of the two methods evaluated, the heap system was a better method for biodegradation of wastes than the pit method. The heap recorded higher population growth with a 20.37-20.86 fold increase in *Eudrilus eugeniae* as compared to 16.64-17.79 fold with the pit method. Biomass production was also significantly higher (44.76-47.33 fold) in the heap than the pit (31.33-31.70 fold). The consequent production of vermi compost was also higher in the heap (49.50-51.40 kg) as against 37.54-41.30 kg in the pit.

Chowdappa *et al.* (1999) studied efficient recycling of organic wastes in arecanut (*Areca catechu*) and cocoa (*Theobroma cacao*) plantations through vermi composting. The possibility of converting available organic wastes in arecanut and cocoa gardens into vermi compost by using African night crawler (*Eudrilus eugeniae*) was studied during 1994-95. The results indicated that the organic wastes could be efficiently converted into vermi compost with a recovery of 74.65-87.75 percent in a composting period of 3 months. Vermi compost had lower C:N ratio and pH than normal compost irrespective of the source of organic waste. The microbial population was considerably higher in vermi compost than in normal compost. Economics of vermi compost production revealed that the profit of Rs 1.51-1.69 could be realized from 1kg compost. The estimated cost of commercial

vermi compost production showed that a profit of Rs 11,114 could be obtained from vermi composting the organic wastes from 1 ha of arecanut plantation.

Giraddi (2000) studied the influence of vermi composting methods and season on the biodegradation of organic wastes. An experiment was conducted during 1997-98 at UAS Dharwad to study the effect of vermi composting and season on the biodegradation of organic wastes. Organic wastes chiefly comprising agricultural wastes were effectively degraded using earthworms (*Eudrilus eugeniae*) in field pits (10m x 1m x 0.3-0.6m) followed by composting in above ground brick columns (3m x 1m x 0.5-1.0m) and ground heaps (5m x 1m x 0.5-1.0m), as indicated by higher worm biomass (41-42 worms/sample unit) in pits, 29–36 worms per sample pit in brick columns and 1-23 worms per sample pit in ground heaps. The biodegradation was quite efficient during rainy and winter composting as compared to summer composting. This is indicated by higher vermi compost production of 8.9 and 9.7 kg and lower amounts of undegraded wastes of 914 and 1225 kg respectively in rainy and winter composting than in summer composting (6.0 and 212 kg of vermicompost and undegraded waste, respectively).

Suresh (2001) in his study on performance of organic farming in Shimoga district of Karnataka reported that per acre net income obtained in organic farms (Rs.19,367.96) was more than inorganic farms (Rs.13691.02). This was due to 18.10 percent higher yields obtained on organic farms over the inorganic farms and the B:C ratio in case of organic method of cultivation (2.04) was noticed to be higher than inorganic method of cultivation.

Biradar *et al.* (2001) conducted a study during 1997-98 in Karnataka, to determine the effect of vermi culturing structures on large-scale production of vermi compost and biomass of *Eudrilus eugenia*. Six different structures (2 above ground structures with flat stone wall and brick wall, and 4 below-ground structures with flat stone wall, brick wall and pit lined with empty fertilizer bags and conventional pit) were constructed for the study in comparison with the heap method. Below-ground structures with stone wall and brick wall were found significantly superior in production of earthworm biomass and vermi compost. These two structures recorded relatively more benefits compared with the heap method and other structures.

Jeyabal and Kuppuswamy (2001) studied about recycling agricultural and agro-industrial wastes for the production of vermi compost. Its response was studied in a rice-legume (black gram) cropping system during 1994-96 in Tamil Nadu, India. The study showed that bio-digested slurry and weeds were found to be an ideal combination for vermi composting considering the nutrient content and compost maturity period. The study showed that the integrated application of vermi compost, fertilizer N and bio-fertilizers increased rice yield by 15.9 percent over application with fertilizer N alone. The integrated application of 50 percent N through vermi compost, 50 percent via fertilizer N and bio-fertilizers recorded a grain yield of 6.25 and 0.51 ton per hectare in rice and legume, respectively. These yields were 12.2 percent and 19.9 percent higher than those obtained with 100 percent fertilizer N alone. The studies indicate that integrated nutrition comprising vermi compost, fertilizers N and bio-fertilizers could be applied to rice-legume cropping system to achieve higher yields and sustain soil health.

Shweta and Sharma (2003) studied biomass and vermi compost production by the earthworm, *Lampoon mauritii*, in different organic wastes. Vermi compost was prepared from different substrates like kitchen waste, cow dung, buffalo dung, leaf litter, oil cake and agriculture waste individually or in combination utilizing indigenous earthworm, *Lampito mauritii*. The increase in biomass (in number and weight) of earthworms was recorded and cow dung had the least number of earthworms with the maximum increase in weight. The reverse trend was observed in the leaf litter. The optimum increase in both number and weight was observed in the mixed substrate with dung.

Sundar *et al. (*2004) in their study on economics of production of *Gloriosa superba* in Tamilnadu calculated the cost and returns of the production of *Gloriosa* in the study area. The unit cost of production per kg of seeds was worked out to be Rs.76.75, while the total cost was Rs.38,130.35 per hectare. Gross income realized from the production of *Gloriosa* was Rs.1,46,557 per hectare, while the gross margin was Rs.1,28,600. The profit per hectare worked out to be Rs.1,14,382.

Costa *et al.* (2005) evaluated composting process through diary temperature monitoring of piles composed of wastes from the cotton carding industry and with three kinds of inoculums. Six piles were divided in 2 treatments and each was inoculated with cattle waste diluted in water, cattle waste and rumen. In the second phase of the study, 3 piles with rumen under intensified turnings were evaluated to determine the reduction of weight and volume and the dimension of the composting

area. All the composts produced were transferred to a vermi composting area. After composting, samples were analyzed for their nutrient content. The results showed that the rumen as inoculums presented high temperature values in the initial phase and low values in the final phase although the stabilization occurred at the same time. The system with aeration allowed faster material stabilization when compared to the system without aeration. The intensification of turnings in the second phase decreased the composting time and reduced the final volume by 46 percent. The vermi compost showed higher nutrient content compared to the other composts produced.

Barik *et al.* (2005) studied the effect of different farm wastes on vermi composting. Various crop residues (paddy straw, vegetable waste, gliciridia leaves, rice bran, wheat bran, green gram haul, and gobar gas slurry and groundnut haulm) were mixed with cow dung and were used as substrates for vermi composting. The production of vermi compost was maximum with the groundnut haulm treatment (2.5 kg). This was at par with having gliciridia leaves and green gram haulm.

Reddy *et al.* (2006) conducted a study in Tiptur taluka of Tumkur district, Karnataka to workout economics of vermi compost use in coconut with a sample size of 40 vermi compost (VC) user farmers and 20 non-vermi compost user farmers. In general, VC users incurred lower expenditure on inputs especially on fertilizer and plant protection chemicals. The Cobb-Douglas production function revealed that area under the crop and plant protection chemicals were positively associated with copra output. The variable vermi compost, though not statistically significant, had positive association with the copra output. The application of VC to coconut farms resulted in many environmental benefits such as reduction in fertilizer use, plant protection chemicals and number of irrigations given to the crop. Farmers in general possessed favorable attitude towards VC use as a result of realization of positive impact on crop yields and environment. The researchers, thus, opined that it was time to popularize the use of VC in agriculture and horticulture on large scale through intensive education programmes and by other means.

Surendra (2006) analyzed the potential utilization of guar gum industrial waste in vermi compost production. The recycling of guar gum industrial waste through vermi technology was studied under laboratory conditions by using composting earthworm *Perionyx excavatus* (Perrier). Three different combinations of guar gum industrial waste, cow dung and saw dust were used in 40:30:30, 60:20:20 and 75:15:10 ratio. Maximum earthworm mortality during vermi composting was recorded with treatment while zero mortality was recorded for treatment after 150 days. Overall, treatment appeared to be an ideal combination for enhancing maximum bio-potential of earthworms in management of guar gum industrial waste as well as for earthworm biomass and cocoon production.

Biradar and Shaila (2006) studied the effect of vermi culturing structures on the biomass of *Eudrilus eugeniae* and large scale production of vermi compost in Bijapur, Karnataka, during the rainy and winter seasons. Three structures, i.e. two-tier structure installed 4 feet deep, single-tier structure installed 2 feet deep and single-tier structure installed above the ground, were evaluated against the heap method. The two-tier structure resulted in the highest mean number of earthworms during the rainy (25.8/0.5 m^3) and winter (24.2/0.5 m^3) seasons. Vermi compost production was almost the same in both seasons for the two-tier structure and single-tier structure installed below the ground (39.8 and 39.10 kg/0.5 m^3, on average). The mean percentage of food material that remained undegraded for the two seasons was lowest in the two-tier structure (26.7%) and single-tier structure installed below the ground (27.8%).

Ramamurthy *et al.* (2007) in their study conducted near Nagpur in Maharashtra reported that vermi compost application would improve the yield of citrus by 21 percent, with B:C ratio of 3.21. The adoption of vermi compost application increased from 3 percent to 28 percent over five years. Economic analysis of vermi compost production under heap system revealed that a farmer could get around Rs.46,000 net profit, besides 33 human-day's work per ha of citrus cultivation as additional employment. The rate of return of vermi compost worked out to be 2.92 for each rupee invested.

Chinnappa *et al.* (2007) analyzed economics of vermi compost production and economic gains from its application to the crops like banana, coconut, coffee, and pepper. The study was carried out in Coorg, Mysore, Hassan, Kolar, Mandya, Tumkur and Bangalore districts. The study focused on two types of vermi compost production namely, trench method and heap method with regard to the vermi compost production. The study pointed out that the average of rate of return per rupee of investment was 3.01 and 2.04 respectively.

Adhikari (2009) conducted a study on economics of organic V/s inorganic carrot production in Nepal. The study was based on primary source of information from 34 farmers (17 organic and 17 inorganic) collected by using pre-tested interview schedule, applying face-to-face interview method.

The analytical tools used were microsoft excel and Statistical Package for Social Science (SPSS). The study revealed that total cost of organic carrot production was Rs.90,406.84, whereas Rs.94,855.73 for inorganic. The gross margin was Rs.1,37,425.92 and Rs.1,36,527.84 from organic and inorganic carrot production respectively. The B:C ratio was found to be 1.52 and 1.44 from organic and inorganic carrot production respectively.

Ganesh (2010) in his study on economic analysis of organic farming in North Karnataka: a case study of organic villages, estimated the cost and returns in arecanut cultivation under organic and conventional practices. The total cost of arecanut cultivation was found to be Rs.86,700 per hectare and Rs.74,923 per hectare under organic and conventional farming respectively. The gross returns analyzed annually from arecanut was Rs.2,14,000 per hectare and Rs.1,80,320 per hectare respectively in organic and inorganic farms.

Singh and Grover (2011) in their study on economic viability of organic farming: An empirical experience of wheat cultivation in Punjab computed the economics of organic and inorganic wheat cultivation. The total input cost in organic wheat was Rs.7,741 per acre, whereas it was Rs.8,112 per acre in inorganic wheat cultivation. The gross returns were Rs.29,830 per acre and Rs.24,685 per acre from organic and inorganic wheat cultivation respectively.

Banerjee (2012) in his working paper estimated the cost and returns of organic and inorganic banana cultivation. The total cost of cultivation was Rs.39,750 per hectare and Rs.56,300 per hectare under organic and inorganic respectively. The yield observed were 60,000 kg and 70,000 kg respectively for organic and inorganic. The gross profit estimated were Rs.3,90,250 per hectare and Rs.2,93,700 per hectare respectively.

Anonymous (2012) in his study “Model Bankable Scheme for Organic Cultivation of Basmati Rice” estimated the cost and returns of organic basmati rice cultivation. The total cost of cultivation of organic basmati rice was Rs.40,200 per hectare. Returns were estimated to be around Rs. 49,580 per hectare.

2.2 Marketing management of organic inputs

Singh (1999) revealed the issue of rural marketing in India, from a development perspective. The nature of three input markets (seeds, fertilizers and pesticides) is examined to arrive at the marketing mix problems and the issues. Strategies are discussed for specific input marketing as well as rural marketing in general. The identification of problems in product usage and efficiency is one of the major steps involved in better marketing management. Agri-business firms have not been proactive in this area until recently, as markets were regulated; not very competitive and input usage levels were relatively low. However, the intensification of farm production is expected to increase due to new technologies, investment and market opportunities. This will create additional opportunities and problems for input firms as they will have to deal with the problems of sustainability of production systems. This will require better business management as well as ethical and sincere partnerships with farmers.

Singh (2000) studied the status of fertilizer marketing system in India and examined its potential improvement. The study focused mainly on sources and location of fertilizer supply; distribution channels; fertilizer use promotion; extent of fertilizer use and output performance; sources of information on fertilizer practices and fertilizer purchase behavior of farmers; efficiency of marketing systems and problems experienced by the farmers in acquiring fertilizers. It discussed important issues about the next stage of development of the fertilizer market. The basic circumstances which affect the growth of fertilizer use have changed and new challenges are emerging. The new developments which are a result of new economic environment require a new orientation of efforts and policies.

Mittal and Sudhakar (2000) argued that the potential of information technology was yet to be fully tapped in input marketing activity, not withstanding the need for quality information for decision making. This evaluates the possibilities of improving the efficiency and effectiveness of marketing operations with a well conceived information technology deployment. The paper also outlines the emerging business environment with the passing of the Indian Information Technology Act, 2000 and the consequent prospects for fertilizer marketing operations.

Chinnappa (2001) conducted a study “Price spread analysis in arecanut marketing” in Southern transition zone of Karnataka with a sample size of 80 farmers through well designed schedule by personal interview method. He identified three major channels through which arecanut

passes to ultimate consumer *viz. (*I) Grower – Pre-harvest Contractor – Commsion agents – Traders – Retailers – Consumers (II) Grower – Commsion agents – Traders – Retailers – Consumers (III) Grower – Cooperative marketing societies – Traders – Retailers – Consumers.

The total price paid was found to be 3929.07, 2540.28 and 2298.56 rupees per quintal in Channel-I, II, and III respectively. The producers share in consumers rupee was found to be highest in Channel-III (85.63 percent) and lowest in Channel-I (75.44 percent), whereas it was 84.12 percent in case of Channel-II.

Sundaravaradarajan and Jagmohan (2003) studied the marketing cost, margin, price spread and marketing channels of cashew in Tamilnadu and observed following four different marketing channels of cashew *viz.* (1) Farmer – village trader – wholesaler – processor – trader (2) Farmer – Co-operative marketing society (3) Farmer – Commission agent – wholesaler – processor (4) Farmer – Processor. A majority of the farmers (60 percent) adopted channel-1 followed by channel-2 (26.25 percent), channel 3 (10 percent) and channel-4 (3.75 percent).

Deorukhakar *et al. (*2005) in their study on marketing of arecanut in Ratnagiri district of Maharashtra identified two major channels of marketing of arecanut in the study area *viz. (*I) Producer – Commission agent cum wholesaler – Retailer – Consumer (II) Producer – Village merchant – Commission agent cum wholesaler – Retailer – Consumer. Eighty percent of the farmers surveyed sold their produce through channel-I, whereas remaining 20 percent of the farmer used channel-II to sell their produce. The quantity sold through channel-I was found to be 83.18 percent and remaining 16.82 percent of the produce was sold through channel-II.

Sundar *et al* (2005) in their study related to price spread analysis on marketing of *Gloriosa superba* in Tamil Nadu identified two marketing channels in the study area *viz. (*I) Producer – Village Merchant – Exporter – Importer in distant market and (II) Producer – Commission agent cum traders – exporter – importers in distant Market. About 75 percent of the farmers sold their produce through channel-I and remaining 25 percent farmers used channel-II to sell their produce. The quantity sold through channel-I was 70.13 percent of the total and remaining 29.87 percent of the produce sold through channel-II. The total prices spread in channel-I was Rs.175.96 per kg which was 37.04 percent, whereas it was Rs.176.10 per kg (37.07 percent) in case of channel-II.

Talathi *et al.* (2005) conducted a study on economics of marketing of sapota in Konkan region. They reported that commodity passes through four different channels of trade *viz.* (I) Producers – Fruit merchants – Commission agents – Retailers – Consumers (II) Producer – Commission agents – Retailers – Consumer (III) Producers – Co-operative society – Commission agents – Retailers – Consumers (IV) Producers – Fruit merchants – Hawkers – Consumers. The producers share in consumers rupee was highest (34.40 percent) in channel-II and it was lowest (28.39 percent) in channel-I. It was 32.23 and 31.61 percent in channel-II and IV respectively.

Chinnappa *et al*. (2007) in their study conducted in six districts of Karnataka state observed that a majority of vermi compost producers used it only on their farms and just 16 percent of them sold the compost to other farmers.

Ajjan *et al.* (2008) studied the economics of cultivation of *Gloriosa* in Tamilnadu in which they identified two major channels under which *Gloriosa* was marketed by the farmers. *viz.* (I) Cultivators – Pre harvest contractors – Exporters and (II) Cultivators – Traders – Exporters. The study revealed that Channel-I was the most commonly practiced channel in the study area with respect with *Gloriosa* as more than 80 percent of the cultivators were marketing their produce through this channel.

Sreenivasa Murthy *et al*. (2009) conducted a study on marketing and post-harvest losses in fruits: its implication on availability and economy. They observed eight channels of marketing of mango of which four major channels together accounted for more than 85 percent of the trade. The identified channels of marketing of mango are (1) Farmers – PHC – Wholesaler (Distant) – Retailer – Consumer (2) Farmers – PHC – Wholesaler (Local) – Wholesaler (Distant) – Consumer (3) Farmers – PHC – Wholesaler (Local) – Retailer – Consumer (4) Farmers – Wholesaler (Distant) – Retailer – Consumer. They also calculated the marketing cost and marketing efficiency (ratio) for channel-3 which were Rs.2944 per ton and 0.85 respectively.

They also identified three channels of marketing of pomegranate which are (1) Producer – Contractor – Wholesaler/CA – Retailer – Consumer (2) Producer – Wholesaler/CA (distant market) – Retailer – Consumer (3) Producer – PHC – Wholesaler/CA (distant market) – Retailer – Consumer. The

marketing cost and marketing efficiency (ratio) for channel-2 were Rs.5664 per ton and 1.01 respectively.

Naik *et al.* (2010) studied on comparative economics of organic and inorganic cultivation of tomatoes in Karnataka. They observed that per acre average yield of organic tomatoes was 5.81 ton as against 6.95 tons in inorganic tomatoes. The per ton market price for organic & inorganic tomatoes were Rs.9550 & Rs.6850 respectively. The transportation cost for organic tomatoes was Rs.2562 per acre as against Rs.2756.64 for inorganic tomatoes. The per acre commission charges for organic & inorganic tomatoes were Rs.3620.63 & Rs.3478.93 respectively. The gross returns of organic tomatoes were Rs.55989 per acre as against Rs.47012.62 for inorganic tomatoes. The net returns of organic tomatoes Rs.62,171.71 were higher than that of inorganic tomatoes Rs.60, 098.19.

Bhat *et al.* (2011) conducted a study on economic appraisal of kinnow production and its marketing under North-western Himalayan Region of Jammu. A multi-stage sampling was adopted for the selection districts, block, villages and kinnow growers. They surveyed 108 kinnow growers through personal interview method, using well-designed and pre-tested schedules. They identified four important channels in kinnow marketing namely (I) Producer – Forwarding/commission agent – Retailer – Consumer (II) Producer – Wholesaler – Retailer – Consumer (III) Producer – Retailer – Consumer (IV) Producer – Consumer. The results for the price spread of kinnow under the above mentioned marketing channels in the Jammu region indicated that producers share in consumers rupee was highest in channel-IV (81 percent), followed by channel-III (59 percent), channel-I (50 percent) and channel-II (45 percent), which revealed that direct sale in local market provided higher share to producer in consumers rupee.

Malave *et al.* (2012) conducted a study on economics of marketing of raw cashewnut in the Konkan region of Maharashtra in which they studied the various channels of marketing of raw cashewnuts. Five marketing channels were observed in the study area for marketing of raw cashewnuts *viz. (*I) Grower – Village merchant – Wholesaler – Processor (II) Grower – Itinerant merchant/village merchant – Processor (III) Grower – Village merchant – Factory agent – Processor (IV) Grower – Wholesaler– Processor (V) Grower – Processor (Direct sale). Channel-I was most popular in the study area as 27 growers (45 percent) sold their 22.13 percent produce through this channel followed by Channel-II, Channel-IV, Channel-V and Channel-III with 12 growers (20 percent), 10 growers (16.67 percent), 6 growers (10 percent) and 5 growers (8.33 percent) respectively. The study also revealed that the marketing efficiency was much higher in channel-V (1:76.56). The higher marketing margin in channel IV, III, II, and I resulted into poor efficiency of 1:4.72, 1:4.12, 1:3.97 and 1:3.69 respectively.

2.3 Constraints in marketing of organic inputs

Sagar (2001) documented the problems of large mushroom growers, which included lack of good quality spawn, uncertain mushroom price and lack of common facility for storage of fresh mushrooms. The problems pertaining to small and marginal mushroom growers were non availability of requisite inputs, complex process of obtaining loan/finance, lack of low cost mushroom, farm design and lack of training facilities.

Thimmareddy (2001) reported that, the majority of the farmers (70 percent) of North Karnataka expressed the problem of no separate market for organically grown produce, followed by 40 percent of the respondents expressed the problem of decline in returns in the initial period (3-4 years) of organic farming. Similarly, the labour problem was expressed by 30 percent of the respondents whereas 20 percent of the respondents expressed the problem of non-availability of organic pesticides and lack of published literature on organic farming and a less percent (10 percent) of respondents expressed the problem of non availability of good quality compost, no support and encouragement from sugarcane factory management to produce sugarcane by organic methods, no remunerative price for organic produce and discouragement by people in continued adoption of organic cultivation.

Mali *et al.* (2001) studied economics of production and marketing of banana in Jalgaon district of Maharashtra. The study identified that high cost of transportation, non-availability of sufficient credit by the institutions in time, high price fluctuations, the problem of cheating in weighing of produce and lack of suitable grading of the produce according to quality as main problems in production and marketing of banana.

Jayaratnam (2002), studied farmers market in Tamilnadu and reported strength of Rhythu bazaar as function from 5 am to 5 pm every day with long working hours, government support is

extended in terms of construction of the shops, free supply of the weighing machines, free transport of the vegetables to the farmers market in the selected state run buses, fresh vegetables are weighed correctly and are available at lower prices (15% less than retail shop prices) for the consumers. They also reported the opportunities of the farmers market as, the spirit of co-operation and togetherness has emerged among the growers resulting in the collective responsibility. It was also observed that the vegetable growers are willing to contribute in the form of entry fee to sustain and improve the present marketing system.

Sunil (2011) in a study conducted on tomato growers of Belgaum district in Karnataka reported that, majority of respondents (75.83 percent) faced the problem of technical knowledge, whereas 65 percent of the respondents expressed the problem of high fluctuation in market price, followed by high transportation cost (62.53 percent), labour shortage and high wages (55.83 percent) and lack of irrigation facilities and power shortage (46.66 percent).

Sundar *et al.* (2004) in their study on economics of production of *Gloriosa superba* in Tamilnadu identified and ranked the constraints in *Gloriosa* cultivation in the study area. Price fluctuations, shortage of labour, requirement of more skill, requirement of more care, large investment on pendal erection and seed material, allergic problems to human beings and wastage of tubers at planting were the identified constraints in rank-wise.

Deorukhakar *et al.* (2005) in their study on marketing of arecanut in Ratnagiri district of Maharashtra identified the constraints in the production and marketing of arecanut in the study area. Under production constraints, water scarcity during summer season (33.33 percent), non-availability of agro-chemicals in villages (32.22 percent) and non-availability of credit from commercial banks (28.89 percent) were found to be major. Under the marketing constraints payment recovery took long period (20 percent) and monopoly of village merchants (12.22 percent) were identified as the major constraints.

Baghel *et al.* (2005) reported that the major problems encountered by farmers in adopting vermi compost technology were: attack by ants, shortage of water, storage problems and marketing problems which were experienced by 39, 13.5, 13.5 and 79% of the respondents interviewed respectively.

Venkataram and Mani (2006) studied the prospects and constraints in adoption of organic farming in Tamilnadu. The study revealed that the major obstacles in practicing pure organic agriculture have been identified as limited technological options, large marginal costs and risk in shifting to a new system from the conventional farming, low awareness about the organic farming system, lack of marketing and technical infrastructure and added cost by way of inspection and certification.

Bala *et al.* (2006) conducted a study on marketing system for apple in hills: problems and prospects (A case study of Kullu district, Himachal Pradesh). They surveyed 120 apple growers and identified many constraints faced by the growers such as lack of road facility, inadequate storage facility, delayed payment and lack of market intelligence.

Kaur *et al.* (2006) conducted a study in Punjab of India to ascertain the problems associated with organic farming. Several respondents wanted to discontinue organic farming due to non-availability of vermi compost, weed problem, lack of training and lack of specific bio-fertilizers for specific crops. On the contrary, lack of awareness regarding organic farming and breaching of agreements by the farmers were the problems faced by the firms.

Kumar *et al.* (2006) opined that the ultimate objective of generation of any technology, particularly in the field of agriculture was its speedy diffusion and quicker adoption by the farmers at large. But a number of constraints might be responsible for slowing down the rate of adoption. In the present study, the most important constraint in adoption of banana production technology was lack of knowledge about banana production technology. The other major constraints found in the order of importance were low profit due to high cost of cultivation and high price of chemicals for plant protection.

Hendge *et al.* (2007) conducted a study to determine the constraints encountered by banana growers in Nanded District, Marathwada region of Maharashtra. It was recorded that 97.50 percent growers observed the fluctuations in selling price of bananas, 96.66 percent growers stated that there were less cooperatives helping out in marketing of bananas. Further, 80.33 percent of the growers said that inorganic fertilizers were costly, 75 percent growers reported problem of extortion by

middlemen, 68.33 percent growers stated unavailability of labour at proper time, 53.33 percent growers expressed problems on lack of improved implements, 51.66 percent growers experienced lack of guidance, and 50.83 percent grower reported the lack of information regarding improved practices. Moreover, less-pressing constraints were also reported by the growers, including: lack of knowledge on disease control (35 percent), high cost of suckers (30 percent), and inadequate water supply (4.16 percent).

Mathew (2007) studied an overview of the Indian coconut industry and explained the root cause of the current production crisis. It was indicated that the biggest obstacle to the competitiveness of India's coconut sector was the low rate of returns from the coconut holdings and the reduced input-output realization especially in the traditional coconut growing states. Measures to revitalize the industry were also explored.

Pandit *et al.* (2007) conducted a study on adoption and constraints of mulberry sericulture. Adoption of different practices of mulberry cultivation and silkworm rearing were studied along with constraints faced by the sericulture farmers in three traditional sericulture districts of West Bengal. Majority of the farmers were found to be medium level adopter both in mulberry cultivation (45.83 percent) as well as in silkworm rearing (68.75 percent). The sericulture farmers reported that the major constraints were lack of government-regulated market, economic motivation, awareness, and timely extension support, high gestation period, and unavailability of planting materials.

Latha *et al.* (2007) studied the constraints in adoption of recommended IPM practices by trained farmers of cotton. A total of 60 cotton farmers from Kurnool district, Andhra Pradesh, who were trained on integrated pest management (IPM) were asked about the constraints in their adoption of IPM practices. High costs of inputs was perceived by most of the farmers as a problem, followed by lack of awareness on advanced IPM practices and difficulty in implementing biological control methods. Suggestions were given by the farmers on how to overcome the problems.

Singh *et al.* (2007) conducted a study to identify the constraints in adoption of improved farm implements in four selected villages in Bundelkand region of Jhansi, Uttar Pradesh. Fourteen constraints were identified for non-adoption of farm implements, *viz.,* lack of technical guidance, lack of knowledge, lack of resources to purchase the implements, non-availability of implements and tools, higher cost, complicacy of practices and more labour availability in the villages. The results revealed that the first three constraints were the most prominent factors identified in adoption of improved farm machinery in the selected villages.

Ajjan *et al.* (2008) studied the problems in cultivation and marketing of *Gloriosa* in Tamilnadu. Labour problem (30 percent), high cost of cultivation involved (28 percent), pest & disease problem (22 percent) and weed problem (20 percent) were the major cultivation problems. Fluctuation in price (74 percent), no market information (20 percent), and selling only to registered contractors (6 percent) were the identified marketing problems in *Gloriosa* cultivation.

Naphade and Tingre (2008) conducted a study in Buldhana district of Maharashtra to find out the problems faced by the guava growers. The major problems faced by the growers were lack of market information (40 percent), high market commission (38.33 percent), lack of appropriate grader (36.67 percent), lack of processing units, lack of storage facility and high transportation cost etc.

Patil (2008) studied the production and marketing management behavior of organic vegetable growers in Belgaum district, Karnataka. The study revealed that all the respondents expressed that problems of non-availability of labour and lack of research support for traditional organic practices, fluctuation in prices of the commodities, lack of minimum support price and inaccurate weighing instruments used by vegetable venders were most prominent, while majority of them expressed the need for fixing profitable minimum support price for organic produce (77.14 percent) and establishing separate market for the sale of organic produce (72.14 percent).

Kerutagi *et al.* (2009) conducted a study in Belgaum and Dharwad district of Northern Karnataka to identify the constraints in sapota marketing. The study revealed that the major problems in sapota marketing expressed by the farmers were lack of storage facility (94.44 percent), collection of higher commission charges (83.33 percent), higher transportation cost due to lack of markets and non-availability of proper market information.

Tamil Selvan *et al.* (2009) conducted a study on pepper production prospects in 2009-10. They conducted the survey in the major pepper growing tracts of Karnataka, Kerala and Tamilnadu using a pre-designed interview schedule through personal interview. They identified six major

constraints in the production of pepper in Kerala as unstable market prices; disease affecting vines and pest affecting standards; vagaries of nature like drought, heavy rainfall affecting the crop time to time; low coverage of high yielding varieties; non-availability of labour for the cultural operations in pepper plantations and better prices of other agriculture commodities like rubber leading to conversion of pepper area.

Rao *et al.* (2011) conducted a study on problems faced by farmers and traders of saffron and other spices in Jammu and Kashmir. They identified production of quality planting materials, post-harvest management, quality standards, domestic price and marketing problems as the constraints for reduction in area and production of saffron.

Shukla *et al.* (2011) conducted a study on market behavior of chilli growers in Jaipur district of Rajasthan. They surveyed 120 chilli growers through personal interview method using structured interview schedule. The study revealed the constraints faced in production and marketing of chilli growers. The production constraints were high cost of fertilizers (98.33 percent), problems of pest (83.33 percent) problems of diseases (84.16 percent), high cost of plant protection chemicals (41.66 percent) and limited and irregular power supply (39.16 percent). The marketing constraints were fluctuation in price (84.16 percent), exploitation by middleman (75 per cent) and poor transportation facilities (83.33 percent).

Kumar *et al.* (2011) conducted a study on economic analysis of menthol mint cultivation in Barabanki district of Uttar Pradesh. They surveyed 60 farmers through personal interview method using a pre-tested questionnaire. The study identified the major constraints faced by the mint growers as high input cost (85 percent), erratic supply of electricity (80 percent), lack of adequate market information (80 percent), infrastructural facilities, regulated markets (98 percent) and energy efficient distillation units (75 percent).

METHODOLOGY

This chapter deals with the description of the study area, sampling procedure adopted, methods of data collection, nature and sources of data used and the statistical tools and techniques employed for analyzing the data. The methodology is presented under the following major heads.

3.1 Description of the study area

3.2 Sampling procedure

3.3 Nature and sources of data

3.4 Analytical techniques

3.5 Definition of terms and concepts used

3.1 Description of the study area

The present study was undertaken in Dharwad district of Karnataka state during the agricultural year 2012-13. Karnataka is the eighth largest state in India with an area of 190 lakh ha. It is situated between $11^0$5' and $18^0$45' North latitude and between $74^0$12' and $78^0$40' East longitude in the Southern plateau. The state receives the average rainfall of about 1,139 mm both from South-West and North-East monsoons. The temperature ranges from 14^0C to 40^0C. The important crops grown in the state are jowar, paddy, ragi, maize and wheat among cereals; redgram, bengalgram, greengram among pulses; groundnut, sunflower and safflower among oilseeds crops; cotton, chilli, sugarcane, soybean and tobacco among commercial crops; mango, sapota and banana among fruit crops and coconut, arecanut and coffee among plantations crops.

3.1.1 Location

Dharwad district is situated in Northern part of the Karnataka (Fig. 1). It lies between $15^0$15' to $15^0$35' North latitude and between 75^0 to $75^0$20' East longitudes. The district is bound by Belgaum, Haveri, Gadag and Uttar Kannada districts in North, South, East and West respectively. The district is divided into three belts geographically as malanad, transition and dry regions. Dharwad district (Fig. 2) comprises of 14 hoblies. Among these, 4 hoblies are included in Dharwad taluk, 3 in Kalaghatagi, 3 in Hubli and 2 hoblies each included in Kundagol and Navalgund taluks.

3.1.2 Geographic and demographic features

Geographic and demographic features of Dharwad district are presented in Table 3.1. The total geographical area of the district is 4,27,329 ha. Hubli and Navalgund taluks have an area of 1,032 and 682 Km^2. The district consists of 372 villages, while Hubli and Navalgund taluks consist of 101 and 58 villages respectively. The total population of Dharwad district was 16,04,253 and that of Hubli and Navalgund taluk were 2,18,961 and 1,37,016 respectively. The density of population in Dharwad district was 377 per Km^2 and that in Hubli and Navalgund taluks was 219 and 163 per Km^2. The district as well as the taluks under consideration is having a good network of roads, communication facilities, markets etc, which is indicative of good infrastructural facilities in the sample taluks. Both poultry and dairy occupy an important place in agrarian economy as these activities are considered as major source of income.

3.1.3 Climate, rainfall and soil type

The South-West monsoon is the most crucial for Dharwad district. The district gets an annual average rainfall of 772 mm, as against 419 and 470 mm for Hubli and Navalgund taluks which falls under transition zone. The soils of the district are mostly black, deep black and red sandy loam. Similar types of soil are found in Hubli and Navalgund taluks, which comprise red and medium black soils. The major part of soil comprised deep black cotton soil which is moderately rich in nutrients.

3.1.4 Cropping pattern

The oilseed, cotton and other non-food crops accounted for 40.85 percent followed by cereals which accounted for 37.60 percent of the cropped area in Dharwad district. Taluk specific data shows that hubli taluk accounts for 39.72 percent of the area under cereals where as navalgund taluk accounted for 17.20 percent as shown in Table 3.2.

Fig 1: Map of Karnataka state showing Dharwad district

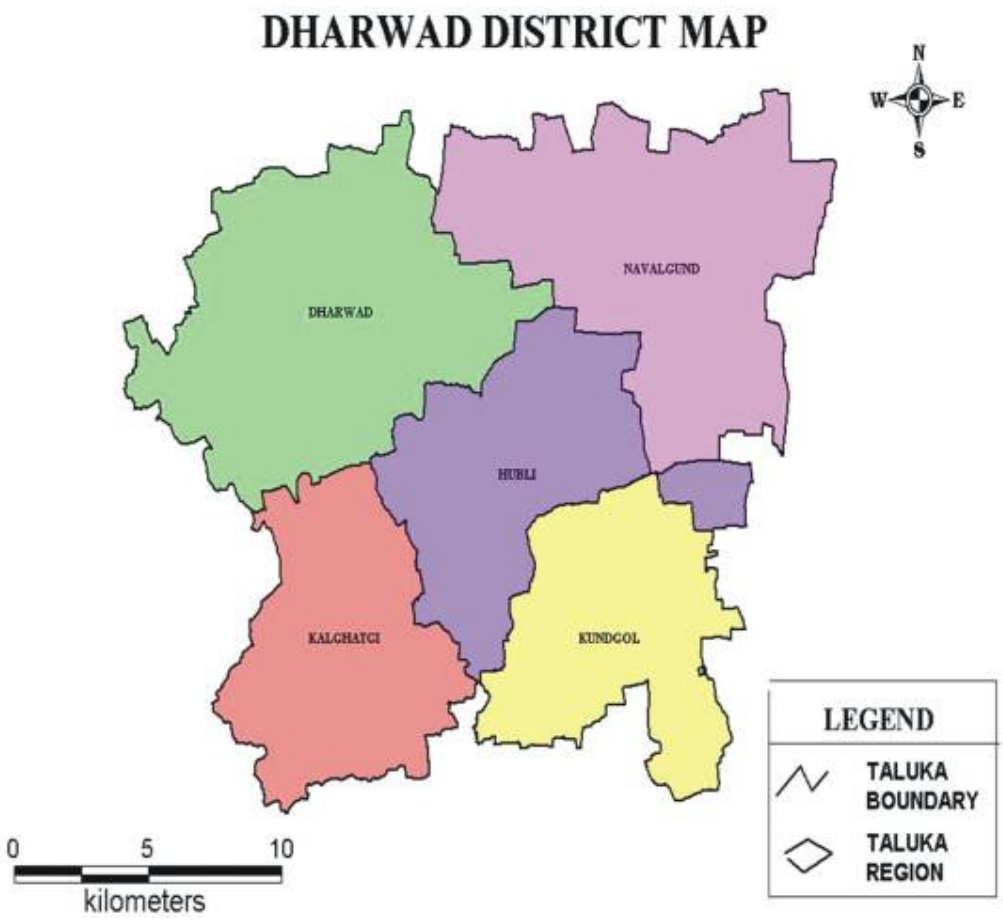


Fig 2: Map of Dharwad district

Table 3.1: Salient features of the study area and the sample taluks

Sl. no.	Particulars	Dharwad district	Hubli taluk	Navalgund taluk
1	Geographical area (ha)	427329	53894 (12.61)	34378 (8.04)
2	Number of villages	372	101 (27.15)	58 (15.59)
3	Area not available for cultivation (ha)	25732	4594 (17.85)	2317 (9.00)
4	Other uncultivated land	6402	1745 (27.26)	747 (11.67)
5	Net sown area (ha)	325549	38526 (11.83)	21329 (6.55)
6	Fallow land (ha)	34411	4191 (12.18)	440 (1.28)
7	Net irrigated area (ha)	42899	2900 (6.76)	1335 (3.11)
8	Gross cropped area (ha)	508329	55164 (10.85)	25963 (5.11)
9	Rainfall (mm)	772	419 (54.27)	470 (60.88)
10	Population	16,04,253	218961 (13.65)	137016 (8.54)
11	Population density (No. per Km^2.)	377	219 (58.09)	163 (43.24)
12	Road length (in km)			
a	State high ways	416.2	186.31 (44.76)	91.29 (21.93)
b	District main roads	554.69	126.12 (22.74)	127.97 (23.07)
c	Village roads	2778	651 (23.43)	446 (16.05)
13	Communication facilities			
a	Post offices	218	62 (28.44)	44 (20.18)
b	Telephone connections	93260	5669 (6.08)	5354 (5.74)
14	Markets (numbers)	16	2 (12.50)	12 (75.00)
15	Veterinary institutions			
a	Primary Veterinary centers (numbers)	15	6 (40)	3 (20.00)
b	Artificial insemination centers (numbers)	40	11 (27.50)	6 (15.00)
16	Live stock population (numbers)			
a	Cattle	193476	27905 (14.42)	17557 (9.07)
b	Buffalo	89882	15832 (17.61)	8412 (9.36)
c	Sheep	33583	2502 (7.45)	7142 (21.27)
d	Goat	60946	8681 (14.24)	7670 (12.58)
e	Poultry	306929	88824 (28.94)	6025 (1.96)

Note: Figures in parentheses indicates percentage to the totals of district.
Source: Dharwad district at a glance, 2010-11, District Statistical Office, Dharwad

3.2 Sampling procedure

3.2.1 Selection of study taluks

The present study pertains to Dharwad district. To accomplish the objectives of the study, two taluks of districts namely, Hubli and Navalgund were purposively selected since they are one of the major organic input producers area.

3.2.2 Selection of villages

For selection of organic input producers: two villages were selected from Hubli and Navalgund taluks *viz*., Tarihal and Mishrakote from Hubli taluk and Shirur and Alagawadi from Navalgund taluk based on preliminary information collected from department of horticulture. Fifty organic producers were randomly selected from each village in each taluk. Thus, the total sample size was 200.

3.3 Nature and sources of data

Both primary and secondary data were collected for the study to evaluate the objectives of the study.

3.3.1 Primary data for the present study

Primary data required for the present study was collected from various sources. Specifically organic input producers were interviewed for collection of data pertaining to their socio-economic characteristics, costs and returns in organic input production, marketing methods followed by them for the disposal of organic inputs, problems faced in organic input production and its marketing.

3.3.2 Secondary data

Detailed general information pertaining to Dharwad district and the two study taluks namely, Hubli and Navalgund were extracted from the records maintained at the Dharwad District Statistical Office and the Department of Agriculture. The information regarding the organic inputs production and also about organic farmers were collected from the records available at the Department of Horticulture, Krishi Vidyan Kendra (KVKs) and Bhartiya Agro-Industries Foundation (BAIF) etc.

3.4 Analytical techniques

The data collected for the study was processed and analyzed by using suitable techniques. Tabular analysis, SWOT analysis and Garret's ranking technique were used to present the collected data. A detailed description of the analytical tools employed in the study presented below.

3.4.1 Tabular analysis

Tabular analysis was employed for studying the socio-economic characteristics of organic input producers for the promotion of organic input production, economics of organic input production, production and marketing of organic input produce like vermi compost, farm yard manure, sheep manure, goat manure, poultry manure, Jeevamrutha, Beejamruta and oilcake manure. Further, farmers opinion regarding the problems faced in marketing of organic inputs was studied through tabular analysis and B:C ratio was also calculated using this analysis.

3.4.2 SWOT analysis

SWOT analysis is done for marketing of organic inputs produce in that particular study area. It includes strength, weakness, opportunities and also threats.

3.4.3 Garrett ranking technique

Garrett's ranking technique was adopted for studying marketing problems of organic inputs like vermi compost, farm yard manure, oilcake manure, sheep and goat manure, Beejamruta, Jeevamrutha and poultry manure.

Stage I: Ranking given by 200 respondents for each factor was analysed.

Table 3.2: Cropping pattern of Dharwad district and the sample taluks

Sl. no.	Crop	Dharwad district	Hubli taluk	Navalgund taluk
I.	Cereals			
1.	Wheat	38907 (9.50)	7526 (8.77)	1685 (4.72)
2.	Jowar	58426 (14.26)	17402 (20.27)	1229 (3.44)
3.	Maize	30769 (7.51)	6295 (7.33)	3161 (8.86)
4.	Paddy	22903 (5.59)	1627 (1.90)	0 (0)
5.	Ragi	135 (0.03)	18 (0.02)	0 (0)
6.	Others	2905 (0.71)	1225 (1.43)	0 (0)
Subtotal(I)		154045 (37.60)	34093 (39.72)	6075 (17.02)
II.	Pulses			
1.	Bengal gram	36568 (8.93)	14326 (16.69)	2715 (7.61)
2.	Tur	3174 (0.77)	1358 (1.58)	103 (0.29)
3.	Others	48495 (11.84)	9433 (10.99)	2194 (6.15)
Subtotal(II)		88237 (21.54)	25117 (29.26)	5012 (14.04)
III.	Non food crops			
1.	Oil seeds	89162 (21.76)	22290 (25.97)	15338 (42.98)
2.	Cotton	76994 (18.79)	3931 (4.58)	8893 (24.92)
3.	Other non food crops	1235 (0.30)	412 (0.48)	369 (1.03)
Subtotal(III)		167391 (40.85)	26633 (31.03)	24600 (68.93)
Grand Total		409673 (100)	85843 (100)	35687 (100)

Note: Figures in parentheses indicates percentage to the grand total.
Source: Dharwad district at a glance, 2010-11, District Statistical Office, Dharwad

Eg: Rank given by the respondents.

Respondent No.	Factors									
	1	2	3	4	5	6	7	8	9	10
1	25	65	35	75	15	55	25	45	95	5
2	5	15	25	35	45	55	65	75	85	95
3	75	45	65	95	5	85	55	35	45	65

Stage II: Thus assigned ranks by the individual respondents were counted into percent position value by using the formula.

$$\text{Percent position} = 100\ (Rij - 0.5)/Nj.$$

Where,

Rij stands for rank given for the i^{th} factor by the j^{th} individual.

Nj stands for number of factors ranked by j^{th} individual.

The percent position value for the same assigned ranks by the respondents as follows

Respondent No.	Factors									
	1	2	3	4	5	6	7	8	9	10
1	3	7	4	8	2	6	3	5	10	1
2	1	2	3	4	5	6	7	8	9	10
3	8	5	7	10	1	9	6	4	5	7

Stage III: For each percent position scores were obtained with reference to Garrett's table and each percent position value was converted into scores by reference to Garrett's table.

Eg: Garrett's table scores for the percent position values as follows

Respondent No.	Factors									
	1	2	3	4	5	6	7	8	9	10
1	63	42	57	37	70	48	63	52	18	82
2	81	70	63	57	52	48	42	37	30	18
3	37	52	42	18	82	30	48	58	52	42

Stage IV: Summation of these scores for each factor was worked out for the number of respondents who ranked for each factor.

Respondent No.	Factors									
	1	2	3	4	5	6	7	8	9	10
1	63	42	57	37	70	48	63	52	18	82
2	81	70	63	57	52	48	42	37	30	18
3	37	52	42	18	82	30	48	58	52	42
∑	181	164	162	112	204	126	153	147	100	142

Stage V: Mean scores were calculated by dividing the total score by the number of respondents.

Respondent No.	Factors									
	1	2	3	4	5	6	7	8	9	10
1	63	42	57	37	70	48	63	52	18	82
2	81	70	63	57	52	48	42	37	30	18
3	37	52	42	18	82	30	48	58	52	42
∑	181	164	162	112	204	126	153	147	100	142
Mean	60.33	54.66	54.33	37.33	68	42	51	49	33.33	47.33

Stage VI: Overall ranking was obtained by assigning ranks 1, 2, 3 …. *etc*. in the descending order of the mean score.

Respondent No.	Factors									
	1	2	3	4	5	6	7	8	9	10
1	63	42	57	37	70	48	63	52	18	82
2	81	70	63	57	52	48	42	37	30	18
3	37	52	42	18	82	30	48	58	52	42
∑	181	164	162	112	204	126	153	147	100	142
Mean	60.33	54.66	54.33	37.33	68	42	51	49	33.33	47.33
Ranks	II	III	IV	IX	I	VIII	V	VI	X	VII

3.4.4 Demand forecasting technique

Demand forecasting analysis is done for forecasting the demand for next year for those particular organic inputs like farm yard manure, vermi compost, oilcake manure, sheep manure, goat manure, Beejamruta and Jeevamrutha and also poultry manure with reference to actual values.

Demand forecasting was calculated by using the following formula

$$F_{dt} = y_{t-1}\left[1+\left[\frac{\sum_{i=1}^{n} y_{t-i} - y_{t-i-1} / y_{t-i-1}}{n}\right]\right]$$

Where,

F_{dt} = Forecast demand for period t

y_{t-1} = Actual demand for current period

y_{t-i} = Actual demand for i^{th} year

y_{t-i-1} = Actual demand for $i-1^{th}$ year

n = Number of years

3.4.5 Marketing margin is calculated using this formula

Marketing margin = selling price – production cost

3.4.6 Cost Benefit ratio

Benefit cost ratio was calculated by using the following formula.

Benefit cost ratio = gross returns (Rs./ha) / total cost of production

3.4.7 Marketing efficiency

Marketing efficiency was calculated by the following formula

Marketing efficiency = O/C x 100

Where,

O stands for value added in marketing system

C stands for marketing cost involved

3.5 Definition of terms and concepts used

A) The total costs were divided into two broad classes.

1) Variable costs: includes costs incurred on agricultural wastes & cow dung, labour cost and interest on working capital.

2) Fixed costs: includes land revenue and depreciation on farm implements.

B) Agriculture waste and cow dung: Actual purchase price of raw material for the farmers as considered. Agriculture waste & cow dung was charged @ Rs.300 per ton in the study area.

C) Earth worms: Earthworms were charged according to prevailing market rates during the period of study. Earthworms were charged at Rs.250 per kg.

D) Interest on working capital: Interest on working capital was calculated at 8 percent on total working capital per annum.

E) Land rent: It was charged according to the actual payment made by the cultivators i.e Rs.100.

F) Compost: Compost manures are the decayed refuse like leaves, twigs, roots, stubble, bhusa, crop residue and hedge clippings, street refuse collected in towns and villages, water hycianth, saw-dust and bagasse. The process of decomposition is hastened by adding nitrogenous material like cow dung, night soil, urine or fertilizers. A large number of soil microorganisms feed on these wastes and convert it into well-rotted manure. The final product is known as compost. Farm yard manure and compost possess the same characteristics. The method of application of compost is the same as that of farm yard manure.

G) Farm yard manure: This is the traditional organic manure and is most readily available to the farmers. It is the product of decomposition of the liquid and solid excreta of the livestock, stored in the farm along with varying amounts of straws or other litter used as bedding. Farm yard manure is prepared basically using cow dung, cow urine, waste straw and other dairy wastes. Indian litter is rarely used as bedding because the straw is utilized as fodder. Cattle-urine is absorbed in the soil spread over the floor of the shed but no extra soil is used for effective absorption of this fraction.

H) Vermi composting: The various organic wastes including farm yard manure is fed by earth worms and they excrete out the fine mucus coated fecal pellets called vermi compost and the process is called as vermi composting.

I) Jeevamrutha: It is important to provide a congenial environment to micro-organisms that helps in making available the essential nutrients for plant growth *viz.,* nitrogen, phosphorus and potassium to the plants. Jeevamrutha provides such an environment to beneficial microbes. Application of Jeevamrutha to soil improves the soil considerably. It also encourages microbial activity in the soil.

Preparation method:

Ingredients per barrel of 15 litres

Water : 12 – 15 litres

Cow dung : 1 – 2 Kg

Cow Urine : 3 – 4 litres

Jaggery: 3 Kg

Mix all of them and keep them in a shade for 1 – 2 weeks. Stir the mixture once a day. Apply the mixture when the ground is wet for the plants. This seems to work wonder for the plants due to increased microbial activity. This is an excellent culture for enabling the exponential increase of beneficial microbes. The microbes are added through foliar spray.

J) Beejamruta: It is prepared by adding cow urine, lime and cow dung. It is used for seed treatment before sowing.

K) Poultry manure: This is rich organic manure, since liquid and solid excreta are excreted together resulting in no urine loss. The excreta of birds ferment very quickly. If left exposed, 50 percent of its nitrogen is lost within 30 days. Poultry manure contains higher nitrogen and phosphorus compared to other bulky organic manures. Poultry manure can be applied to the soil directly as soon as possible. After application, it should be worked into the surface of the soil. Addition of super phosphate improves the fertilizing quality and helps in control of flies and odour.

L) Oilcake manure: Oilseeds are generally rich in manurial ingredients. After oil extraction, the oilcakes are rich in nitrogen and also contain phosphorus and potash. Cultivators apply both edible and non-edible oilcakes to the soil as manure. Edible oilcakes are more profitable as cattle feeds. As such, non-edible cakes should be used as manures. Edible oilcakes which can be safely fed to livestock; e.g. groundnut cake, coconut cake etc., Non edible oilcakes which are not fit for feeding livestock; e.g. castor cake, neem cake, mahua cake etc. Both edible and non-edible oilcakes can be used as manures. Nutrients present in oil cakes, after mineralization are made available to crops 7 to 10 days after application. Oilcakes need to be well powdered before application for even distribution and quicker decomposition. Oilcakes are usually applied during soil preparation before sowing.

M) Sheep and goat manure: The droppings of sheep and goat makes very good manure. Panning is therefore a common practice of ensuring the use of sheep and goat droppings in the field. Sheep and goat manure contains 3 percent N, 1 percent P_2O_5 and 2 percent K_2O.

RESULTS

In accordance with the objectives of the study, the data collected from primary and secondary sources were analyzed and interpreted. The findings of the study were presented in this chapter under the following heads.

4.1 Socio-economic characteristics of organic input producers.

4.2 Reasons for shifting over to organic farming.

4.3 Production and sale of organic inputs in the district.

4.4 Organic input production by the farmers in the district.

4.5 Demand for organic inputs in the district.

4.6 Economics of production of organic inputs in the district.

4.7 Marketing efficiency of organic inputs.

4.8 Marketing margin in selling of organic Inputs.

4.9 Problems in marketing of organic inputs.

4.10 Strength, weakness, opportunities and threats in marketing of organic inputs.

4.1 Socio-economic characteristics of organic input producers

The socio-economic characteristics of organic input producers in Dharwad district were presented in Table 4.1. A cursory look at the table suggested that the education level, occupation level, age, annual income and land holdings are the parameters which were studied at greater depth.

Among the sample organic input producers studied in the district, majority of them were of middle aged (between 25-50 years) and represent 56 percent of the sample. About 22.50 percent were of older ages (above 50 years) and about 21.50 percent are belonging to young aged category (below 25 years). Large proportion of the respondents (43.50 %) have completed secondary education, about 24 percent of them were illiterate and only 16.50 and 16 percent of the sample respondents have completed collegiate education and primary education respectively.

Agriculture was the main occupation for around 58.50 percent of the respondents, while remaining 41.50 percent of the respondents taken agriculture as subsidiary occupation. Nearly about 52 percent of the respondents income was below 25,000 rupees per year. While around 27 percent of the respondents income was in between 25,000 and 1,00,000 rupees per year. Only 21 percent of the respondents had annual income more than 1,00,000 rupees.

The average size of land holdings of organic input producers was found to be 2.19 hectares in the study area. Out of this around 57.53 percent of the lands were unirrigated and remaining 42.47 percent of the lands were irrigated. All these lands were self-owned and none of the sample respondents have leased the land for cultivation.

4.2 Reasons for shifting over to organic farming

Table 4.2 revealed that the reasons for shifting over to organic farming by the sample respondents in the study area. Increasing cost of inorganic chemicals was the most important reason for shifting over to organic farming as revealed by 90 percent (180 farmers) of the respondents. Soil health oriented motives was the next prominent reason in this context as agreed by 86.50 percent of the respondents. Next in the order were better quality of organic produce and increasing returns were the reasons with 81 and 78.50 percent of the respondents opined a piece. Concerned over the environment, motivation by neighbouring organic farmers and motivation by media were the other reasons related to shifting over organic farming, as responded by 52, 64.50 and 41 percent of the respondents respectively.

4.3 Production and sale of organic inputs in the district

Method of production and frequency of sale of different organic inputs are presented in Table 4.3. As many as eight organic inputs, namely *viz.,* vermi compost, farm yard manure, sheep manure,

goat manure, poultry manure, Jeevamrutha, Beejamruta and oilcake manure were produced and sold by the organic input producers in Dharwad district.

Vermi compost was produced by either heap or trench method by the respondents and in a proportion of 46.67 percent and 53.33 percent respectively. Sales of the same were in the order of 56.67 percent and 43.33 percent by the respondents on monthly and quarterly basis respectively.

The farm yard manure was also produced by the organic input producers in the districts by heap and trench method with a proportion of 48 and 52 percent respectively. They sold the produce at a frequency of a month (58 %) and at a frequency of a quarter in a year by 42 percent of the respondents.

Sheep manure, goat manure and poultry manure were also produced by heap and trench method by the respondents. In case of sheep manure, the number of respondents using heap method and trench method were in the order of 25 and 75 percent respectively, the same in the case of goat manure was in the order of 46.67 and 53.33 percent respectively, while in case of poultry manure the proportion of farmers adopting the two methods was in the order of 48 and 52 percent. The frequency of sales of all these three types of manures was on monthly and quarterly basis and it was 40 and 60 percent of the respondents for sheep manure, 36.67 and 63.33 percent for goat manure as well as 44 and 56 percent for poultry manure respectively.

Jeevamrutha and Beejamruta were the two liquid organic inputs produced by the organic input producers in the district. For both these inputs, cent percent of the respondents were found using barrel method. However it was found that 56.66 percent of respondents were selling Jeevamrutha on monthly basis and 43.33 percent were selling on quarterly basis. In case of Beejamruta, 37.5 percent of the respondents were selling the produce on monthly basis and 62.5 percent were selling on quarterly basis.

Oilcake manure was also organically produced by the respondents by using heap and trench method and their percentage was 47.05 and 52.94 respectively as that of other organic inputs. Oil cake manure was also sold on both monthly and quarterly frequency and the percentage of the respondents selling in this frequency was 29.41 and 70.58 respectively.

4.4 Organic input production by the farmers in the district

The different organic inputs produced by the organic inputs producers in the district and the quantity of production are presented in Table 4.4. About 30 percent of the respondents (60 farmers) were involved in producing vermi compost in the study area. On an average, the respondents produced 5.36 tons per season and in all each one of them have produced around 21.44 tons of vermicompost in a year. About 25 percent of the respondents were involved in the production of farm yard manure at an average rate of 3 times in a year. Each time every farmer produced around 4.32 tons, aggregating to 12.96 tons in a year.

Sheep manure, goat manure, poultry manure and oil cake manure produced by 10, 15, 25 and 8.5 percent of the sample organic input producers respectively in the study area. On an average each one of them produced 5.75, 5.25, 4.85 and 4.47 tons of the produce respectively on a yearly basis.

Jeevamrutha and Beejamruta were produced by 15 and 20 percent of the organic input producers in the district respectively. Each time, average production of both Jeevamrutha and Beejamruta was 15 litres each by respective input producers, which amounts to a total production of 30 litres by each one of the input producers in a given year respectively.

4.5 Demand for organic inputs in the district

An analysis of the demand for the different organic inputs considered for the study in the past 12 years and the expected demand in the forthcoming three years were analyzed and are presented in Table 4.5.

The study revealed that there was an increasing demand for all the organic inputs considered. Over the time period, the demand for farm yard manure was 595 tons during the year 2000, which steadily increased at a rate 2.85 percent per annum over the study period and it was 835 tons during the year 2011. It is expected that the demand for the farm yard manure in the district would be around 861, 888 and 915 tons during the years 2012, 2013 and 2014 respectively.

Table 4.1: Socio-economic characteristics of organic input producers in the district

(n=200)

Sl. no	Particulars	Respondents	
		Value	Percentage
1	Age		
a	Below 25 years	43	21.50
b	Between 25-50 years	112	56.00
c	Above 50 years	45	22.50
2	Education		
a	Illiterate	48	24.00
b	Primary education (up to 7^{th} standard)	32	16.00
c	Secondary education (8^{th} – 10^{th} standard)	87	43.50
d	Collegiate education (PUC - degree)	33	16.50
3	Occupation		
a	Agriculture as main occupation	117	58.50
b	Agriculture as subsidiary occupation	83	41.50
4	Annual income		
a	Below Rs. 25,000	104	52.00
b	Rs. 25,000 – Rs.100,000	54	27.00
c	Rs.100,000 and above	42	21.00
5	Land holdings (ha)	2.19	
	Owned - irrigated	0.93	42.47
	Unirrigated	1.26	57.53
	Leased - irrigated	0	0
	Unirrigated	0	0
	Total - irrigated	0.93	42.47
	Unirrigated	1.26	57.53

Table 4.2: Reasons for shifting over to organic farming

(n=200)

Sl. no.	Reasons	No. of farmers	Percent (%)
1.	Increasing cost of inorganic chemicals	180	90.00
2.	Soil health oriented motives	173	86.50
3.	Better quality of organic produce	162	81.00
4.	Increasing returns	157	78.50
5.	Motivation by neighbouring organic farmers	129	64.50
6.	Environmental concern	104	52.00
7.	Motivation by media	82	41.00

Table 4.3: Method of production and frequency of sale of organic inputs by sample respondents

Sl. no.	Organic inputs and method of production and frequency of sale	Respondents	
		No. of respondents	Percentage
1	i) **Vermi compost** (n=60)		
	a. Heap method	28	46.67
	b. Trench method	32	53.33
	ii) Frequency of sales		
	a. Monthly	34	56.67
	b. Quarterly	26	43.33
2	i) **Farm yard manure** (n=50)		
	a. Heap method	24	48.00
	b. Trench method	26	52.00
	ii) Frequency of sales		
	a. Monthly	29	58.00
	b. Quarterly	21	42.00
3	i) **Sheep manure** (n=20)		
	a. Heap method	5	25.00
	b.Trench method	15	75.00
	ii) Frequency of sales		
	a. Monthly	8	40
	b. Quarterly	12	60
4	i) **Goat manure** (n=30)		
	a. Heap method	14	46.67
	b.Trench method	16	53.33
	ii) Frequency of sales		
	a. Monthly	11	36.67
	b. Quarterly	19	63.33
5	i) **Poultry manure** (n=50)		
	a. Heap method	24	48
	b.Trench method	26	52
	ii) Frequency of sales		
	a. Monthly	22	44
	b. Quarterly	28	56
6	i) **Jeevamrutha** (n=30)		
	a. Barrel method	30	100.00
	ii) Frequency of sales		
	a. Monthly	17	56.66
	b. Quarterly	13	43.33
7	i) **Beejamruta** (n=40)		
	a. Barrel method	40	100.00
	ii) Frequency of sales		
	a. Monthly	15	37.50
	b. Quarterly	25	62.50
8	i) **Oilcake manure** (n=17)		
	a. Heap method	8	47.05
	b. Trench method	9	52.94
	ii) Frequency of sales		
	a. Monthly	5	29.41
	b. Quarterly	12	70.58

Table 4.4: Details of organic inputs produced by sample farmers in Dharwad district

(Qty/producer)

Sl. no	Name of organic input	Respondents producing organic input		Unit	Average quantity produced per harvest	Total production in a year
		Number	Percent			
1	Vermi compost	60	30.00	Tons	5.36	21.44
2	Farm yard manure	50	25.00	Tons	4.32	12.96
3	Sheep manure	20	10.00	Tons	5.75	5.75
4	Goat manure	30	15.00	Tons	5.25	5.25
5	Poultry manure	50	25.00	Tons	4.85	4.85
6	Jeevamruta	30	15.00	Litres	15.00	30.00
7	Beejamruta	40	20.00	Litres	15.00	30.00
8	Oilcake manure	17	8.50	Tons	4.47	4.47

Table 4.5: Actual and forecast demand of organic inputs in Dharwad district

(Qty/year)

Year	Farm yard manure (tons)	Vermi compost (tons)	Sheep manure (tons)	Goat manure (tons)	Poultry manure (tons)	Jeevamrutha (litres)	Beejamruta (litres)	Oilcake manure (tons)
Actual demand								
2000	595	800	600	882	500	650	842	800
2001	640	825	620	890	512	659	848	809
2002	658	849	639	900	520	662	852	815
2003	666	913	645	935	529	667	865	822
2004	690	935	667	943	535	675	873	829
2005	700	950	675	949	542	682	882	835
2006	745	959	683	955	549	689	889	842
2007	756	964	692	958	552	695	895	850
2008	769	968	706	962	564	705	899	855
2009	786	972	722	966	571	715	905	862
2010	800	979	735	975	580	722	918	875
2011	835	985	749	984	582	728	928	887
CAGR	2.85	1.82	1.91	0.95	1.36	1.05	0.87	0.88
R^2	0.98	0.82	0.99	0.90	0.99	0.99	0.99	0.99
Forecast demand								
2012	860.89	1003.72	763.98	993.84	590.15	735.28	936.35	894.98
2013	887.57	1022.79	779.26	1003.78	598.41	742.63	944.78	903.04
2014	915.09	1042.22	794.84	1013.82	606.79	750.06	953.28	911.17

Source: Department of Agriculture, Dharwad (2012)

Vermi compost was demanded to the tune of 800 metric tons during the year 2000 and the demand increased to around 985 tons during the year 2011 with an annual growth of 1.82 percent. It is expected that the demand for vermi compost in the district would be about 1004, 1023 and 1042 tons by the year 2012, 2013 and 2014 respectively.

The demand for sheep manure, goat manure, poultry manure and oil cake manure also steadily increased over the past twelve years starting from the year 2000. The demand for these organic inputs was of the order of 600, 882, 500 and 800 metric tons respectively during the year 2000. This increased year after year at the rate of 1.91, 0.95, 1.36 and 0.88 percent respectively. The forecast analysis of the demand of these organic inputs suggests that the demand would be around 795, 1014, 607 and 911 metric tons respectively during the year 2014.

The two liquid organic inputs considered for the study, Jeevamrutha and Beejamruta the demand for which also found to be steadily increasing from the year 2000. The demand for Jeevamrutha was 650 litres during the year 2000, which has become 728 litres by 2011, while the demand for Beejamruta was 842 litres during the year 2000 has rows to 928 litres by 2011. The annual incremental growths were 1.05 percent and 0.87 percent with respect to the two liquid organic inputs respectively.

As per the predictions of demand for these inputs the demand is expected to be 735, 743 and 750 litres in the years 2012, 2013 and 2014 for Jeevamrutha and 936, 945 and 953 litres for Beejamruta for the three respective years. Demand for other organic inputs is mentioned in Table 4.5.

High value of coefficient of determination (R^2 value) of the analysis indicates that time variable has sufficiently explained the variations in the models selected to arrive at compound annual growth rates.

4.6 Economics of production of organic inputs in the district

Various costs involved and the returns generated for producing each unit of the various organic inputs in the district were analyzed and were presented under the following sub sections. For vermi compost manure, farm yard manure, sheep manure, goat manure, poultry manure and oilcake manure, the cost of production were analyzed on per ton basis, while for the liquid organic inputs namely, Jeevamrutha and Beejamruta, the cost and returns were calibrated for each litre of the product.

The total production cost was broadly categorized into variable and fixed cost and these costs for each of the items under the specific category were separately calculated and were summed up at the end to arrive at the total cost of production of each of the organic inputs. The total production cost per unit of the produce was deducted from the respective gross returns to arrive at net returns. To have a clear understanding of the economics of production of these organic inputs, the benefit cost ratio was also calculated.

4.6.1 Cost and returns in vermi compost manure production

The cost and returns in production of per ton of vermi compost are presented in Table 4.6. Total cost of Rs.1847 was required to produce one ton of vermi compost manure in the district. Of this 85.85 percent (Rs.1585.88) was the variable cost and the remaining 14.15 percent (Rs.261.43) were the fixed cost component. Among the variable cost, material cost was the prime item of cost which contribute nearly 75.18 percent of the total variable cost. In absolute value terms it was Rs.1192.32 per ton of the produce.

The material cost consists of agricultural wastes and cow dung and cost on earth worms. The labour cost for filling of pits, watering, worm separation, waste collection and sieving all together would be Rs.276 per ton which constitutes 17.41 percent of variable cost and remaining 7.41 per cent of the variable cost was interest on working capital which was calculated at 8 per cent per annum.

Land rent and depreciation on working shed were the main fixed cost items which all together worked out to be Rs.261.43 per ton of the manure produced.

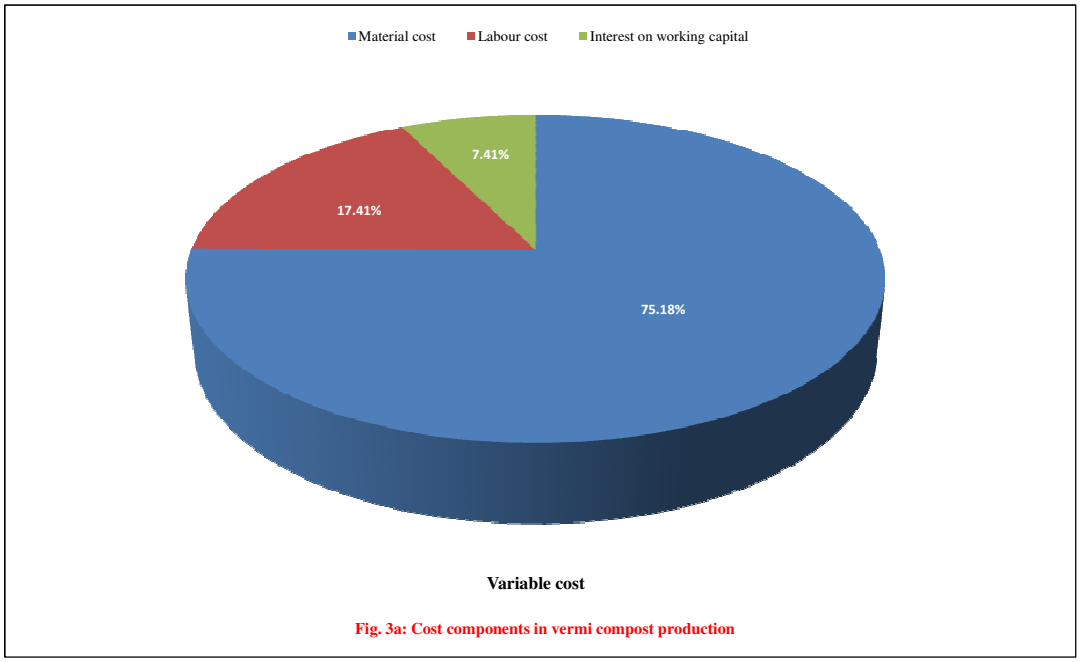
The gross return on production of each ton of vermi compost produced was around Rs.2967. Thus net returns of Rs.1119 could be obtained in case of vermi compost production. The benefit cost ratio worked out to be 1.61. Cost components in vermi compost production is graphically represented in Fig. 3.

Table 4.6: Cost and returns of vermi compost production

(Rs./ton)

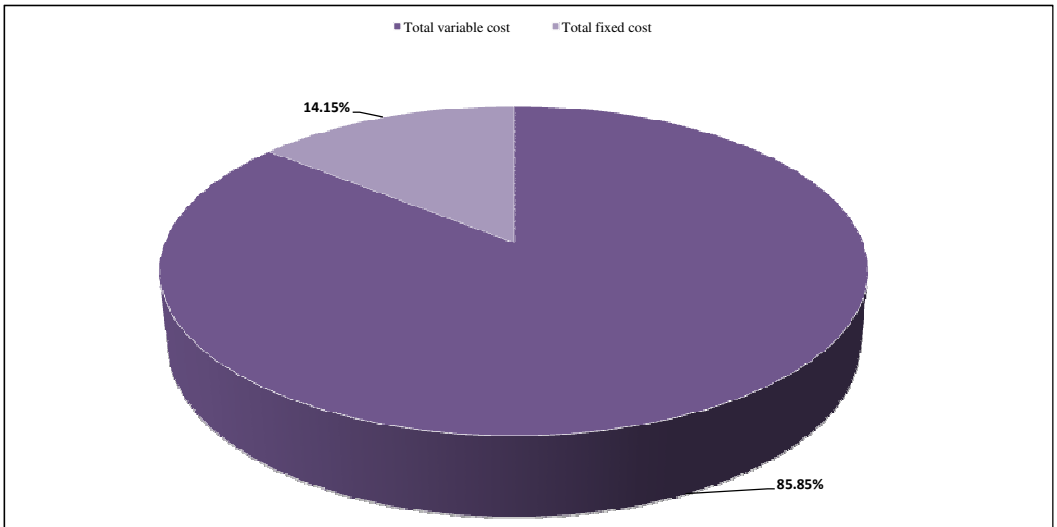
Particulars	Cost of vermi compost		
	Unit	Physical quantity	Value (Rs.)
Variable cost			
I. Material cost	Rs.		1192.32 (75.18)*
1. Agricultural wastes and cow dung	Tons	2.06	617.50
2. Earthworms	Kg	2.30	574.82
II. Labour cost	Rs.		276.09 (17.41)*
1. Pit filling	MD	0.44	88.80
2. Worm separation	MD	0.19	29.04
3. Watering	MD	0.01	1.75
4. Collection of wastes	MD	0.27	40.24
5. Sieving	MD	0.47	116.25
III. Interest on working capital	Rs.		117.47 (7.41)*
IV. Total variable cost (I+ II+III)	Rs.		1585.88(85.85)**
Fixed cost			
1. Land rent	Rs.		100.00
2. Depreciation on working shed and equipments	Rs.		161.43
V. Total fixed cost	Rs.		261.43 (14.15)**
VI. Total production cost (IV+V)	Rs.		1847.31
Gross returns	Rs.		2966.67
Net returns	Rs.		1119.35
Benefit cost ratio			1.61

Note: * Percentage to total variable cost
** Percentage to total cost
MD stands for man days



Variable cost

Fig. 3a: Cost components in vermi compost production



Total production cost

Fig. 3b: Cost components in vermi compost production

Fig 3: Cost components in vermi compost production

Table 4.7: Cost and returns from production and sale of vermi compost

(Rs./ton)

Particulars	Amount (Rs)
A. Production cost	1847.31 (62.27)*
B. Marketing cost	270.00 (9.10)*
i. Plastic bags	100.00
ii. Packing	20.00
iii. Transportation cost	100.00
iv. Loading & unloading	50.00
C. Price realized per ton	2966.67
Net returns per ton [C-B-A]	849.35 (28.63)*

*Figures in the bracket indicate the percentage to the price realized

Table 4.8: Cost and returns of farm yard manure production

(Rs./ton)

Particulars	Cost of farm yard manure		
	Unit	Physical quantity	Value (Rs.)
Variable cost			
I. Material cost	Rs.		553.68 (76.70)*
1. Agricultural wastes and cow dung	Tons	1.78	533.63
2. Cow urine	Litres	4.01	20.05
II. Labour cost	Rs.		114.76 (15.90)*
1. Pit filling	MD	0.41	61.02
2. Watering	MD	0.01	2.17
3. Sieving	MD	0.34	51.56
III. Interest on working capital	Rs.		53.47 (7.41)*
IV. Total variable cost (I+ II+III)	Rs.		721.91 (76.63)**
Fixed cost			
1. Land rent	Rs.		100.00
2.Depreciation on working shed and equipments	Rs.		120.14
V. Total fixed cost	Rs.		220.14 (23.37)**
VI. Total production cost (IV+V)	Rs.		942.05
Gross returns	Rs.		1774
Net returns	Rs.		831.95
Benefit cost ratio			1.88

Note: * Percentage to total variable cost
** Percentage to total cost.
MD stands for man days

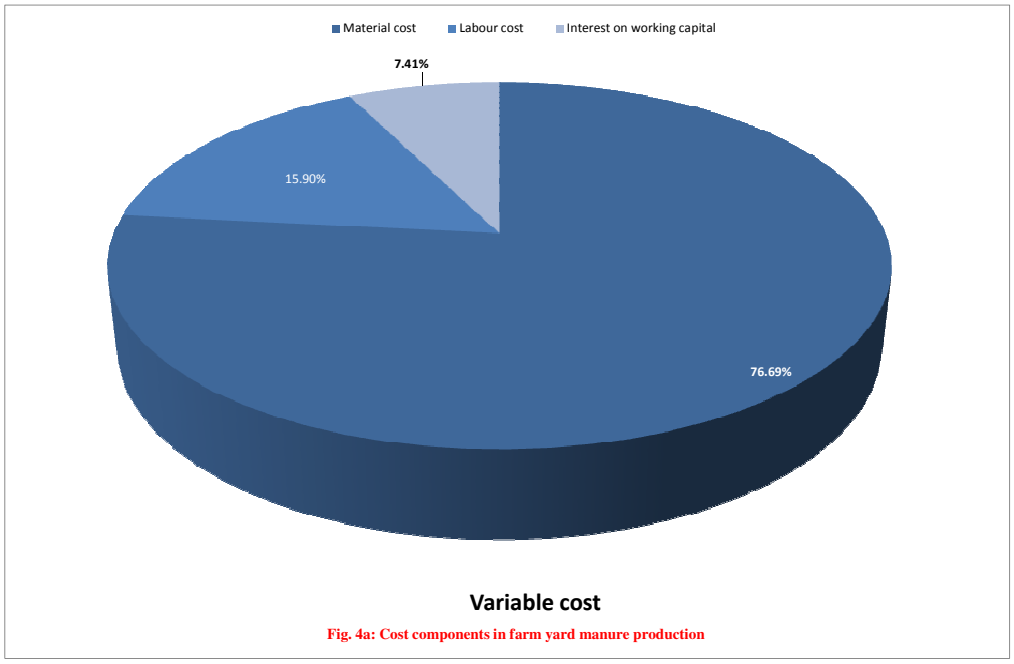


Fig. 4a: Cost components in farm yard manure production

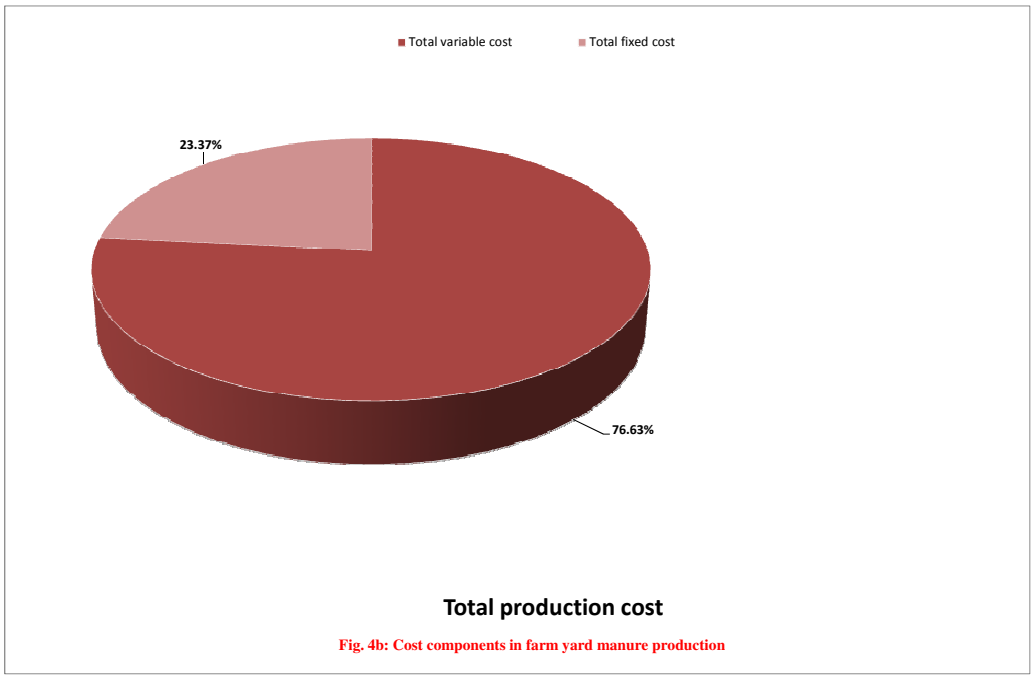


Fig. 4b: Cost components in farm yard manure production

Fig 4: Cost components in farm yard manure production

Table 4.9: Cost and returns from production and sale of farm yard manure

(Rs./ton)

Particulars	Amount (Rs)
A. Production cost	942.05 (53.10)*
B. Marketing cost	268.00 (15.11)*
i. Plastic bags	100.00
ii. Packing	20.00
iii. Transportation cost	97.00
iv. Loading & unloading	51.00
C. Price realized per ton	1774.00
Net returns per ton [C-B-A]	563.95 (31.79)*

*Figures in the bracket indicate the percentage to the price realized.

The analysis of economics of vermi compost production and sale are represented in Table 4.7. Of the total price realized by production and sale of vermi compost was Rs.2967, the marketing costs were 9.10 percent (Rs.270 per ton) of the price realized. Production costs were 62.27 per cent (Rs.1847.31 per ton) of the value of the price realized and thus the net return from production and sale of one ton of vermi compost was Rs.849.35 per ton, which represents 28.63 per cent of the price realized.

4.6.2 Cost and returns in farm yard manure production and sale

Table 4.8 represents the cost incurred and the returns generated for producing each ton of farm yard manure by the organic input producers in the district. Of the total production cost of Rs.942 per ton, variable costs represent around 76.63 percent (Rs.721.91 per ton) and fixed cost represent around 23.37 percent (Rs.220.14 per ton). Among the variable cost items, material costs was the prime cost representing 76.70 percent (Rs.553.68), followed by labour costs which represent 15.90 percent (Rs.114.76) and interest on working capital representing 7.41 percent (Rs.53.47). A gross return of around Rs.1774 could be realized from one ton of farm yard manure. The net return realized was around Rs.831.95 per ton. The benefit cost ratio in farm yard manure production in the district was 1.88. Cost components in farm yard manure production is graphically represented in Fig. 4.

The cost and returns from production and sale of farm yard manure are presented in Table 4.9. Of the total price realized per ton, production cost represented 53.10 percent (Rs.942) and marketing cost was 15.11 percent (Rs.268 per ton) leaving behind the net return of Rs.563.95 on each ton of farm yard manure produced and marketed which constitute nearly 31.79 percent of the price realized by the farm yard manure in the district.

4.6.3 Cost and returns in sheep manure production and sale

Table 4.10 present the total cost and returns incurred in production of a ton of sheep manure in the district. It can be seen that total variable cost which primarily comprised the material costs accounted for 82.77 percent of total cost. Material costs which arose on account of procurement of agriculture waste and sheep droppings which accounted for around 80.24 percent of total variable cost. Labour cost which accounted for around 12.35 percent of the total variable costs were incurred for pit filling, watering and sieving. Interest on working capital which was calculated at 8 percent per annum and accounted for around 7.41 percent of the total variable cost. The table shows that the total variable cost incurred per ton of sheep manure was Rs.1090 and total fixed cost which amounted to around Rs.226.96 per ton accounted for around 17.23 percent of total cost of production. The components of the fixed cost were land rent and depreciation on working shed charges. Overall, the total cost of production cost of sheep manure per ton was Rs.1317. This table also reveals that gross returns which amounted to around Rs.2250 per ton on an average and net returns which amounted to around Rs.933 and also benefit cost ratio was around 1.71. Cost components in sheep manure production is graphically represented in Fig. 5.

Table 4.11 furnished cost and returns from production and sale of sheep manure. The table depicts two types of costs incurred, namely production cost and marketing cost. As the previous table (table 4.10) shows the production cost per ton of sheep manure were 58.53 percent (Rs.1317 per ton) of the value of the price realized, while cost incurred for plastic bags and packing was Rs.100 and Rs.20 respectively. Transportation cost Rs.92 per ton. Similarly, loading and unloading charges was Rs.48 per ton. As such, the total marketing costs were 11.56 percent (Rs.260 per ton) of the price realized. The table also reveals that price realized on an average per ton of sheep manure amounted to Rs.2250. The net return from production and sale of one ton of sheep manure was Rs.673 per ton, which represents 29.91 percent of the price realized.

4.6.4 Cost and returns in goat manure production and sale

The cost and returns in production of per ton of goat manure production are presented in Table 4.12. Total variable costs of Rs.1214 which primarily comprised the material costs accounted for 85.28 percent of total cost. Of this 81.19 percent (Rs.985.66) were the material cost, the 11.40 percent (Rs.138.45) were the labour cost and the remaining 7.41 percent (Rs.89.93) were the interest on working capital which was calculated at 8 percent per annum.

The material cost consists of agricultural wastes and goat droppings, cow urine and also addition of supplemental wastes like nitrogen waste such as fresh grass clippings, fruit scarps, vegetable wastes and also addition of carbon rich wastes like dead leaves, straw etc. The components of the fixed cost were land rent and depreciation on working shed charges. Overall, the

total cost of production of goat manure per ton was Rs.1423.56. The total fixed cost which amounted to around Rs.209.52 per ton accounted for around 14.72 percent of total cost of production. This table also reveals that gross returns which amounted to around Rs. 2233.33 per ton on an average and net returns which amounted to around Rs. 809.77 and also benefit cost ratio was around 1.57. Cost components in goat manure production is graphically represented in Fig. 6.

The economics of goat manure production and sale are presented in Table 4.13. Of the total price realized per ton, production cost was Rs.1423.56 of 63.74 percent of the value of the price realized and marketing cost was Rs.260.50 per ton of 11.66 percent of the price realized and thus the net returns from production and sale of one ton of goat manure was Rs.549.27 per ton which represents 24.59 percent of the price realized. The table also reveals that price realized on an average per ton of goat manure amounted to Rs.2233.33.

4.6.5 Cost and returns in poultry manure production and sale

Table 4.14 presents the total cost and returns incurred in production of a ton of poultry manure. It can be seen that total variable cost which primarily comprised the material cost accounted for 89.28 percent of total cost. Material cost which arose on account of procurement of agriculture waste and poultry droppings which accounted for around 81.21 percent of total variable cost. Labour cost which accounted for around 11.38 percent of the total variable cost were incurred for pit filling, watering and sieving. Interest on working capital which was calculated at 8 percent per annum and accounted for around 7.41 percent of the total variable cost. The total variable cost incurred per ton of poultry manure was Rs.1679.42. Total fixed cost which amounted to around Rs.201.65 per ton accounted for around 10.72 percent of total cost of production. The components of the fixed costs were land rent and depreciation on working shed charges.

The total cost of production of poultry manure per ton was Rs.1881. The gross returns which amounted to around Rs.2972 per ton on an average and net returns which amounted to around Rs.1090.93 and also benefit cost ratio for poultry manure production in the district was around 1.58. Cost components in poultry manure production is graphically represented in Fig. 7.

Table 4.15 presents cost and returns from production and sale of poultry manure. The table shows two types of costs incurred, namely production cost and marketing cost. As the previous table (Table 4.14) showed, the production cost per ton of poultry manure which amounted to Rs.1881 and accounted for around 63.29 percent of the value of the price realized. The total marketing cost which amounted to Rs.256 per ton and accounted for around 8.61 percent of the price realized. The table also showed that price realized on an average per ton of poultry manure amounted to Rs.2972. The net return per ton of poultry manure were Rs.834.93 and marketed which constitute nearly 28.09 percent of the price realized by the poultry manure producers in the district.

4.6.6 Cost and returns in Jeevamrutha production and sale

The cost and returns incurred to produce per litre of Jeevamrutha are presented in Table 4.16. Total variable cost which consists of material cost accounted for 100 percent of total cost. Material cost which arose on account of procurement of cow urine, cow dung and jaggery which accounted for around 48.03 percent of total variable cost. Labour cost which accounted for around 44.56 percent of the total variable cost were incurred for barrel filling and maintenance as well as mixing. Interest on working capital which was calculated at 8 percent per annum and accounted for around 7.41 percent of the total variable cost. The total variable cost incurred per litre of liquid Jeevamrutha was Rs.46.75. The total cost of production of Jeevamrutha per litre was Rs.46.75. The gross returns which amounted to around Rs.75.89 per litre on an average and net returns which amounted to around Rs.29.14 and also benefit cost ratio was around 1.62. Cost components in Jeevamrutha production is graphically represented in Fig. 8.

The economics of Jeevamrutha production and sale are presented in Table 4.17. In this table, production cost and marketing cost are shown. As the previous table (Table 4.16) showed, the production cost per litre of Jeevamrutha was Rs.46.75 and accounted for around 61.61 percent of the value of the price realized.

A total marketing cost amounted to Rs.8.87 per litre and accounted for around 11.68 percent of the price realized. The table also reveals that price realized on an average per litre of Jeevamrutha amounted to Rs.75.89 and the net returns from production and sale of Jeevamrutha was Rs.20.27 per litre which represents 26.71 percent of the price realized.

Table 4.9: Cost and returns from production and sale of farm yard manure

(Rs./ton)

Particulars	Amount (Rs)
A. Production cost	942.05 (53.10)*
B. Marketing cost	268.00 (15.11)*
i. Plastic bags	100.00
ii. Packing	20.00
iii. Transportation cost	97.00
iv. Loading & unloading	51.00
C. Price realized per ton	1774.00
Net returns per ton [C-B-A]	563.95 (31.79)*

*Figures in the bracket indicate the percentage to the price realized.

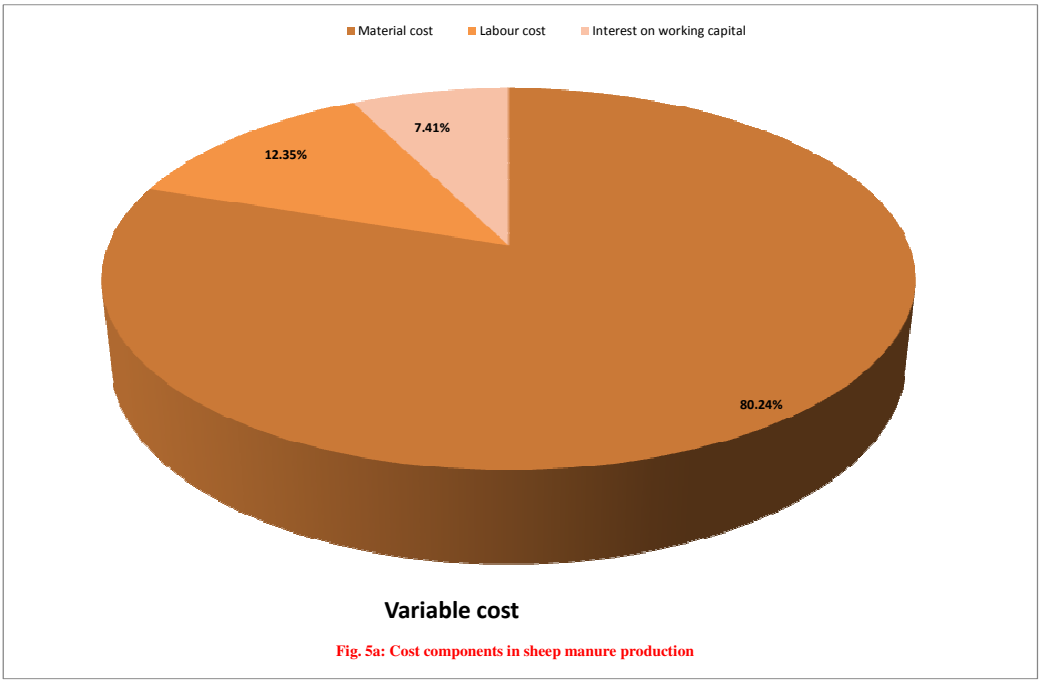


Fig. 5a: Cost components in sheep manure production

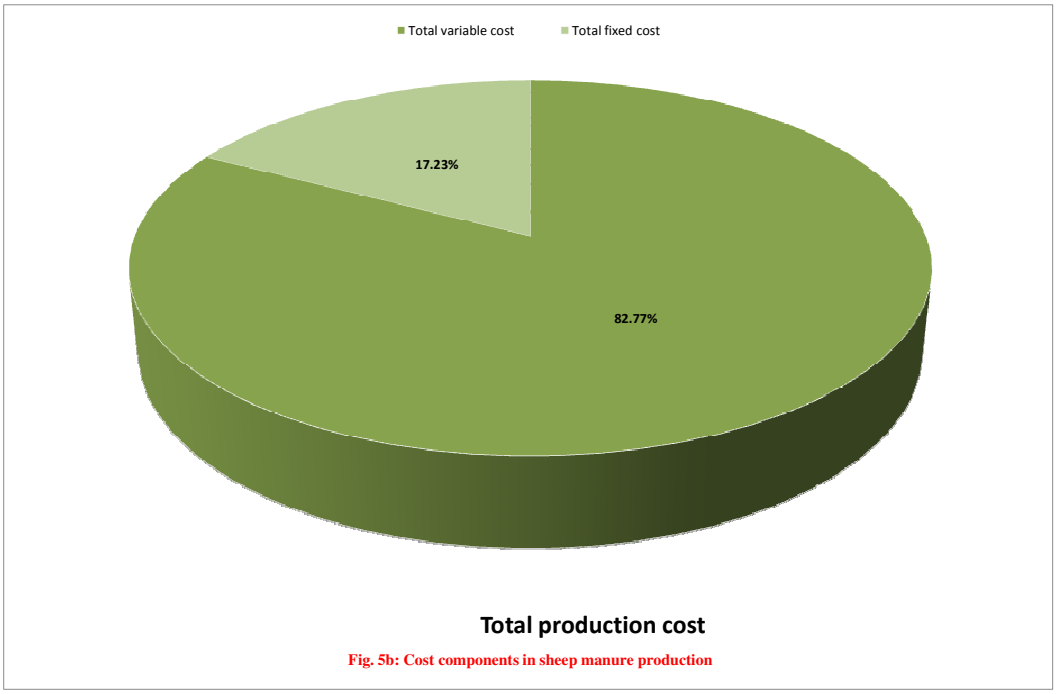


Fig. 5b: Cost components in sheep manure production

Fig 5: Cost components in sheep manure production

Table 4.11: Cost and returns from production and sale of sheep manure

(Rs./ton)

Particulars	Amount (Rs)
A. Total production cost	1316.99 (58.53)*
B. Marketing cost	260.00 (11.56)*
i. Plastic bags	100.00
ii. Packing	20.00
iii. Transportation cost	92.00
iv. Loading & unloading	48.00
C. Price realized per ton	2250.00
Net returns per ton [C-B-A]	673.01 (29.91)*

*Figures in the bracket indicate the percentage to the price realized.

Table 4.12: Cost and returns of goat manure production

(Rs./ton)

Particulars	Cost of goat manure		
	Unit	Physical quantity	Value (Rs.)
Variable cost			
I. Material cost	Rs.		985.66 (81.19)*
1. Agricultural wastes and goat droppings	Tons	1.81	906.40
2. Cow urine	Litres	6.13	30.67
3. Add supplemental			
i) Nitrogen waste such as fresh grass clippings, fruit scraps & vegetable waste)	kg	4.71	23.54
ii) Carbon rich waste (such as dead leaves, straw etc)	kg	5.01	25.04
II. Labour cost	Rs.		138.45 (11.40)*
1. Pit filling	MD	0.41	61.67
2.Watering	MD	0.01	1.79
3.Sieving	MD	0.50	75.00
III. Interest on working capital	Rs.		89.93 (7.41)*
IV. Total variable cost (I+II+III)	Rs.		1214.04 (85.28)**
Fixed cost			
1. Land rent	Rs.		100.00
2. Depreciation on working shed and equipments	Rs.		109.52
V. Total fixed cost	Rs.		209.52 (14.72)**
VI. Total production cost (IV+V)	Rs.		1423.56
Gross returns	Rs.		2233.33
Net returns	Rs.		809.77
Benefit cost ratio			1.57

Note: * Percentage to total variable cost
** Percentage to total cost.
MD stands for man days

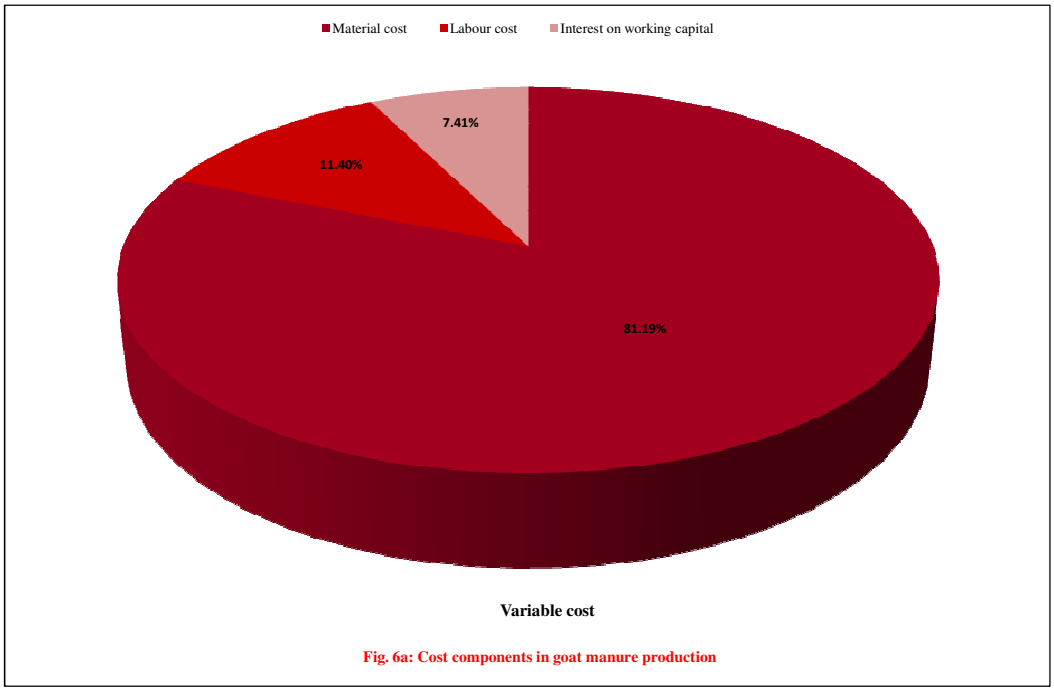


Fig. 6a: Cost components in goat manure production

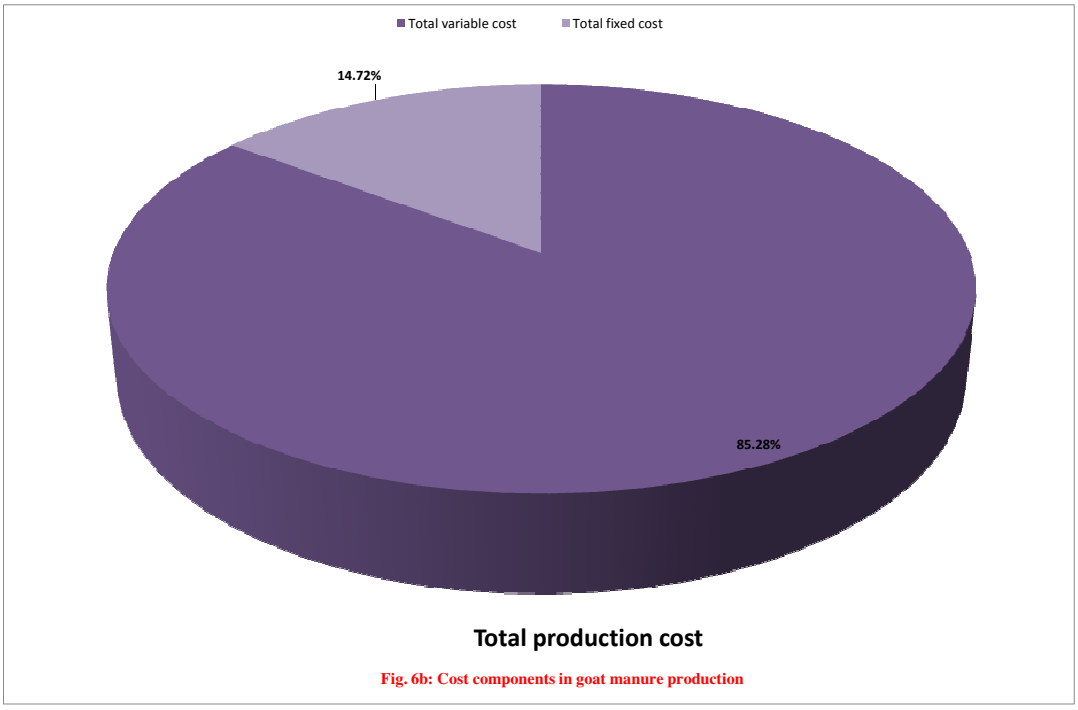


Fig. 6b: Cost components in goat manure production

Fig 6: Cost components in goat manure production

Table 4.13: Cost and returns from production and sale of goat manure

(Rs./ton)

Particulars	Amount (Rs)
A. Total production cost	1423.56 (63.74)*
B. Marketing cost	260.50 (11.66)*
i. Plastic bags	100.00
ii. Packing	20.00
iii. Transportation cost	93.00
iv. Loading & unloading	47.50
C. Price realized per ton	2233.33
Net returns per ton [C-B-A]	549.27 (24.59)*

*Figures in the bracket indicate the percentage to the price realized

Table 4.14: Cost and returns of poultry manure production

(Rs./ton)

Particulars	Cost of poultry manure		
	Unit	Physical quantity	Value (Rs.)
Variable cost			
I. Material cost	Rs.		1363.88 (81.21)*
1. Agricultural wastes and poultry droppings	Tons	1.88	938.12
2. Superphosphate	kg	17.03	425.76
II. Labour cost	Rs.		191.13 (11.38)*
1. Pit filling	MD	0.41	81.44
2. Watering	MD	0.01	2.58
3. Sieving	MD	0.54	107.11
III. Interest on working capital	Rs.		124.40 (7.41)*
IV. Total variable cost (I+ II+III)	Rs.		1679.42 (89.28)**
Fixed cost			
1. Land rent	Rs.		100.00
2. Depreciation on working shed and equipments	Rs.		101.65
V. Total fixed cost	Rs.		201.65 (10.72)**
VI. Total production cost (IV+V)	Rs.		1881.07
Gross returns	Rs.		2972.00
Net returns	Rs.		1090.93
Benefit cost ratio			1.58

Note: * Percentage to total variable cost
** Percentage to total cost
MD stands for man days

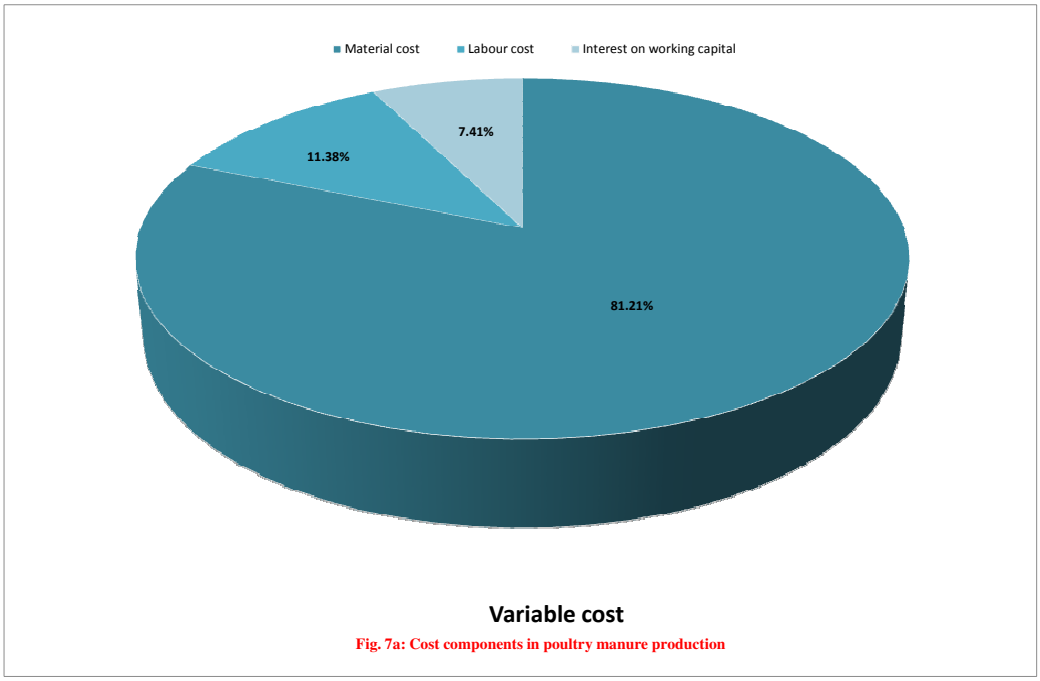


Fig. 7a: Cost components in poultry manure production

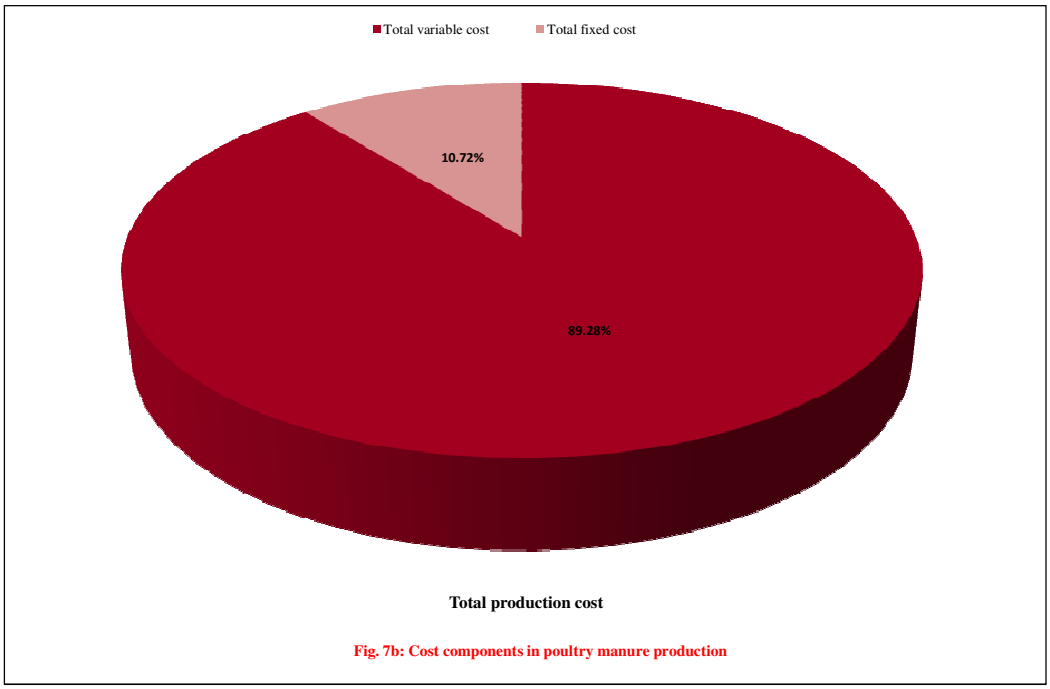


Fig. 7b: Cost components in poultry manure production

Fig 7: Cost components in poultry manure production

Table 4.15: Cost and returns from production and sale of poultry manure

(Rs./ton)

Particulars	Amount (Rs)
A. Total production cost	1881.07 (63.29)*
B. Marketing cost	256.00 (8.61)*
i. Plastic bags	100.00
ii. Packing	20.00
iii. Transportation cost	90.00
iv. Loading & unloading	46.00
C. Price realized per ton	2972.00
Net returns per ton [C-B-A]	834.93 (28.09)*

*Figures in the bracket indicate the percentage to the price realized.

Table 4.16: Cost and returns of Jeevamrutha production

(Rs./litre)

Particulars	Cost of jeevamrutha		
	Unit	Physical quantity	Value (Rs.)
Variable cost			
I. Material cost	Rs.		22.46 (48.03)*
1. Cow dung	kg	0.09	4.50
2. Cow urine	Litres	0.23	11.50
3. Jaggery	kg	0.18	6.46
II. Labour cost	Rs.		20.83 (44.56)*
1. Barrel filling and maintenance	MD	0.08	16.67
2. Mixing	MD	0.02	4.17
III. Interest on working capital	Rs.		3.46 (7.41)*
IV. Total variable cost (I+II+III)	Rs.		46.75 (100)**
V. Total production cost (IV)	Rs.		46.75
Gross returns	Rs.		75.89
Net returns	Rs.		29.14
Benefit cost ratio			1.62

Note: * Percentage to total variable cost
** Percentage to total cost
MD stands for man days

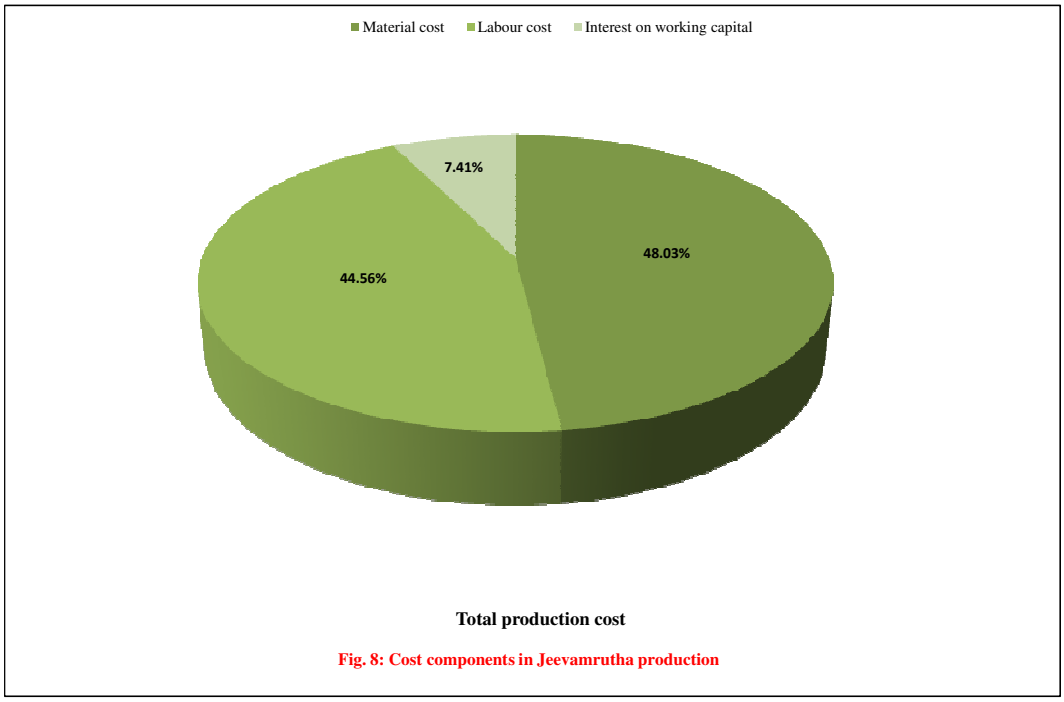


Fig. 8: Cost components in Jeevamrutha production

Fig 8: Cost components in Jeevamrutha production

Table 4.17: Cost and returns from production and sale of Jeevamrutha

(Rs./litre)

Particulars	Amount (Rs)
A. Total production cost	46.75 (61.61)*
B. Marketing cost	8.87 (11.68)*
i. Plastic bottles	5.00
ii. Packing	1.00
iii. Transportation cost	1.67
iv. Loading & unloading	1.20
C. Price realized per litre	75.89
Net returns per litre [C-B-A]	20.27 (26.71)*

*Figures in the bracket indicate the percentage to the price realized.

Table 4.18: Cost and returns of Beejamruta production

(Rs./litre)

Particulars	Cost of Beejamruta		
	Unit	Physical quantity	Value (Rs.)
Variable cost			
I. Material cost	Rs.		16.30 (41.57)*
1. Cow dung	kg	0.10	5.08
2. Cow urine	Litres	0.22	11.17
3. Lime	kg	0.0015	0.05
II. Labour cost	Rs.		20.00 (51.02)*
1. Barrel filling and maintenance	MD	0.08	16.67
2. Mixing	MD	0.017	3.33
III. Interest on working capital	Rs.		2.90 (7.41)*
IV. Total variable cost (I+ II+III)	Rs.		39.20 (100)**
V. Total production cost (IV)	Rs.		39.20
Gross returns	Rs.		75.58
Net returns	Rs.		36.38
Benefit cost ratio			1.93

Note: * Percentage to total variable cost
** Percentage to total cost
MD stands for man days

4.6.7 Cost and returns in Beejamruta production and sale

Table 4.18 presents the total cost and returns incurred to produce per litre of Beejamruta. A total variable cost which primarily constitutes the material cost accounted for 100 percent of total cost. Material cost which arose on account of procurement of cow urine, lime, cow dung which accounted for around 41.57 percent of total variable cost. Interest on working capital which was calculated at 8 percent per annum and accounted for around 7.41 percent of the total variable cost. This table shows that the total variable cost incurred per litre of Beejamruta was Rs.39.20. Over all, the total cost of production of Beejamruta per litre was Rs.39.20. This table also reveals that gross returns which amounted to around Rs.75.58 per litre on an average and net returns which amounted to around Rs.36.38 and also benefit cost ratio in liquid Beejamruta production in the district was 1.93. Cost components in Beejamruta production is graphically represented in Fig. 9.

Table 4.19 presents cost and returns from production and sale of Beejamruta. The table depicts two types of costs incurred, namely production cost and marketing cost. As the previous table (Table 4.18) showed, the production cost per litre of Beejamruta was Rs.39.20 which accounted for around 51.86 percent of the value of the price realized. As such, the total marketing cost amounted to Rs.8.62 per litre and accounted for around 11.40 percent of the price realized. The table also showed that price realized on an average per litre of Beejamruta amounted to Rs.75.58 and thus the net return per litre of Beejamruta was Rs.27.76, which represents 36.73 percent of the price realized.

4.6.8 Cost and returns in oilcake manure production and sale

The cost and returns incurred to produce per litre of oilcake manure are presented in Table 4.20. Total variable cost which primarily comprised the material costs accounted for 88.15 percent of total cost. Material cost which arose on account of procurement of agriculture waste and oil cakes which accounted for around 83 percent of total variable cost.

Labour cost which accounted for around 9.59 percent of the total variable cost were incurred for pit filling, watering and sieving. Interest on working capital which was calculated around 8 percent and accounted for around 7.41 percent of the total variable cost. The table also shows that the total variable cost incurred per ton of oilcake manure was Rs.1512.72. Total fixed cost which amounted to Rs.203.29 per ton accounted for around 11.85 percent of total cost of production. The components of the fixed cost were land rent and depreciation on working shed charges. The total cost of production of oilcake manure per ton was Rs.1716. This table also reveals that gross return which amounted to around Rs.2450 per ton on an average and net returns which amounted to around Rs.734 and also benefit cost ratio was around 1.43. Cost components in oilcake manure production is graphically represented in Fig. 10.

The economics of oilcake manure production and sale are presented in Table 4.21. The table shows two types of costs incurred, namely production cost and marketing cost. As the previous table (Table 4.20) showed, the production cost per ton of oilcake manure was Rs.1716 which accounted for around 70.04 percent of the value of the price realized. Total marketing cost amounted to Rs.286 per ton and accounted for around 11.67 percent of the price realized. The table also showed, that price realized on an average per ton of oilcake manure amounted to Rs.2450 and thus net return per ton of oilcake manure was Rs.448 which represents 18.29 percent of the price realized.

4.7 Marketing efficiency of organic inputs

To know the event of value added through the marketing system for the organic inputs considered, the marketing efficiency were calculated and the same are presented in Table 4.22. A bird's eye view of the table reveals that marketing efficiency was the highest (426.15%) in the case of poultry manure marketing followed by vermi compost (414.57%), sheep manure (358.85%) and goat manure (310.85%) marketing.

Marketing efficiency of the two liquid organic inputs produced by the organic input producers in the district were 422.10 percent in the case of Beejamruta and 328.61 percent in case of Jeevamrutha. The lowest marketing efficiency was found in the case of oilcake manure marketing in the district. Marketing of farm yard manure had a marketing efficiency of 310.43 percent.

4.8 Marketing margin in selling of organic inputs

The marketing margin in selling of various organic inputs produced in Dharwad district is presented in Table 4.23. Among the organic inputs produced and sold in the district, highest.

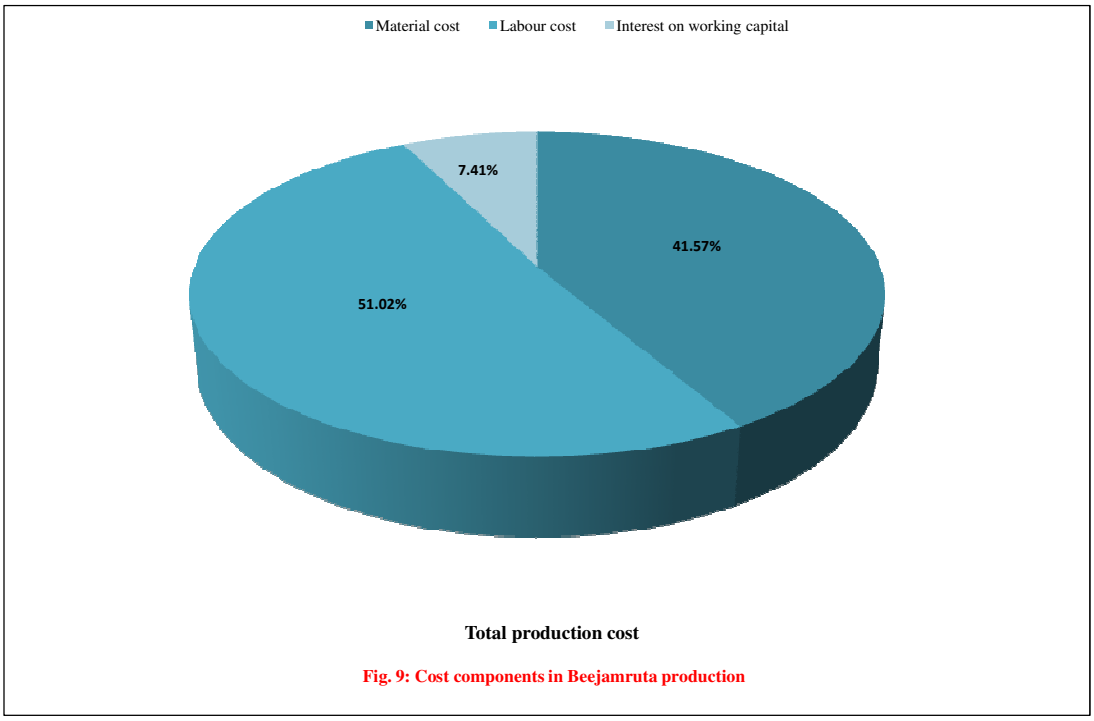


Fig. 9: Cost components in Beejamruta production

Fig 9: Cost components in Beejamruta production

Table 4.19: Cost and returns from production and sale of Beejamruta

(Rs./litre)

Particulars	Amount (Rs)
A. Total production cost	39.20 (51.86)*
B. Marketing cost	8.62 (11.40)*
i. Plastic bottles	5.00
ii. Packing	1.00
iii. Transportation cost	1.49
iv. Loading & unloading	1.13
C. Price realized per litre	75.58
Net returns per litre [C-B-A]	27.76 (36.73)*

*Figures in the bracket indicate the percentage to the price realized

Table 4.20: Cost and returns of oilcake manure production

(Rs./ton)

Particulars	Cost of oil cake manure		
	Unit	Physical quantity	Value (Rs.)
Variable cost			
I. Material cost	Rs.		1255.60 (83.00)*
1. Agricultural wastes and cow dung	Tons	1.65	495.60
2. Oil cakes	Tons	0.076	760.00
II. Labour cost	Rs.		145.07 (9.59)*
1. Pit filling	MD	0.44	87.50
2. Watering	MD	0.01	2.80
3. Sieving	MD	0.37	54.77
III. Interest on working capital	Rs.		112.05 (7.41)*
IV. Total variable cost (I+ II+III)	Rs.		1512.72 (88.15)**
Fixed cost			
1. Land rent	Rs.		100.00
2. Depreciation on working shed and equipments	Rs.		103.29
V. Total fixed cost	Rs.		203.29 (11.85)**
VI. Total production cost (IV+V)	Rs.		1716.01
Gross returns	Rs.		2450.00
Net returns	Rs.		733.99
Benefit cost ratio			1.43

Note: * Percentage to total variable cost
** Percentage to total cost
MD stands for man days

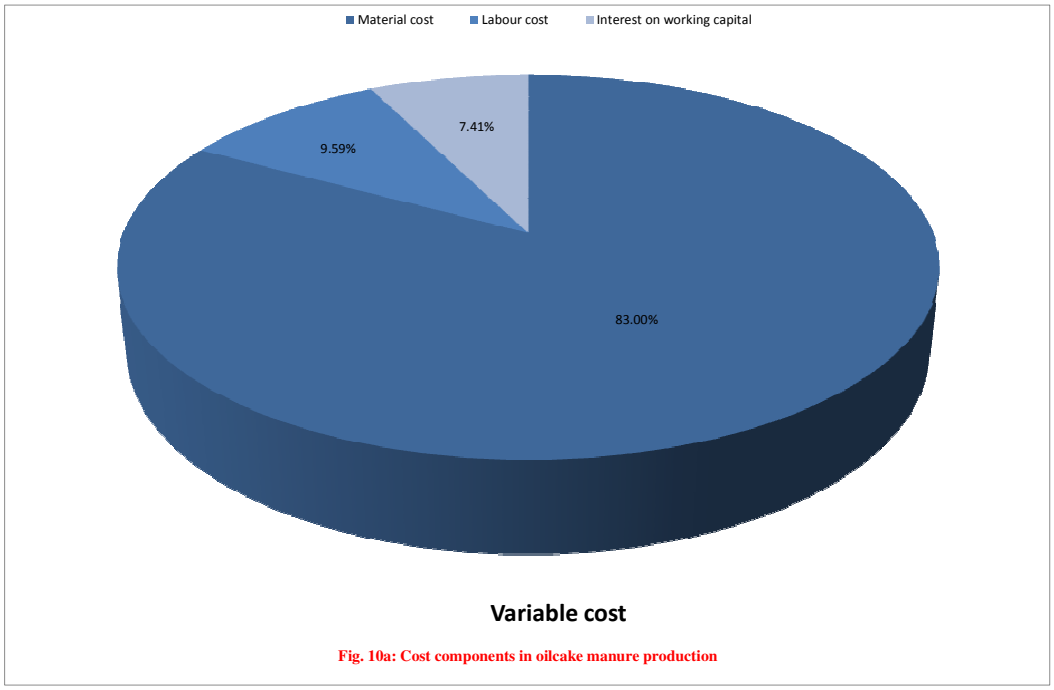


Fig. 10a: Cost components in oilcake manure production

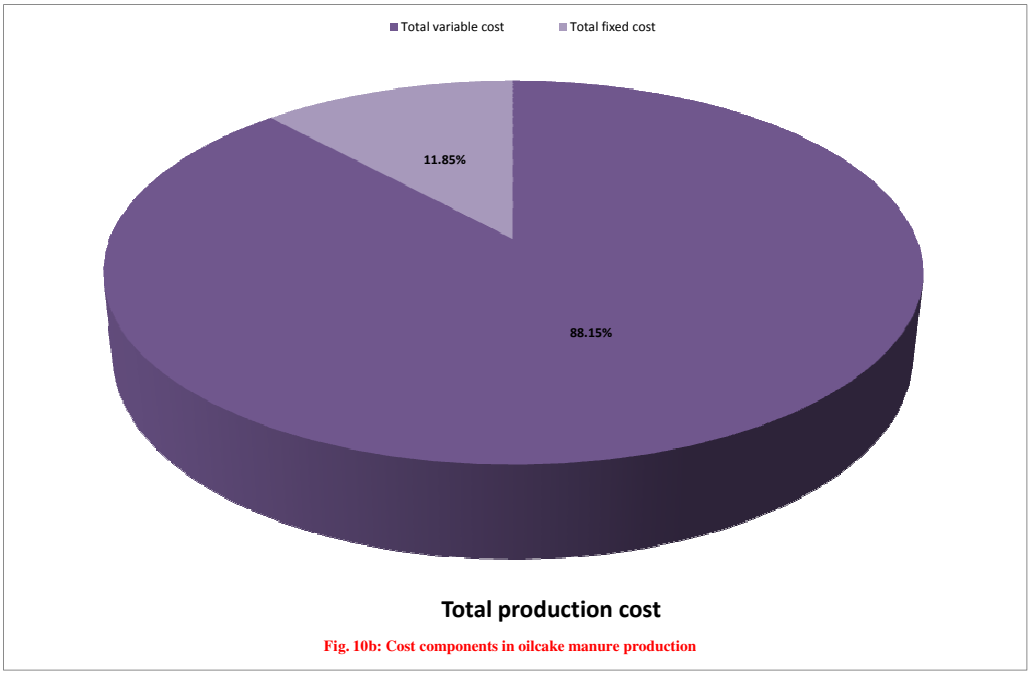


Fig. 10b: Cost components in oilcake manure production

Fig 10: Cost components in oilcake manure production

Table 4.21: Cost and returns from production and sale of oilcake manure

(Rs./ton)

Particulars	Amount (Rs)
A. Total production cost	1716.01 (70.04)*
B. Marketing cost	286.00 (11.67)*
i. Plastic bags	100.00
ii. Packing	20.00
iii. Transportation cost	112.00
iv. Loading & unloading	54.00
C. Price realized per ton	2450.00
Net returns per ton [C-B-A]	447.99 (18.29)*

*Figures in the bracket indicate the percentage to the price realized.

Table 4.22: Marketing efficiency of various organic inputs

Sl. no.	Name of the organic input	Unit	Value added in marketing system	Marketing cost	Marketing efficiency (%)
1.	Vermi compost	Ton	1119.35	270.00	414.57
2.	Farm yard manure	Ton	831.95	268.00	310.43
3.	Sheep manure	Ton	933.01	260.00	358.85
4.	Goat manure	Ton	809.77	260.50	310.85
5.	Poultry manure	Ton	1090.93	256.00	426.15
6.	Jeevamrutha	Litre	29.14	8.87	328.61
7.	Beejamruta	Litre	36.38	8.62	422.10
8.	Oilcake manure	Ton	733.99	286.00	256.64

Table 4.23: Marketing margin of different organic inputs

(Rs/Unit)

Sl. no.	Name of the organic input	Unit	Production cost (Rs.)	Selling price (Rs.)	Marketing margin (Rs.)
1.	Vermi compost	Ton	1847.31	2966.67	1119.35
2.	Farm yard manure	Ton	942.05	1774.00	831.95
3.	Sheep manure	Ton	1316.99	2250.00	933.01
4.	Goat manure	Ton	1423.56	2233.33	809.77
5.	Poultry manure	Ton	1881.07	2972.00	1090.93
6	Jeevamrutha	Litre	46.75	75.89	29.14
7.	Beejamruta	Litre	39.20	75.58	36.38
8.	Oilcake manure	Ton	1716.01	2450	733.99

Table 4.24: Problems regarding marketing of organic inputs

(n=200)

Sl. no.	Problems	Mean score	Garrett ranking
1.	Non availability of exclusive market for organic inputs	55.26	I
2.	Non availability of labour	54.87	II
3.	High transportation cost	53.27	III
4.	Poor transport facilities	53.26	IV
5.	Non availability of market related information	51.35	V
6.	Storage problem	48.74	VI
7.	Low price for the product	48.15	VII
8.	Low marketable surplus	46.72	VIII
9.	Faulty weighment	45.53	IX
10.	Non availability of information on organic farming	44.96	X

Table 4.25: SWOT analysis on marketing of organic inputs

Strength	Weakness
1. Safety food	1. Lack of established markets
2. Low cost of production	2. Poor quality management
3. High quality and improved nutrition	3. Lack of strategy for development of organic market
4. Improved soil health	4. Organic market buyers/consumers driven market
	5. Adulteration and poor quality of organic inputs
Opportunities	**Threats**
1. Growing health awareness	1. Low awareness about organic inputs
2. Growing market for organic products	2. Lack of infrastructure facilities like labs and certification bodies
3.Control of nitrate loss and Co_2 emissions	3. Costly and complex organic certification process

marketing margin was in vermi compost (Rs.1119.35 per ton) followed by poultry manure (Rs.1090.93 per ton), sheep manure (Rs.933 per ton) and farm yard manure (Rs.831.95 per ton). The two liquid organic inputs, Jeevamrutha and Beejamruta had marketing margin of Rs.29.14 and Rs.36.38 per litre respectively. Goat manure and oil cake manure had the marketing margin of Rs.809.77 and Rs.734 for each ton of the produce sold.

4.9 Problems in marketing of organic inputs

Garrett ranking analysis was carried out to rank the problems involved in marketing of organic inputs in the district. Based on the mean scores the ten identified marketing problems were ranked and the results are presented in Table 4.24. Among the problems, non availability of exclusive market for organic inputs was the most severe problem with a mean score of 55.26 and hence ranked as I. This was followed by the problems of non availability of labour, high transportation cost, poor transportation facilities, non-availability of market related information and storage problem with mean scores of 54.87, 53.27, 53.26, 51.35 and 48.74 respectively. The least prolific problems were the problems of low price for the product, low marketable surplus, faulty weighment and non-availability of information on organic farming with mean scores of 48.15, 46.72, 45.53 and 44.96 respectively.

4.10 Strength, weakness, opportunities and threats (SWOT) in marketing of organic inputs

In order to study the strength in marketing of organic inputs, weakness in operating them, opportunities available for the marketing of the same and the threats in taking up marketing of the organic inputs. SWOT analysis was carried out for a sample of 200 respondents and the results are presented in Table 4.25.

The food produced by organic inputs are safe to human health, there is low cost in producing of organic inputs, there will be high quality and improved nutrition supplied to the plants and the soil health will also be improved by making use of organic inputs. Thus these points would act as strength in marketing of organic inputs.

However, there are very less established markets for organic inputs. Poor quality management, lack of strategy for development of organic input markets, organic input markets being buyer driven market and adulteration and poor quality organic inputs are the weakness revealed from the study. Growing health awareness among the consumers of organic products, growing market for organic products and control over nitrate losses and Co_2 emissions were the opportunities revealed by the respondents in organic inputs marketing.

The threats for marketing of organic inputs were in the form of low awareness about the organic inputs among the farming community, lack of infrastructure facilities like laboratories and certification bodies which would help in improving marketing of these inputs and costly and complex organic certification processes as revealed by the respondents in the study.

DISCUSSION

The results of the investigation in the previous chapter are discussed in this chapter under the following heads.

5.1 Socio-economic characteristics of organic input producers

5.2 Reasons for shifting over to organic farming

5.3 Production and sale of organic inputs in the study area

5.4 Organic input production by the farmers in the district

5.5 Demand for organic inputs in the district

5.6 Economics of production of organic inputs in the district

5.7 Marketing efficiency of organic inputs

5.8 Marketing margin in selling of organic inputs

5.9 Problems in marketing of organic inputs

5.10 Strength, weakness, opportunities and threats in marketing of organic inputs

5.1 Socio-economic characteristics of organic input producers in the district

The socio-economic characteristics of organic input producers in the district were studied with respect to the age, education level, occupation, annual income and land holding of the sample respondents in the district. It is found that majority of the respondents were of middle aged (56%). A sizeable proportion of them (22.5%) are of older ages (>50 years). This indicates that the organic input producers have rich experience in production and marketing of the produce. Higher the experience better would be the efficiency in the business as evidenced by the higher proportion of organic input producers in the district. Better efficiency would lead to greater success in the business. Hence the experience with respect to organic input production in the district would make the producers successful in organic input production and marketing.

Level of education is also another consideration which would speak about the success in organic input production and marketing. More than 75 percent of the respondents were literate who can follow the literature related to recent developments in organic input production and thus could modify or conveniently adopt new technologies very easily which would reflect in higher efficiency. At the same time it is alarming to see a sizeable proportion of respondents (24%) were still illiterate. This is a matter of greater concern for the healthy development of organic input production sector. As organic farming is gaining more importance in recent years, the new developments and innovations in the field are to be quickly imbibed by the farmers concerned for attaining higher efficiency. Therefore there is a need to make those illiterate farmers in the society as educated by looking into the importance of the organic farming under the present context.

The majority of the respondents had agriculture as the main occupation (58.5%) and the remaining also practicing agriculture as subsidiary occupation that means all the respondent organic input producers have agricultural back ground. This is a welcome sign as far as agricultural organic input producers are concerned. Those organic input producers who will have the basic knowledge in agriculture can produce the best organic inputs which are going to be the most effective in insitu situations. Therefore it is evident that these input producers would have tested the organic input produced by them in their own fields and could have made improvements in their effectiveness before selling them to others. Hence it could be presumed that these organic inputs will have sustained demand in the future years as well.

Higher proportions of organic input producers (nearly about 52%) have got sizeable annual income. Higher the income, more will be the savings and thus their investment capacity in the business would improve. Organic input production is basically a low investment business, the producers could readily invest in such organic input production ventures without much hiccups.

It is seen from table 4.1 that the organic input producers have enough land holding (2.19 ha) to denote lands for organic input production. Since the unirrigated land was quite sizeable (on an average 1.26 ha) among the respondents, the land which could not be utilized for crop husbandry, could be effectively utilized for organic input production. Thus these organic input producers could effectively augment their family income through organic input production and sale apart from cultivating their land and generating income.

5.2 Reasons for shifting over to organic farming

In addition to the above factors which had developed a favorable platform for organic input production in the district, There are several other contributing factors as well as which has led to shift over organic farming, has also induced encouragement for organic input production in the district. Among those contributing factors that led to shifting over organic agriculture, quality, conscious of organically produced products, increased return from organic products, increased cost of inorganic inputs and consciousness to protect the soil health by making use of organic inputs were the major factors which have induced the use of organic inputs and in turn have effectively supported organic input production and sale business in the district.

5.3 Production and sale of organic inputs in the district

The organic inputs produced and sold in the district were mainly in two forms, *viz.,* solid and liquid forms. Amongst the organic inputs dealt by the input producers in the district, vermi compost manure, farm yard manure, sheep manure, goat manure, poultry manure and oilcake manure were solid form preparations where as Jeevamrutha and Beejamruta were produced in liquid form and sold to the farmers in the district.

All the solid organic inputs produced in the district were either produced through heap method or trench method. The liquid forms were produced only through barrel method. The ingredients and raw materials are heaped above the ground and covered with solid waste for fermentation and microbial activities, so that the ingredients and raw materials are decomposed to form the manure, is termed as heap method. But in case of trench method, the trenches of convenient size are dug into the ground and the raw materials and ingredients are dumped into the trenches and covered with air tight covers to facilitate the microbial action and to convert them into nutrient rich manure.

In all the six solid organic input production, trench method was found to be more popular among the organic input producers in the district. Ease and effectiveness in operations, less wastage of the inputs and intactness of microbial activity might be the reason for popularity of trench method. Since the raw materials are heaped above the ground, there is possibility of wastage of raw materials which may get strewed all over due to wind or due to the activity of animals and other sources which may lead to wastage of manure resulting into less output of the final product. However convenience in operation and less availability of space to dig trenches might be the reason for some of the producers to go for heap method.

The liquid forms of organic input are produced conveniently through barrel methods. Tin or plastic barrels of around 30 litres capacity were found convenient by the organic input producers for production of Beejamruta and Jeevamrutha.

The sales frequency was found to be different for different types of organic inputs produced in the district. Vermi compost manure, farm yard manure and Jeevamrutha are sold in higher proportions on monthly frequency. These are the organic inputs which are required for treatment to the crops at regular intervals. Vermi compost manure and farm yard manure are applied to the crops at the time of sowing and also as top dress to the crops at different growth stages. Jeevamrutha is also used as foliar spray at different stages of crop growth. Therefore there will be a continuous demand for these organic inputs resulting in more frequent sales.

On the other hand sheep manure, goat manure, poultry manure, oilcake manure and Beejamruta are the organic inputs which are used for specific purposes. Amongst these, the four solid organic inputs (the first four) are usually used for soil application at the time of land preparation before sowing. Therefore they are demanded less frequently coinciding with the beginning of crop season. Beejamruta is also that organic input which is used as a seed treatment ingredient. Therefore it is demanded only at the time of sowing of crops in respective seasons. Hence the frequency of sale of Beejamruta was coincided with the beginning of the crop season and therefore the sale of it was usually on quarterly basis.

5.4 Organic input production by the farmers in the district

Proportion of sample respondents producing different organic inputs and average quantity of each of the organic inputs produced by them are presented in Table 4.4. It is found from the table that farm yard manure and vermi compost manure are produced by large number of respondents in the study area. These are the two basic nutrient supplying organic manures required to be applied at different stages of crop growth. Hence there was a necessity to produce them in large quantity to meet the demand of the purchasers. The ongoing discussion also supports the findings of the previous sections. However poultry manure and Beejamruta are also produced in substantial quantities by large number of respondents. Sheep manure, goat manure and oilcake manure are produced by smaller proportion of the respondents in less quantity. Availability of the raw material and selective utility of the produce might be the prime reason for such a behavior.

5.5 Demand for organic inputs in the district

It is evident from table 4.5 that the demand for all the organic inputs considered for the study has steadily been increased over the years. This is the welcome sign for the producers of the organic inputs that the prospects of production and sale of organic inputs in the district would be very good. The concept of organic farming gained a lot of importance during the early years of 21st century because of the health hazards, effects of the farm produce which are produced by making use of inorganic chemicals and fertilizers. Increased awareness among the consuming population has led to the demand for organically produced farm products. This in turn necessitated the increased use of organic inputs to produce the desired organic products. Therefore the demand for the organic inputs went on increasing year by year by enlarge.

The table also reveals the rate of growth of demand for the organic inputs during the study period. It is seen that farm yard manure and sheep manure have higher growth rates as compared to other organic inputs studied. Farm yard manure is the traditionally used organic supplement by almost every farmer. Farm yard manure and sheep manure are the well known organic inputs to the farmers of the region. They are rich source of nutrients and were being utilized as soil amendments in the re-fertilizer era. Thus when it was thought by the farmers of the region to switch over from inorganic agriculture to organic agriculture, first that would come to their mind are these two organic inputs. Hence it is quite obvious that the demand for these organic inputs increased at a higher growth rate.

The demand for vermi compost also grown at sizeable proportion (1.82% per annum). Vermi composting is the new technology, the output of which known as vermi compost manure. It has become very popular in the region in recent years because of its higher productive capacities, as a rich source of soil nutrients. Due to the effect of demonstrations conducted by agricultural universities and extension personnel, the utility of the vermi compost manure is wide spread. Hence many farmers want to use vermi compost manure on their field, which has led to steady increase in the demand of the produce.

However Beejamruta and oilcake manure are very recent innovations among the farm inputs. The benefits of these inputs have not yet been disseminated among the farming population on a large scale. Therefore the demand for the same was not on a high growth rate.

5.6 Economics of production of organic inputs in the district

In order to arrive at the net returns generated in production and marketing of various organic inputs considered for the study, the cost-return analysis was carried out separately for each of the organic inputs. The cost included for fixed as well as variable cost and the returns generated were based on the value realized by selling of the respective organic input.

For the two liquid organic inputs, Beejamruta and Jeevamrutha, the cost-return analysis was met on per litre basis and for rest of the organic inputs, *viz.,* farm yard manure, vermi compost manure, sheep manure, goat manure, poultry manure and oilcake manure, the analysis were done on per ton basis and the results are presented in table 4.6 through 4.21. The Table 5.1 explains the cost of production, gross returns, net returns and B:C ratio of all the eight organic inputs of this study.

5.6.1 Cost and returns in vermi compost production and sale

Cost and returns in vermi compost manure production and sale. Among the total cost of production of vermi compost manure, nearly 85.85 percent of the total cost was constituted by variable cost. Among all the variable cost, material cost was the prime variable cost item, expenditure

on agricultural wastes and cow dung which are to be placed for decomposition and action of earthworms regularly. The cost of earthworms is also to be considered. Hence the proportion of material cost out of total variable cost blotted to around 75.18 percent. Labour were required for filling up pits, worm separation, watering the trenches or heaps, collection of wastes and sieving of vermi compost manure. All these costs put together were around Rs.276 per ton. The interest on working capital was worked out at bank rate of 8 percent. Thus the total variable cost worked out to be around Rs.1585.88 per ton of vermi compost produced. The fixed cost comprised of land rent as well as depreciation on working shed and equipments, put together were around Rs.261.43 per ton. Thus the total cost for producing one ton of vermi compost manure was worked out to around Rs.1847.31. The average price realized on each ton was Rs.2967. Thus yielding a net return of Rs.1119.35 at the farm level. The benefit-cost ratio was 1.61 indicating that vermi compost manure production is a profitable venture.

For marketing of the vermi compost manure on an average around Rs.270 were to be spent and thus the net returns that would be generated from production and marketing of each ton of vermi compost manure would be around Rs.849.35.

5.6.2 Cost and returns in farm yard manure production and sale

The expenditure incurred for producing each ton of farm yard manure in the study area and gross returns generated by selling of it are presented in table 4.8 and the sales realization of marketing of the produce are depicted in table 4.9. Of the total cost, variable cost constituted around 76.63 percent and fixed cost around 23.37 percent. Among the variable cost, material cost, labour cost and interest on working capital were the major cost components. Material cost comprising of agricultural wastes, cow dung and cow urine constituted around 76.70 percent of variable cost and was Rs.553.68 per ton in value terms. Pit filling and watering of trenches or heaps were the major components of labour cost. The interest on the expenditure on above two variable cost items were worked out at 8 percent rate of interest and were added to variable cost under the head interest on working capital. Thus the total variable costs amounted to Rs.721.91 per ton of farm yard manure produced.

Land rent as well as depreciation on working shed and equipments were the major fixed cost item, both of which put together costs around Rs.220.14 under the fixed cost head. From the value realized by selling of each ton of farm yard manure Rs.1774, the production cost of Rs.942 were taken out to arrive at the net returns of Rs.831.95 per ton. The benefit-cost ratio reveals that for each rupee invested, the farm yard manure producers could realize 1.88 rupees indicating farm yard manure production and sale is a profitable venture.

The producers of farm yard manure in the district spent around Rs.268 as marketing cost for plastic bags, packing, transportation, loading and unloading of the produce. Thus if this is also taken out from net returns after production (Rs.831.95 per ton). The net return realized in production and sale of farm yard manure in the district was around Rs.563.95 per ton which was around 31.79 percent of the value realized. Thus farm yard manure production and sale in the district is a profitable venture.

5.6.3 Cost and returns in sheep manure production and sale

Analysis of the cost of production and sale of sheep manure per ton is presented in table 4.10. It is clearly evident from the table that there was a wide variation in different cost components. Among the operational costs, the share of material costs on account of agriculture wastes and sheep droppings was the highest ones. This accounted for around 80.24 percent of the total variable cost. It was so because agriculture wastes and sheep droppings were the main components of sheep manure production and were required in large quantity. Hence, the cost of these inputs accounted for a major share in the total variable cost of sheep manure production. Labour cost and interest on working capital accounted for around 12.35 and 7.41 percent of the total variable cost. The share of fixed cost per ton of sheep manure production was relatively less (17.23%) in comparison with variable cost. The components of fixed cost were land rent as well as depreciation on working shed and equipments. This table also reveals that gross returns which amounted to around Rs.2250 per ton on an average and net returns which amounted to around Rs.933. The benefit cost ratio was 1.71. Thus, sheep manure production and sale is a profitable venture because on every rupee that is invested in sheep manure production, then respondents can earn 1.71 rupees.

The overall cost and returns from production and sale of sheep manure (Table 4.11) revealed that cost of production per ton of sheep manure was of Rs.1317. Total marketing cost incurred per

ton. of sheep manure was of Rs.260 in which transportation cost was Rs.92 had the maximum share since the producer himself had to take the compost to distant markets from the production unit. Further, loading and unloading costs were Rs.48 while sheep manure producers could get Rs.673 per ton of sheep manure in open market and they could sell to users.

5.6.4 Cost and returns in goat manure production and sale

Cost and returns in goat manure production and sale is presented in table 4.12. The table shows that there was wide variation in different cost components. The share of material costs on account of agriculture wastes and goat droppings, cow urine and addition of supplemental wastes was the highest ones. This accounted for around 81.19 percent of the total variable cost. It was so because agriculture wastes, goat droppings, cow urine and addition of supplemental wastes were the main components of goat manure production and were required in large quantity. Hence, the cost of these inputs accounted for a major share in the total variable cost of goat manure production. Labour cost and interest on working capital accounted for around 11.40 and 7.41 percent respectively of the total variable cost. The share of fixed cost per ton of goat manure production was relatively less (14.72%) in comparison with variable cost. The components of fixed cost were land rent as well as depreciation on working shed and equipments. This table also reveals that gross returns which amounted to around Rs.2233 per ton on an average and net returns which amounted to around Rs.809.77 per ton and this goat manure production activity gives around Rs.1.57 on each rupee invested. Thus goat manure production is a profitable venture.

Table 4.13 presents cost and returns from production and sale of goat manure shows that cost of production per ton of goat manure was Rs.1423.56. Total marketing cost incurred per ton of goat manure was Rs.260.50 in which transportation cost was Rs.93 had the maximum share since the producer himself had to take the goat manure to distant markets from the production unit. Further, loading and unloading costs were Rs.47.50. Goat manure producers could get Rs.549.27 of net returns per ton of goat manure in open market.

5.6.5 Cost and returns in poultry manure production and sale

The economics of cost of production and sale of poultry manure are presented in table 4.14. The table reveals that there was a variation in different cost components. Among variable costs, the share of material costs on account of agriculture wastes and poultry droppings was the highest ones. The addition of super phosphate is low compared to agricultural wastes and poultry droppings. Labour cost and interest on working capital accounted for around 11.38 and 7.41 percent of the total variable costs respectively. The share of fixed cost per ton of poultry manure production was relatively less (10.72%) in comparison with variable cost. The components of fixed costs were land rent as well as depreciation on working shed and equipments. This table also reveals that gross returns which amounted to around Rs.2972 per ton on an average and net returns which amounted to around Rs.1090.93 and also benefit cost ratio was 1.58 indicates that poultry manure production and sale is a profitable one.

The overall cost and returns from production and sale of poultry manure (table 4.15) revealed that cost of production per ton of poultry manure was of Rs.1881. Total marketing cost incurred per ton of poultry manure was of Rs.256 in which transportation cost was Rs.90. Loading and unloading charges were Rs.46 per ton which was the major component of marketing cost. Poultry manure producers could get Rs.834.93 per ton of poultry manure in open market.

5.6.6 Cost and returns in Jeevamrutha production and sale

Analysis of cost of production per litre of Jeevamrutha is presented in table 4.16. The table showed that there was a difference in different cost components. Among the operational costs, the share of material costs on account of jaggery, cow dung and cow urine was the highest ones. This accounted for around 48.03 percent of the total variable cost. It was so because jaggery, cow dung and cow urine were main components of Jeevamrutha production and were required in large quantity. Hence the cost of these inputs accounted for a major share in the total variable cost of Jeevamrutha production. Labour cost and interest on working capital accounted for around 44.56 and 7.41 percent respectively of the total variable cost. This table showed that gross returns which amounted to around Rs.75.89 per litre on an average and net returns which amounted to around Rs.29.14 per litre. The benefit cost ratio reveals that for each rupee invested, the Jeevamrutha producers could realize Rs.1.62 indicates Jeevamrutha production and sale is a profitable venture.

Table 5.1: Cost of production and marketing of different organic inputs

Sl. no.	Name of the organic input	Unit	Production cost (Rs.)	Gross returns (Rs.)	Net returns (Rs.)	B:C ratio
1	Vermi compost	Ton	1847.31	2966.67	1119.35	1.61
2	Farm yard manure	Ton	942.05	1774.00	831.95	1.88
3	Sheep manure	Ton	1316.99	2250.00	933.01	1.71
4	Goat manure	Ton	1423.56	2233.33	809.77	1.57
5	Poultry manure	Ton	1881.07	2972.00	1090.93	1.58
6	Jeevamrutha	Litre	46.75	75.89	29.14	1.62
7	Beejamruta	Litre	39.20	75.58	36.38	1.93
8	Oilcake manure	Ton	1716.01	2450.00	733.99	1.43

The total cost and returns from production and sale of Jeevamrutha (Table 4.17) showed that cost of production per litre of Jeevamrutha was Rs.46.75. Total marketing cost incurred per litre of Jeevamrutha was Rs.8.87 in which plastic bottle charges were Rs.5 which had maximum share. Jeevamrutha producers could get Rs.20.27 per litre of Jeevamrutha in an open market.

5.6.7 Cost and returns in Beejamruta production and sale

The economics of cost and returns of production per litre of Beejamruta is presented in table 4.18. The table reveals that there was a wide difference in different cost components. Among the operational costs, the share of material costs on account of lime, cow dung and cow urine was the highest ones and accounted for around 41.57 percent of the total variable cost. Labour cost and interest on working capital accounted for around 51.02 and 7.41 percent of the total variable cost respectively. This table also reveals that gross returns which amounted to around Rs.75.58 per litre on an average and net returns which amounted to around Rs.36.38 and also benefit cost ratio was 1.93.

Marketing of Beejamruta (Table 4.19) showed that cost of production per litre of Beejamruta was Rs.39.20. Total marketing cost incurred per litre of Beejamruta was Rs.8.62 in which transportation cost was Rs.1.49. Further loading and unloading costs was also Rs.1.13, while Beejamruta producers could get Rs.27.76 per litre of Beejamruta in open market.

5.6.8 Cost and returns in oilcake manure production and sale

Analysis of the breakup of cost of production per ton of oilcake manure is presented in table 4.20. From this table 4.20 showed that there was a wide variation in different cost components. Among the variable costs, the share of material costs on account of agriculture waste, oilcake and cow dung accounted for around 83 percent of the total variable cost. It was so because agriculture wastes, cow dung and oilcake were main components of oilcake manure production and were required in large quantity. Hence the cost of these inputs accounted for a major share in the total variable costs of oilcake manure production. Labour cost and interest on working capital accounted for around 9.59 and 7.41 percent of the total variable cost respectively. The share of fixed cost per ton of oilcake manure production was relatively less (11.85%) in comparison with the variable cost. The components of fixed costs were land rent as well as depreciation on working shed and equipments. This table also reveals that gross returns which amounted to around Rs.2450 per ton on an average and net returns which amounted to around Rs.734 and also benefit cost ratio was around 1.43.

The total cost and returns from production and sale of oilcake manure (Table 4.21) showed that cost of production per ton of oilcake manure was Rs.1716. Total marketing cost incurred per ton of oilcake manure was Rs.286 in which transportation cost was Rs.112. Further loading and unloading costs were Rs.54 and cost of plastic bags was Rs.100. These three were the major components of the marketing costs. Of the price realized by selling of one ton of oilcake manure Rs.2450, the net returns realized by production and sale of oilcake manure was Rs.448.

5.7 Marketing efficiency of organic inputs

The marketing efficiency is a measure of value added to the products due to the introduction of marketing system in case of the organic inputs produced and marketed in the district. The marketing cost per unit was more or less same. Therefore change in marketing efficiency was by enlarge dependent on the value added by the marketing system. The marketing efficiency was the maximum in the case of poultry manure, mainly because of higher value addition through the marketing system with the same marketing cost of other organic inputs. The marketing efficiency was relatively better with respect to vermi compost manure, sheep manure, goat manure and farm yard manure. Therefore the marketing efficiency study indicates that production and sale of these organic inputs is more beneficial. However in case of other organic inputs though there is a higher marketing efficiency, the value addition through marketing system is relatively low. Therefore, it would be better for the organic input users to produce these organic inputs which have lesser marketing efficiency of their own rather than relying upon the markets for their requirement.

5.8 Marketing margin in selling of organic inputs

The study of marketing margin in selling of various organic inputs revealed that vermi compost, poultry manure, sheep manure and farm yard manure were the maximum marketing margin paying organic inputs in the district. Therefore, any new ventures in organic input production in the district can keep these things in mind while entering into the business. However not only the

marketing margin, but the volume of production also speaks about the profit in the business. Even then for a new entrepreneur production and sale of vermi compost, poultry manure, sheep manure, farm yard manure and goat manure production and sale are the most attractive ventures.

5.9 Problems in marketing of organic inputs

Non-availability of exclusive markets for organic inputs was the most serious problem in the study area, followed by non-availability of labour and high transportation cost itself. These problems can be very well addressed by conducting awareness campaigns among the users of organic inputs.

Poor transportation facilities, non-availability of market related information, storage problem, low price for the product, low marketable surplus, faulty weighment, and non-availability of information on organic farming are the structural problems which can be solved by the intervention of institutional agencies.

5.10 Strength, weakness, opportunities and threats in marketing of organic inputs

In marketing of organic inputs, safety of the food produced by making use of organic inputs was the important strength under present scenario. The farm products produced by using chemicals and fertilizers led to the traces of residues remaining in the output and thus making the products health hazards. The alternative lies with producing the farm input by making use of organic inputs. This will add phillip to the production and marketing of organic inputs, their ability to supply high quality and improved nutrition and also to their property to improve the soil health have become the important strength in marketing business of organic inputs.

There is no proper market established for efficient marketing of these organic inputs this serves as serious weakness in marketing front of these organic inputs. Production of poor quality organic inputs has become a weakness in the marketing front. Lack of strategy for development of organic input markets being consumer driven market were the other weakness encountered during the study. Adulteration and admixture of poor quality materials with the organic inputs with an intention of getting higher profits was another serious weakness encountered by the sellers in the study area.

The organic input marketing has got several opportunities as well. Slowly and gradually the awareness about the benefits of using organically produced output is increasing among the general public. This will prompt the farmers to grow products using only organic inputs. Thus there is lot of opportunities for production and marketing organic inputs. Growing markets for organic inputs and awareness among the growers that organic inputs control the nitrate losses and CO_2 emissions also are the greatest opportunities for the organic input producers.

There are certain serious threats in organic input production and marketing business as well low awareness among the farming population about the benefits of organic inputs has become the serious threat for the success or organic input production and sale. Lack of infrastructure facilities like well equipped laboratories to test the purity of organic inputs and to provide certification to organic input producers also become a serious threat for development of organic input marketing. The organic input certification process itself is very costly and also it is a complex process. Therefore many organic input producers are not coming forward to produce and release organic inputs on a big scale. If all these threats and weakness are overcome and congenial environment if created, organic input production and marketing business would grow to new heights where in the organic input producers would reap suitable rewards for their efforts.

SUMMARY AND POLICY IMPLICATIONS

6.1 Introduction

Indian farmers were basically organic farmers before the advent of inorganic fertilizers and chemical pesticides. Overtime, the use of these synthetic inputs has come to the level of causing a concern to the environment and human health.

Most of the India's arable land is under traditional agriculture, where no synthetic inputs are being used. Although, the products grown under such systems have so far not been defined as organic products but by all means they are genuine organic products.

Certified organic products including all varieties of food products namely basmati rice, pulses, honey, tea, spices, coffee, oilseeds, fruits, processed food, cereals, herbal medicines and their value added products are produced in India. Apart from edible sector, organic cotton fiber, garments, cosmetics, functional food products and body care products are also produced. Banana, pomegranates, pineapple, grapes, amaranthus, ginger, large cardamom, sweet fennel, peanut, onion, sugar and jaggery are other commodities which will emerge as significant organic commodities produced in India.

Benefits of organic farming includes different parameters like agriculture, environment, social conditions, economic conditions and organizational or institutional. The parameter agriculture includes increased diversity, long term soil fertility, high food quality, reduced pest or diseases, self reliant production system and stable production, where as parameter environment includes reduced pollution, reduced dependence on non renewable resources, negligible soil erosion and wild life protection, resilient agro-eco system, compatibility of production with environment. The parameter social conditions includes improved health, better education, strong community, reduced rural migration, gender equality, increase in employment, good quality work where as parameter economic conditions includes stronger local economy, self reliant economy, income security, increased returns, reduced cash investment and low risk. The parameter organizational or institutional benefits include cohesiveness, stability, democratic organizations and also enhanced capacity.

Organic inputs

In promotion of organic farming, use of organic inputs has assumed an important position. Contrary to conventional farming where synthetic inputs are used to feed the crop and protect the crop by direct action, but in organic farming, organic inputs are being used to feed the soil and to create an environment which can collectively keep the pests below economical threshold limit (ETL). In this endeavor although quantity may not be an important issue, but quality of input is of prime importance. In the recent years, efforts have been made to promote appropriate production methodology among farmers for effective conversion of organic waste into nutrient rich compost and for preparing botanical extracts for pest management.

Production of organic inputs in the district are farm yard manure, sheep manure, goat manure, oilcake manure, vermi compost manure, Jeevamrutha, and Beejamruta. Among these organic inputs, vermi compost manure production was highest and accounted for around 30 percent, followed by farm yard manure, poultry manure, Beejamruta, goat manure, Jeevamrutha, sheep manure, and oilcake manure.

Marketing of organic Inputs

The production and marketing of organic inputs and its application to the crops has been assuming increasing importance in present days when the problems like degradation, loss of soil fertility and rising cost of chemical fertilizers are besetting the farm sector.

As there is no adequate information available on practice as well as production of different organic inputs being followed by organic farmers in Dharwad district. None of the previous studies have reported about production and practice of different organic inputs and there is a need of proper study on cost and returns involved and also the market prices of organic input production. This study also emphasis on problems encountered by organic farmers in marketing of organic inputs. Keeping this in view, the study was conducted with the following objectives.

6.2 Specific objectives

1. To identify and document the organic inputs produced in Dharwad district.
2. To estimate the demand for selected organic inputs in the district.
3. To analyse the cost and returns in the production of organic inputs.
4. To study the marketing management in major organic inputs in the district.
5. To identify the problems in marketing of organic inputs and to suggest appropriate policy measures.

6.3 Methodology

The present study pertains to Dharwad district. To accomplish the objectives of the study, two taluks of district namely, Hubli and Navalgund were purposefully selected.

For selection of organic input producers: two villages each from Hubli and Navalgund taluks were selected. They were Tarihal and Mishrakote from Hubli taluka and Shirur and Alagawadi from Navalgund taluk based on preliminary information collected from department of horticulture. Fifty organic producers were randomly selected from each village in each taluk. Thus, the total sample size was 200.

Primary data required for the present study was collected from various sources. Specifically organic input producers were interviewed and information is collected pertaining to their socio-economic characteristics, cost and returns in organic input production, marketing methods followed by them for the disposal of organic inputs, problems faced in organic input production and its marketing.

Detailed general information pertaining to Dharwad district and the two study taluks namely, Hubli and Navalgund were extracted from the records maintained at the Dharwad District Statistical Office and the Department of Agriculture. The information regarding the organic inputs, and also other organic farmers were collected from the records available at the Department of Horticulture, Krishi Vidyan Kendra (KVKs), and Bhartiya Agro- Industries Foundation (BAIF).

6.4 Major findings of the study

- The socio-economic characteristics of the 200 organic input producers revealed that majority (43.5%) of organic input producers have completed secondary education.
- It was observed that high percent (90%) of the sample farmers expressed that increasing cost of inorganic chemicals followed by soil health oriented motives (86.5%), quality of organic produce (81%), increasing returns (78.5%) and motivation by neighbouring organic farmers (64.5%) are the reasons for shifting from inorganic to organic farming.
- Production of organic inputs includes two forms *viz.,* solid and liquid. In case of solid manure, vermi compost, farm yard manure, sheep manure, goat manure, poultry manure and oilcake manure. In case of liquid, there were only two organic liquids *viz.,* Jeevamrutha and Beejamruta. Most of the sample respondents were found to produce all the organic inputs using trench method. With regard to vermi compost sale, it was monthly in 56.66 percent of the cases, followed by farm yard manure (58%), sheep manure (40%), goat manure (36.66%), poultry manure (44%) and oilcake manure (29.41%). It is found that liquid organic inputs like Jeevamrutha producers were using barrel method only. With regard to Jeevamrutha sale, it was monthly in 56.66 percent of the cases and quarterly in around 43.33 percent. Beejamruta producers were also found using barrel method only. With regard to Beejamruta sale, it was monthly in 37.5 percent of the cases and quarterly in around 62.5 percent.
- It was observed that high percent (30%) of the sample farmers (60 farmers) producing vermi compost manure in the district. These farmers produce an average quantity of around 5.36 ton and total production in a year was around 21.44 ton, followed by farm yard manure, poultry manure, Beejamruta, goat manure, Jeevamrutha, sheep manure and oil cake manure.
- The study reveals that there was an increasing demand for all the organic inputs considered over the time period. It was observed that farm yard manure having high percent (2.85%) per annum followed by sheep manure (1.91%), vermi compost manure (1.82%), poultry manure (1.36%),

Jeevamrutha (1.05%), goat manure (0.95%), oilcake manure (0.88%) and Beejamruta (0.87%). These are the organic inputs demanded by the organic farmers in the district.

- Economics of vermi compost production shows that the total cost of production of vermi compost per ton was Rs.1847.31 which includes total variable cost incurred per ton of vermi compost was Rs.1585.88 (85.85%) and total fixed cost which amounted to around Rs.261.43 (14.15%). Out of the total variable cost, a material cost contributes (75.18%) and labour cost contributes (17.41%), interest on working capital (7.41%) and the benefit cost ratio was around Rs.1.61.

The total marketing cost amounted to Rs.270 per ton. Price realized on an average per ton of vermi compost amounted to Rs.2967 and the net return per ton of vermi compost was Rs.849.35.

- The total production cost of farm yard manure was Rs.942 per ton, variable cost represents around 76.63 percent and fixed cost represent around 23.37 percent. Among the variable cost, material costs representing 76.7 percent followed by labour cost which represent 15.90 percent and interest on working capital representing 7.41 percent. The net return realized was around Rs.831.95 per ton. The benefit cost ratio of farm yard manure in the district was 1.88.

The total price realized per ton production cost represented 53.1 percent (Rs.942) and marketing cost was 15.11 percent (Rs.268 per ton) leaving behind the net returns of Rs.563.95 on each ton of farm yard manure produced and marketed which constitutes nearly 31.79 percent of the price realized.

- Total cost of production of sheep manure per ton was Rs.1317 which has included variable cost of Rs.1090 (82.77%), followed by material cost (80.24%) and labour cost (12.35%), interest on working capital (7.41%) and the total fixed cost which amounted to Rs.226.96 (17.23%). The net returns which amounted to around Rs.933 and the benefit cost ratio was around 1.71.

The total marketing cost per ton was 11.56 percent (Rs.260 per ton) of the price realized. The table reveals that price realized on an average per ton of sheep manure marketing amounted to Rs.2250. The net return from production and sale of one ton of sheep manure was Rs.673 per ton which represents 29.91 percent of the price realized.

- Total production cost of goat manure was Rs.1423.56 per ton. The total fixed cost which amounted to around Rs.209.52 per ton accounted for around 14.72 percent of total cost of production. It was observed that gross returns which amounted to around Rs.2233 per ton and net returns which amounted to around Rs.809.77 and also benefit cost ratio of goat manure production was around 1.57.

The total marketing cost of goat manure was Rs.260.50 and accounted for around 11.66 percent which includes plastic bags, packing, transportation cost as well as loading and unloading charges. The price realized per ton was Rs.2233 and net return per ton of goat manure marketing was around Rs.549.27.

- The total variable cost of poultry manure per ton was Rs.1679.42 and accounted for around 89.28 percent which includes material cost and labour cost of Rs.1363.88 (81.21%) and Rs.191.13 (11.38%) respectively. Interest on working capital calculated at 8 percent, which accounted for around Rs.124.40 (7.41%). The total fixed cost was Rs.201.65 (10.72%) and the total production cost was around Rs.1881. The net returns per ton of poultry manure was around Rs.1090.93 and benefit cost ratio was 1.58.

The marketing cost was Rs.256 per ton of poultry manure. The price realized per ton of poultry manure was Rs.2972 and the net return per ton was Rs.835.

- The total variable cost per litre of Jeevamrutha production was around Rs.46.75 and total production cost was around Rs.46.75. The gross returns of Jeevamrutha production was Rs.75.89 per litre and the net returns of Jeevamrutha production was around Rs.29.14 per litre. The benefit cost ratio was around 1.62.

The net return of per litre Jeevamrutha production and marketing was Rs. 20.27. The price realized per litre of Jeevamrutha was Rs.75.89 and the total marketing cost was Rs.8.87.

- The total production cost of per litre Beejamruta was Rs.39.20 which includes the total variable cost of around Rs.39.20. The net return per litre of Beejamruta was around Rs.36.28 and the benefit cost ratio was 1.93.

The price realized per litre of Beejamruta was Rs.75.58 and the net return per litre of Beejamruta marketing was around Rs.27.76.

- The total variable cost of oilcake manure production was Rs.1512.72 and the total fixed cost was Rs.203.29. The total production cost of oilcake manure was Rs.1716 and the net returns of oilcake manure production per ton was around Rs.734. The benefit cost ratio was around 1.43.

The total marketing cost of per ton of oilcake manure was around Rs.286 which includes plastic bags, packing, transportation cost as well as loading and unloading charges. The price realized per ton of oilcake manure was Rs.2450 and the net return per ton of oilcake manure marketing was around Rs.448.

- It was observed that marketing efficiency was the highest (426.15%) in case of poultry manure marketing, followed by vermi compost (414.57%), sheep manure (358.85%), and goat manure (310.85%) marketing. Beejamruta (422.10%) and Jeevamrutha (328.16%) marketing in case of liquid organic inputs. The marketing efficiency of farm yard manure (310.43%), followed by oil cake manure (256.64).
- The study showed, that the highest marketing margin was in vermi compost production and marketing (Rs.1119.35 per ton), followed by poultry manure (Rs.1090.93 per ton), sheep manure (Rs.933 per ton), farm yard manure (Rs.831.95 per ton), goat manure (Rs.809.77 per ton) and the oilcake manure (Rs.734 per ton) The marketing margin of liquid organic inputs was Rs.36.38 for Beejamruta and Rs.29.14 for Jeevamrutha.
- The study revealed that non-availability of exclusive market for organic inputs was the most severe problem with a mean score of 55.26 and hence ranked as I, followed by non-availability of labour (II), high transportation cost (III), poor transportation facilities (IV), non-availability of market related information (V), storage problem (VI), low price for the product (VII), low marketable surplus (VIII), faulty weighment (IX) and non-availability of information on organic farming (X) were the problems faced by the organic farmers in marketing of organic inputs.
- There are some strength in marketing of organic inputs *viz.,* safety food, low cost of production, high quality and improved nutrition as well as improved soil health.
- Some weakness like lack of established markets, poor quality management, lack of strategy for development of organic market, organic market buyers/consumers driven market, adulteration and poor quality of organic inputs were the important weakness that are faced by the farmers during the marketing of organic inputs.
- Some opportunities in marketing of organic inputs are growing health awareness, growing market for organic products and controlling the nitrate loss and Co_2 emissions.
- Threats are also there in case of marketing of organic inputs like low awareness about organic inputs, lack of infrastructure facilities like labs and certification bodies as well as costly and complex organic certification process.

6.5 Policy implications

Based on the findings of the study following policy implications were drawn

1. The findings suggested that organic input production and marketing was profitable. However, many of organic input producers expressed the concern about lack of required market information for the disposal of their produce. The results have indicated that especially selling of organic manures on site of production would fetch more returns than selling it in open market as the transportation cost can be saved. There is a need to establish retail outlets by the farmer groups who are producing organic inputs at nearby towns to boost the sales of the same.
2. Farmers are facing the problem of non-availability of organic inputs hence large scale production of organic inputs should be undertaken and distributed to the farmers at reasonable rates by the NGO's, Department of Agriculture and private companies.
3. The cost of production of organic inputs is relatively low compared to inorganic inputs. Returns are also good in the production and marketing of organic inputs. But it consumes more time and is a slow process. There is a need of conducting awareness campaigns by extension workers among the farmers to increase the production and sales of organic inputs which in turn increase the returns.

4. The demand forecast analysis suggested that, there is ever increasing demand for organic inputs in future years. It is more true in light of increased demand for organically produced outputs in recent years. Therefore, organic farming, there by demand for organic inputs will be very high in future years. Hence, there is a necessity to revamp and rejuvenate organic input production in a big way to meet the increasing demand in the years to come.

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PRODUCTION AND MARKETING MANAGEMENT OF ORGANIC INPUTS IN DHARWAD DISTRICT

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ABSTRACT

The present study on production and marketing management of organic inputs in Dharwad district was carried out during the year 2011-12 in four villages of two taluks in Dharwad district of Karnataka. In this study, demand forecasting analysis was done for forecasting the demand of different organic inputs for next three years based on the previous year data available. Total production cost analysis showed that 1847, 942, 1317, 1424, 1881, 1716 rupees cost were involved in per ton of production of vermi compost, farm yard manure, sheep manure, goat manure, poultry manure, oil cake manure respectively where as 46.75 and 39 rupees per litre of Jeevamrutha and Beejamruta preparation respectively. The price realized was 2967, 1774, 2250, 2233, 2972 and 2450 rupees per ton of vermi compost, farm yard manure, sheep manure, goat manure, poultry manure, oil cake manure where as 75.89 and 75.58 rupees per litre of Jeevamrutha and Beejamruta respectively.

The net returns obtained after sale was Rs.849, Rs.562, Rs.663, Rs.539, Rs.821 and Rs.464 per ton of vermi compost, farm yard manure, sheep manure, goat manure, poultry manure and oil cake manure and Rs.20 and Rs.27 per litre of Jeevamrutha and Beejamruta respectively. The benefit cost ratio was found to be 1.61, 1.88, 1.71, 1.57, 1.58, 1.43, 1.61 and 1.93 for vermi compost, farm yard manure, sheep manure, goat manure, poultry manure, oil cake manure, Jeevamrutha and Beejamruta respectively.

Marketing efficiency of all the organic inputs was calculated to know the value addition through the marketing system. Marketing margin in selling of various organic inputs was also calculated. Garrett's ranking technique was adopted for studying the marketing problems of all the organic inputs and it revealed that non-availability of exclusive market for organic inputs and non-availability of labour are the major marketing problems.