6. SUMMARY OF MAJOR FINDINGS, POLICY IMPLICATIONS AND CONCLUSION

India bestowed with lot of potential to produce all varieties of organic products due to its various agro climatic regions. In several parts of the country, the inherited tradition of organic farming is an added advantage. This holds promise for the organic producers to tap the market which is growing steadily in the domestic market related to the export market.

The government of India has implemented the national Programme for organic production (NPOP). The national programme involves the accreditation programme for certification bodies; standards for organic production, promotion of organic farming etc. the NPOP standards for production and accreditation system have been recognized by European commission and Switzerland as equivalent to their country standards. Similarly, USDA has recognized NPOP conformity assessment procedures of accreditation as equivalent to that of US. With these recognitions, India organic products duly certified by the accredited certification bodies of India are accepted by the importing countries.

Organic vegetable production practices are assuming importance all over the world nowadays in order to make the harvested vegetables produce free of chemical fertilizers and pesticide residues to minimize environmental pollution and sustain the soil productivity. Organic vegetable farming relies up on crop rotations, crop residues, green manures and mechanical cultivation, bio fertilizers and biological pest control methods to maintain soil productivity to supply nutrients, to control pests, diseases and weeds.

Organic vegetable production is becoming important in the horticulture sectors that promote environmentally, socially and economically sound production of vegetables. These systems take local soil fertility as a key to successful organic vegetable production. By respecting the natural capacity of plants, animals and landscape, it aims to optimize quality in all aspects of horticulture and the environment. Organic vegetable production practices reduce external inputs from the use of chemo-synthetic fertilizers and pesticides. Instead it allows the powerful laws of nature to
increase both vegetable yields and disease resistance. We have exploited our natural resources beyond all limits to realize high productivity and production. During the recent past, the use of chemicals for the management of pest and disease and improve the soil fertility has been increased. Many of these chemicals do not degrade easily and enter into human body leading to health hazards. Therefore in several countries around the world including India, demand for organically grown vegetables is increasing among the consumers. The main importance of organic vegetable farming are to develop a sustainable farming system to meet the consumer demand.

6.1 MAJOR FINDINGS OF THE STUDY

Adoption of organic production practices in tomato crop

6.1.1 Adoption of seedling preparation practices

- It was noticed that 93.33 per cent of the respondent farmers adopted the raised bed method followed by flatbed 6.67 per cent.

- 91.67 percent of the farmers expressed that raise the beds with 1m width and 3m length with a height of 20 cm.

- It was noticed that 80 per cent of the respondent farmers were practicing applying of 20-25 kg well decomposed FYM, *Trichoderma harzianum* @ 4g per kg of FYM and 1-2 kg of neem cake per bed.

- 96.67 per cent of the farmers found to be practicing seed rate around 120-150g per acre for raising the seedlings.

- Eighty per cent of the farmers were found to be treating the seedlings with fungal culture of *Trichoderma viride* at @ 1g / 150 g of seeds and 4-5 % of the Panchagavya.

- It was found that 93.33 per cent of the farmers were used to sow the seeds thinly in line spaced at 5-10cm distance with 2cm spacing between successive seeds at depth of 1-2 cm, then covered with fine layer of soil followed by light watering.
Adoption of agronomic practices in tomato

- It was noticed that 95 per cent of the respondent farmers were adopted the land ploughing and harrowed around 3-4 times to obtain a fine tilth.
- 86.67 per cent of the farmers were transplanting the seedlings preferably in the evening time.
- 83.33 per cent of the respondent farmers used the correct rate of seedlings i.e. seedling @ 7-8 thousand per acre.
- 86.66 per cent of the farmers were used to dip the roots of tomato seedling in suspension of 1-2 kg of *Azatobacter* or *Azospirillum* and PSB per 5-10 liter of water for 20-30 minutes before transplanting to the main field.
- 90 per cent farmers using sole cropping whereas 10 per cent farmers were using the intercropping with soybean and cotton.
- Cent per cent of the respondent farmers expressed that practices gap filling at 7-10 days after transplanting.

Adoption of soil fertility management practices in tomato

Application of green manuring in tomato

- It was noticed that 93.33 per cent of the farmers were practicing applying green manure like sunhemp and sesbania rostrata *etc.*
- 80 per cent of the farmers were found to be applying green leaf manure like Gliricidia and pongamia glabra for their crop land to improve the soil fertility.

Application of organic manure in tomato

- It was found that cent per cent of the organic vegetable growers applied recommended quantity of farm yard manure (5-10 t/acre) once in a year for tomato crop.
- High per cent of farmers (81.66%) were practicing application of vermicompost @ 2-3 t/acre during the time of ploughing.
Application of Bio-fertilizers in tomato

- Application of various types of Bio fertilizers *i.e.*, *Azospirillum* @ 1 kg/acre for soil application was found with 65 per cent of the respondent farmers.

- Application of Phosphate solubalizers @ 1 kg/acre for improving the soil fertility as per recommended was noticed among 63.33 per cent of the respondent farmers.

- There were 56.66 percent of the farmers found to use of neem cake @ 250 kg/acre while forming ridges.

Adoption of organic method of management of pest and disease in tomato

Major pest and diseases observed in tomato

- It was observed that there was 88.33 per cent farmers’ field affected by the major pests like fruit borer, white flies and aphids.

- 85 per cent farmers whose field crop was affected by the major disease like Leaf curl, Fusarium wilt and Blight.

Cultural practices in tomato

- The cent per cent of the farmers practicing the deep summer ploughing and crop rotation with non solanaceous crops like pulses / legumes for breaking the life cycle of the insects and pests

- High per cent of the farmers (81.66%) use the trap crop like marigold to attract the tomato fruit borer.

- 75.55 per cent of the farmers used to sow the entire block in time.

Mechanical practices in tomato

- It was found that 91.66 per cent of the respondent farmer’s collection and destruction of affected plants and shoots.

- 73.33 per cent of the farmers were found to adopt uprooting of alternate host plants.
45.00 percent of the vegetable growers were found to practice erecting of bird perches for predators like crow myna etc. only few of the farmers.

33.33% used to practice conservation and encouraging of predators like wasps, beetles in the field.

Use of Bio-pesticides in tomato

Majority of vegetable growers (98.33%) in tomato crop were found to use Neem Seed Kernel Extract (NSKE) at the rate of 2-5 ml / lit of water to control worms and whiteflies.

The application of the Neem Cake at the rate of 3-5 qtl/acre to control nematodes root disease was noticed with 80.00 per cent of the respondents.

It was found that there were 46.66 per cent of the farmers using one trichocard per acre after 25 days of sowing or eggs of insects are found on the leaves of the plants.

Adoption of weed management practices in tomato

98.33% of the farmers expressed that timely or regular weeding required for removing harmful weed from the field.

88.33 per cent of the farmer’s practices weeding on 3rd and 7th week after transplanting of tomato seedlings.

81.66 percent of the farmers expressed that practice of crop rotation and cover crop to control weeds.

There were 73. 33 per cent of the farmers found to be doing timely inter cultivation.

40.00 per cent of the farmers were obtained practicing the soil solarisation (by exposing soil to sunlight).
Adoption of post-harvest management practices in tomato

- Cent per cent of the respondents expressed that harvesting the tomato crop after 2-3 months of planting when pink colour appears on the fruit.

- 90.00 percent the respondents were practiced picking of tomato at 2-3 days interval.

- The picking was done during the late afternoon or early in the morning by 81.66 per cent of the farmers.

- The method of grading of harvested produce into small and big size, with the objective of getting better price for the produce was noticed among all the respondents (100%).

- It was noticed that 70.00 per cent of the farmers were used to pack the tomatoes in plastic crates

- There were 61.66 percent farmers whose produces mode of transportation was through tempo or trucks whereas 18.33 per cent through bullock cart and 20 percent of the farmers were transport their produce through tractor.

Adoption of organic production practices in potato crop

Adoption of agronomic practices in potato

- There were cent per cent of the farmers prepare their land to fine tilth by deep ploughing and harrowing around 2-3 times and their sowing type was found to be ridges and furrow method.

- There were 80.00 per cent of the farmers whose sowing season was found to be in Kharif followed by 20 percent farmers found to be sow in the rabi season.

- It was noticed that 88.33 per cent of the farmers were select the varieties of tubers or seeds resistant to the pest and disease.

- High per cent of the farmers (81.67%) were found to be selected the tubers from certified organic farms having at least two buds which weigh around 35-40g for planting.
90 per cent of the farmers were found to be use recommended tubers at the rate of 4-6qtl/acre with viable sprouting buds for sowing.

Majority of the respondent farmers (80.00%) were used to treat the tubers with trichoderma solution at the rate of 4kg per 50 liter of water for 10 minutes before sowing.

93.33 percent of the farmers expressed that practicing sole cropping and only 6.66 percent followed intercropping with tomato / cucumber at the time of potato flowering.

Adoption of soil fertility management practices in potato

Application of organic manures in potato

- Cent per cent of the respondents applying the recommended rate of farm yard manure (8-10t/acre) in the cultivation of the organic potato crop.

- 95.00 per cent of the farmers applying vermicompost at the rate of 1 - 1.5t/acre to the potato crop.

Application of green manuring in potato

- 85.00 per cent of the farmers were applying green manure like dhaincha, sunhemp etc. to the potato crop.

- There were 93.33 per cent of the farmers practicing farm yard manure with recommended dose of Trichoderma @1-2 kg/100kg of FYM.

Application of Bio fertilizers in potato

- 81.66 per cent of the farmers using Azospirillum at the rate of 1-2 kg/ acre for the soil application

- It was noticed that 75.00 per cent of the farmers used to apply Panchagavya at the rate of 3-5 liter/ 100 liter of water for spraying over soil.
Adoption of organic method of pest and disease management in potato

- 95 per cent of the farmers’ field noticed that major pests like cut worms, shoot borer and aphids in their potato field.

- 91.66 per cent of the farmer’s field observed that major diseases like blight, Fusarium dry rot, black scurf (Rhizoctonia solani) in the potato field.

Cultural practices in potato

- All respondent farmers were practicing the deep summer ploughing for exposing the eggs and immature stages of pest and insects to high temperature and predatory birds.

- High per cent (93.33%) of the farmers practicing crop rotation with non-host crop for breaking the life cycle of insects and pests.

Mechanical practices in potato

- 70 per cent of the farmers were practicing mechanical removal of the infested shoots and plants.

- 75.55 per cent of the respondents used to install the light traps in and around the potato field to attract the pests.

- 80 per cent of the farmers practicing installation of pheromone trap around 4-6 per acre of the potato field.

Use of Bio pesticides in potato

- High per cent of the farmers (96.67%) noticed that practicing seed or tuber treatment with trichoderma at the rate of 4kg per 50 liter of water.

- 55 per cent of the farmers found to practicing spray of Bacillus subtilis at the rate of 5g per liter of water on the crop and ridges to control the late blight.

- 76.67 per cent of the farmers used to spray Neem Seed Kernel Extract (NSKE) 5% at 45 days after sowing (DAS) to control pest and disease.
High per cent of the respondents (86.66%) used to apply the neem cake to the soil to control nematodes or root disease at the rate of 2-4qtl per acre of the potato crop land.

Adoption of weed management practices

were 96.66 per cent of the farmers found to be practicing of inter cultivation at 20 and 45 days after sowing and 2 times hand weeding at 25 and 50 days after sowing.

. 85.00 per cent of the farmers practicing crop rotation and cover crop to suppress the weed germination in the potato crop land.

41.66 per cent of the farmers used to select the varieties carefully to grow more rapidly than the weeds.

Adoption of pre and post-harvest management practices in potato

Pre-harvest management in potato

Methods of haulm removal

Majority of the farmers (83.33%) use the method of haulm chopping followed by haulm pulling (16.66%) and no one followed flaming method.

Cent per cent of the farmers found to stop their irrigation 2-3 weeks before harvesting of the potato crop and also it was found that all the farmers used to harvest their crop after 10-15 days of haulm cutting or de-haulming process.

Post-harvest management in potato

81.66 per cent of the farmers practicing ploughing by bullock pair or tractor for harvesting the potato.

18.33 per cent of the farmers noticed that use of the hand digging method for harvesting the potato.

It was noticed that 96.67 per cent of the farmers practicing of removing all damaged and diseased tubers during sorting.
Methods of grading in potato

- Cent per cent of the farmers found to grade their product as per recommended (small, medium and large size).

Method of packing of potato

- Majority of the respondents (96.67%) were practicing the packing of the potatoes by using gunny bags.

Mode of transport

- Majority of the respondents (63.34%) expressed that transport their produce through tempo or trucks for the market

Socio – economic characteristics of organic vegetable growers

- Majority of them (66.66%) belonged to middle age group of 31-50 years,

- 35.00 per cent of the organic vegetable growers had studied up to high school education, and post graduated were noticed to the extent of 3.33 per cent respectively.

- The distribution of land holding depicts that comparatively a high per cent (39.16%) of the respondents belonged to small farmers category

- 53.33 per cent of respondents were found to be medium type family of 4 -6 members.

- 37.50 per cent respondents had medium farming experience of 16-25 years.

- 61.66 per cent respondents belonged to medium organic farming experience of 2-3 years, 12.50 per cent of the respondent’s belonged to less organic farming experience category of 2 years.

- 83.34 per cent of the farmers having dairy cows in their home with their average number of cows were found to be as 2 per household.
70.00 per cent of the farmers having bullock cart followed by 71.67 per cent of them having tractor.

The high per cent of the respondents were found to participate regularly in krishimela (91.67%), organic farming training programme (95.83%), savayava gram sabha (93.33%), organic farming field days (85.00%), organic farming field visits (90.00%) and organic farming exhibition (80.00%).

Assessment of the consumer awareness and preference towards organic vegetables

The sample size 52 (86.67%) found to be male and rest 08 (13.33%) were female respondents.

Majority (35.00 %) of them belonged to the age group of 31 – 40 years.

In case of the occupation the majority 60.00 per cent of the sample respondents were found to be paid employers.

It was found that 50 per cent of the sample respondents have 1-4 persons in their family. 5 per cent of the respondents were found to be having more than 8 members in the family.

Majority (66.67%) of the sample respondents expressed that the media was the main source to get information about the organic vegetables.

Majority of the sample consumers (48.33%) spend 1001 - 1500 rupees for purchasing of the organically cultivated vegetables. 5.00 per cent of the respondents spend around Rs. 1501 – 2000.

41.67 per cent of the consumer’s respondents who used to get the organic vegetables by travelling less than 1 km, 8.33 per cent respondents travel more than 4 km to purchase the organic vegetables.

Majority 70 per cent of the consumers were use two wheelers to get the organic vegetables, 8.33 per cent of consumer respondents use public transport system to purchase the organic vegetables.
45.00 per cent of consumer respondents who consume organic vegetables several times in a week

Majority 90.00 per cent of the consumers expressed that organically grown vegetables protect the health.

81.67 per cent of the consumer respondents expressed that organically grown vegetable more taste than chemically grown vegetables.

Cent per cent of the consumers have given the statement as organic vegetables are tastier.

Majority 88.34 per cent of the consumers agreed that organic vegetables are safe food for children and sick person.

Majority 98.34 per cent of the sample respondents agreed that organic vegetables are eco friendly.

91.67 per cent of the consumers expressed that organic vegetables are free from pesticide residue.

Majority 90.00 per cent of the consumer respondents expressed that the organic vegetables are produced without using chemical fertilizers and pesticides.

68.33 per cent of the sample respondents agreed that organic vegetables stay more fresh comparatively conventional produce.

81.67 per cent of the consumer respondents agreed that the organic vegetables are certified followed by 15.00 per cent of the consumer respondents expressed negative statement only 3.33 per cent expressed about neutral statement.

68.33 per cent of the consumers expressed that certification is a quality assurance for organic vegetables.

95.00 per cent of the consumer respondents facing the problem of insufficient quantity and non-availability of the organic vegetables followed by 93.34 per cent of the consumers facing the problem of low produce range of the products.
Constraints of organic vegetable growers related to production aspects

- All the respondents had expressed problem of lack of literature or package of practices on organic vegetable production followed by low yield comparatively conventionally growing (96.66%).

- Majority of the organic vegetable growers noticed that Lack of support from the government agencies and other relevant departments in the farm of subsidy and financial assistance (92.50%).

- More than 40% of the farmers noticed that lengthy organic certification procedure and high cost, limited and irregular power supply and lack of literature on local language.

- Few of the respondents expressed the problem of non availability of labour (35.83%), insufficient of water for irrigation (26.66%) and drastic reduction in cattle population (14.16%).

Constraints of organic vegetable growers related to marketing aspects

- 100% of respondents expressed the problem of lack of minimum support price for organically grown vegetables, followed by non availability of market exclusively for organic produce (91.66%).

- Majority of the farmers noticed that absence of premium price for organic vegetable in local market (78.33%) followed by inability to identify marketing networks for organic vegetables (60.83%).

Suggestions obtained from the organic vegetable growers related to production aspects

- 100 percent of the respondents suggested the intensive research on organic farming and networking of research information followed by supply of organic inputs at subsidized rate (97.50%).

- Majority of the growers were suggested that identification and multiplication of indigenous seeds material (85.33%) followed by Co-ordination with animal husbandry department to increase the local cattle population (67.50%) for preparing compost.
More than 40% of the growers suggested that Improved credit facilities for organic farming through banks and simplifying certification procedures, reduced cost of certification and encouraging group certification.

Introduction of organic farming curriculum at school and college level (27.50%) and Introducing separate courses on organic farming in concerned universities (20.00%)

Suggestions obtained from the organic vegetable growers related to Organic vegetable marketing aspects

The entire organic vegetable growers had suggested that government has to fix minimum support price for organically produced vegetables followed by encourage setting up exclusively for organic vegetable marketing centres (94.16%).

Majority of the growers had suggested that developing organic vegetable supply chain system (90.00%).

More than 50% of the respondents had suggested that arranging organic vegetable producers and buyers meet regularly

Many of the respondents had suggested that incentives in prices over and above the MSP (Minimum Support Price) rates for organically produced vegetables (37.50%) and formation of clusters/collection centres for Forward and Backward linkages of organic vegetables (27.50%).

Increasing consumer awareness on the values of organically grown vegetables (10.83%) had suggested by the organic vegetable growers for strengthening the organic vegetable marketing.

6.2 POLICY IMPLICATIONS

From the results it can be inferred that majority of the growers are having lack of knowledge of the organic cultivation practices. By which there is low yield of the organic vegetables considerably. Government should boost for the growth of organic vegetables by implementing various schemes so that the farmers will
show interest in cultivation. Proper training should be given farmers through extension activities

➢ Since organic farming is new area, majority of the growers are stepping back in cultivation. Government should bring out this draw back from by having proper extension activities such as krishi mela, organic farming trainings etc.

➢ Organic vegetable farmers are facing the problem of non-availability of organic inputs, hence large scale multiplication of biofertilizers, vermicompost, biocontrol agents should be undertaken for distribution to the farmers at reasonable rates by the NGO’s, Department of Agriculture, Agricultural Universities and private companies.

➢ As the consumers are much aware about the benefits from organically grown vegetables. Contract farming can be made popularized with the tie up with major companies and retailers, so that there will be assured income for the organically grown vegetable farmers.

➢ Government should take a lead role in conduct of training and demonstration programs for creating organic production practices and marketing of organically grown vegetables more awareness about use of different organic inputs, pest and disease control and their benefits. so that it will not only boost the confidence of the farmers and but also increase the demand for organic vegetable vegetables.

➢ Current organically grown vegetables market demand is considerably higher than the supply, a situation which creates potential opportunities for countries in the short and medium term. So, India should use this, opportunity timely to tap the national and international markets by farming a well defined strategy on organic farming sector at the national level. The development of international markets can also stimulate domestic as well as regional opportunities.
6.3 CONCLUSION

The pest practices of organic vegetable production and marketing are the on-farm input management and organic vegetables package of practices based climatic condition and seasons, assessment and management of risks in production and marketing of organically grown vegetables and proper post harvest management and development of local marketing system connected to domestic and export chain for promoting the organic vegetable production and marketing.

The consumer concerns on organic vegetables are safety; quality and nutrition are increasingly becoming important across the world including India and Karnataka, which has provided growing opportunities for organic vegetables in the recent years. The demands for organic vegetables are steadily increasing in the developed countries, while developing countries still need to go a long way. The untapped potential markets for organic vegetables in the countries like India need to be realised with organized interventions various fronts, which require better understanding of the consumer’s awareness and preferences on organic vegetables. So that, assess the consumer awareness and preferences of various aspects of organic vegetables may be considered as important ground to build the markets for organic vegetables in the initial phase of market development.

Both, consumers and farmers are now slowly and gradually shifting back to organic farming in India. It is believed by many that organic farming is healthier. Though the health benefits of organic food are yet to be proved, consumers are willing to pay premium price for the same. Many farmers in India are shifting to organic farming due to the domestic and international demand for organic food. Further stringent standards for non-organic food in European and US markets have led to rejection of many Indian food consignments in the past. Organic farming therefore provides a better alternate to chemical farming.