Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 8(6): 1522-1525
Received: 12-09-2019
Accepted: 17-10-2019

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The trends of organic cultivation in the horticulture sector of Sikkim

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DOI: https://doi.org/10.22271/phyto.2020.v9.i6v.13165

Abstract
In recent years, various extensive and case studies have imparted knowledge in highlighting the substance of organic farming and the multitude of its benefits. Although a significant difference may be minimal between conventional and organic practices of farming, recent findings implicate the injudicious use of synthetics in the field of conventional farming. Many of the chemically created, man-made pesticides and herbicides have proved to have unfold number of side effects on our human health as we Consume produce which could have residues of the chemicals used during the course of production. Apart from this, recent innovations and technologies have created cultivation practices which have diverged or nullified the age old, traditional practices of growing food and plantation crops in recent times; it will not be long till a time comes when technology takes control of the farming dynasty. For this very reason, it is essential for us to give paramount attention to the sustainability of organic farming practices which will not only improve the safety of produce but also help us remember the traditional farming practices and carry on its legacy throughout the years and generations to come. This paper culminates the organic scenario of the state of Sikkim, focusing particularly on horticultural crops and its area and production.

Keywords: Organic, horticultural crops, Sikkim, area, production

1. Introduction
Organic Farming practices are believed to date back to the time of the 20th century as one of the first methods of crop cultivation. It may be defined as a method of farming practice which is rigorously traditional and does not make use of any kind of synthetic fertilisers, pesticides, etc., genetically modified crop (s), at any point of time during cultivation. It adheres to the age-old norms of using locally available natural resources for the use of production and other inter-cultural operations. Crop rotation, companion planting, biological pest control, mixed cropping are some of the key designs of practices which allow the use of naturally existing substances while conscientiously prohibiting the use of man-made, synthetic substances. The use of indigenous sources of nutrients help in the increment of production and productivity along with the refinement of soil physical conditions. Much of the organic materials which are wasted in large amounts without judicious use, can help in decreasing the cost of cultivation, enhancing productivity and soil, as well as human and livestock health. Soil fertility management is the key to sustaining crop productivity with the adequate and balanced supply of nutrient.

Sikkim is one of the eight states of the North-Eastern Region (NER) of India and is well known for its organic production and farming systems. The land of Sikkim is a state which has the privilege of an array of resources, copious with biodiversity, perennial water resources, and a number of different kinds of soil profile. Diversification of horticulture in the state is affable due to the diverse agro-ecological and topographical conditions. Much of the horticulture development programmes by the State Govt. are based on foundations which arise from both advantages and disadvantages posed by the geography and topography. Efforts to convert the disadvantages into advantages have brought about path breaking transformations in the horticulture sector. In 2003, the Govt. of Sikkim advocated the idea of making the state an Organic State keeping the year 2015 as the target for the successful completion of the mission. Much of natural wild lands of Sikkim harbour medicinal plants, fruits, vegetables, and other flora which have been certified with the organic status. During this mission, 50,000 ha of farmland was converted into organic and over 60,000 farming families were engaged in organic farming practices. Major horticultural crops grown in the state include vegetable crops, fruits, spices and flowers (loose) with vegetables occupying majority of the share in terms of area and production. After 2015, a steady growth was observed in the area and production of much of the horticulture sector.

By 2017-18, vegetables occupied an area of 38.42 ('000 Ha) and production of 229.10 ('000 MT) in comparison to area of 25.56 ('000 Ha) and production 132.51 ('000 MT) recorded for the year of 2012-13 according to the statistics computed by the Horticulture Statistics Division, Department of Agriculture, Coopn & Farmers Welfare, Ministry of Agriculture & Farmers Welfare. Similar instances can be observed in case of fruits, spice crops and flowers which will be further discussed in detail. This only indicates that the mission for declaring the state 100% organic by the State Govt. was fruitful and displayed positive outcomes not just statistically, but also providing livelihood for the rural population as well along with the judicious use of the untouched, virgin resources of the state. Thus, we can come to a cessation which enlightens us about the pragmatic and efficacious outcomes of organic farming which can be adopted by other sections of the society, thereby spreading awareness to other parts of the nation and boosting the country's capacity to adopt organic farming techniques.

2. Materials and Methods

The statistics computed and recorded from the year of 2012 to 2018 in the National Horticulture Board by the Horticulture Statistics Division, Department of Agriculture, Coopn & Farmers Welfare, Ministry of Agriculture & Farmers Welfare have been collected and analysed. According to the database, vegetables, fruits, spices and flowers (loose) have major shares in the horticulture sector and in order to scrutinise their trends in terms of area and production, the percentage change and Compound Annual Growth Rate (CAGR) have been calculated as per the following formulae:

% change = [(Final value-Initial value)/Initial value] x 100

CAGR = {(Final value/Initial value)^(1/n)} – 1

CAGR (%) = [{(Final value/Initial value)^(1/n)} – 1] x 100

Where *n* is the number of years.

3. Results and Discussion

In the year of 2003, the Govt. of Sikkim decided with its plentiful resources and virgin soil to declare the state an organic state. This was inspired with the then existing methods of farming which were more in the line of organic and traditional methods of cultivation of crops. Much of the land and soil even then remained untouched or unexperienced with the use of synthetic fertilisers which also gave ample scope for the state to turn into an organic state. By 2015, this mission was achieved and the state observed a sedated yet encouraging increase in the area and production of crops mainly vegetables, fruits, spice crops and loose flowers; although, it may be noted that during 2014-16, a brief period of decline in the growth, especially in fruits, was observed which may have resulted from the final preparations just as the state was ready to be declared as an organic state. In recent times, it has been observed that the state of Sikkim has also taken its place in the leaderboard by being the largest producer of large cardamom. Ginger, large cardamom, flowers and Sikkim mandarin are some of the horticultural crops which are largely exported from the state. After being declared as an organic state, the production of vegetables has increased from 22,310 to 75,200 tonnes thereby registering 240% growth and fruits have had an increased production from 5,250 to 20,080 tonnes (282% growth).

Apart from these, organic production has also found its way into integrating methods with protected cultivation in the state and an exponential growth in the number of protected cultivation structures has been observed. Farmers are reaping good amounts of profit by growing vegetables and fruits in the greenhouses. Till now, 10,360 low cost polyhouses and 850 tubular structures have been built in the state.

Table 1 provides a scrutiny of the area and production of vegetables, fruits, spices and loose flowers in the state from 2012-13 to 2017-18. In 2012-13, the area covered by vegetables, fruits, spices and loose flowers were 25.56 ('000 Ha), 14.65 ('000 Ha), 26.56 ('000 Ha) and 0.22 ('000 Ha) respectively. This noticeably increased to 38.42 ('000 Ha), 19.36 ('000 Ha), 32.3 ('000 Ha) and 0.24 ('000 Ha) respectively for vegetables, fruits, spices and loose flowers during 2017-18. In a similar manner, a trend in the increase of production for vegetables, fruits, spices and loose flowers were observed which is elaborated in the table below.

Table 1: Area and Production of Horticultural crops in Sikkim. Area in '000 Ha Production in '000 MT

Year	Vegetables		Fruits		Spices		Flowers (Loose)	
	A	P	A	P	A	P	A	P
2012-13	25.56	132.51	14.65	24.02	26.56	60.08	0.22	26.50
2013-14	26.11	134.53	16.02	24.05	32.06	55.80	0.24	17.88
2014-15	29.15	130.06	0.02	0.03	34.08	61.14	0.24	18.42
2015-16	20.25	106.94	17.53	23.48	29.46	64.78	0.24	16.59
2016-17	25.54	190.72	18.55	25.56	32.25	66.58	0.24	16.50
2017-18	38.42	229.10	19.36	54.90	32.3	66.6	0.24	16.50
CAGR (%)	7.03	9.55	4.75	14.77	3.31	1.73	1.46	-7.59

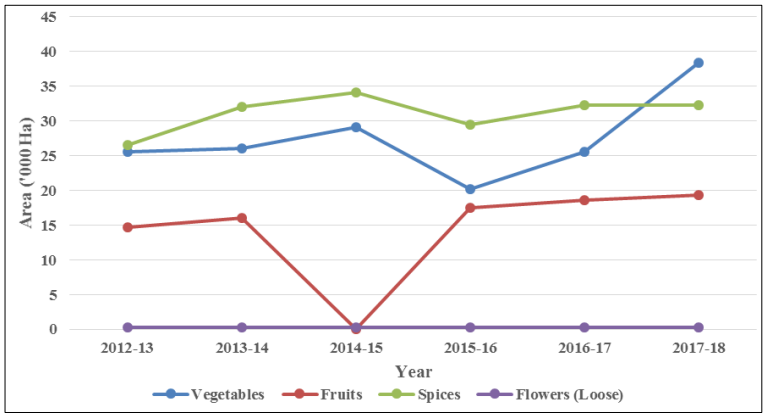

Fig 1: Area covered by Horticultural Crops in Sikkim

From Fig. 1, it can be inferred that before the period of 2016-17, spice crops occupied much of the area under the horticulture sector which was then overtaken by area occupied by vegetables. This could be due to the demand of more

organic vegetables which resulted in the cultivation of more vegetables thereby the need for occupying more land. However, in the case of fruits, it can be observed that in the year of 2014-15, there was a sharp decrease in the area which then rejuvenated in the following years and continued its growth; this may have also been a positive outcome from the declaration of the state to be organic which led to adoption of more organic methods of cultivation thus boosting the cultivation and demand of organic fruits.

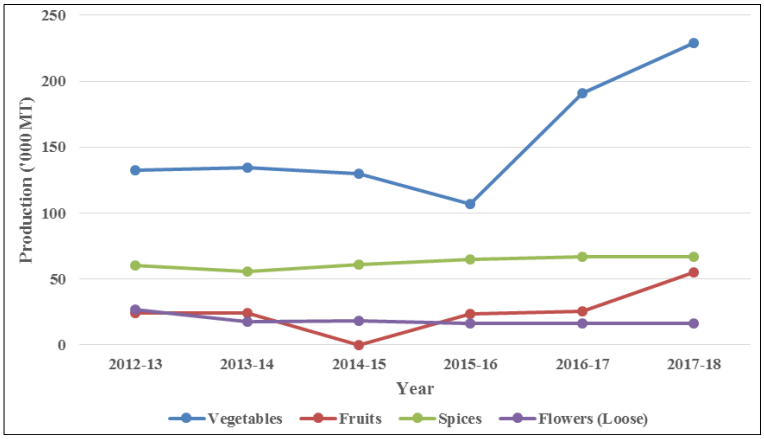

Fig 2: Production of Horticultural Crops in Sikkim

In a similar manner, Fig. 2 depicts the lead of production of vegetables among all horticultural crops from 2012-13 to 2017-18. It can be noticed that after 2015-16, the production of almost all horticultural crops increased except for loose flowers. This could again be concluded from the fact that the adoption of organic state reaped what it sowed, thereby creating a market flux for organic vegetables, fruits and spices which in turn led to the need for increase of their production.

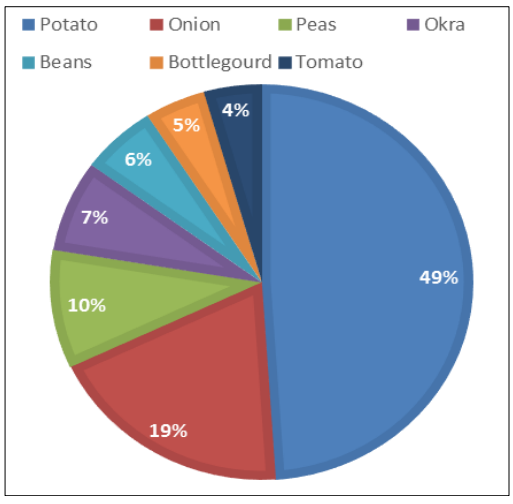

Fig 3: Production Share of Major Vegetables in Sikkim (2017-18)

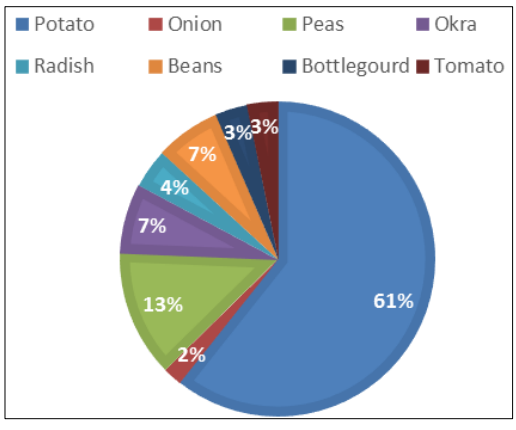

Fig 4: Area Covered by Major Vegetables in Sikkim (2017-18)

Fig. 3 and 4 depicts the percentage share of area and production of major vegetables grown in the state in 2017-18. In both cases, it can be seen that potato takes the lead in share with a record area and production of 19.14 ('000 Ha) and 89.91 ('000 MT) respectively. Following potato in production came onion which recorded 35.00 ('000 MT) and peas in area with a record of 4.10 ('000 Ha).

4. Conclusion

As per statistics enumerated by the National Horticulture Database, by 2017-18, vegetables have taken the frontline in the horticulture which was preceded by spices and till date remain at the top of the board. It may be noted that this boost in the area and production of vegetables in the state of Sikkim is primarily due to the demand for organic vegetables. Vegetables have high nutritive value as it is known to mankind and have proven to be a kind of protective food for years since its domestication. It is obvious that in any part of the world, vegetables are the preferred and recommended choice of daily diet for all ages and the scope of having access to organic vegetables which definitely increase its demand at any point of time. In other words, the trend of organic produce is a burning sensation in modern times as people have a general idea or attraction towards the thought of consuming healthy, non-synthetic, organic produce. Thus, the state of Sikkim, having declared itself a totally "Organic State" has produced positive outcomes in the area and production of the horticultural sector, especially in vegetables.

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