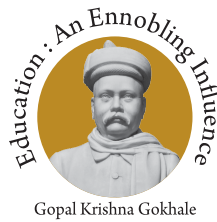


AERC Report

**Assessment of Ratio of Different Products/Forms
of Spices Being Marketed : Study based
on Ginger and Turmeric**

Sangeeta Shroff

(Co-ordinator)



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Participating Centres

Agricultural Development and Rural Transformation Centre (ADRTC)
Institute for Social and Economic Change, Bengaluru

Agro Economic Research Centre
University of Madras, Chennai

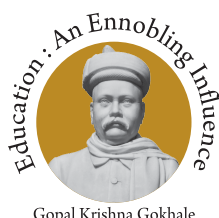
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Foreword

India is well known as the home of spices which are considered to be low volume but high value products. Besides consumption of fresh produce, value added commodities from spices have begun to gain importance in the domestic as well as international markets for various uses in different segments.

In view of the above and considering the potential of the spice sector to strengthen the economy, a study was sponsored by the Ministry of Agriculture and Farmers' Welfare, Government of India, to assess the ratio of different products/forms of spices being marketed with reference to ginger and turmeric crops. The study was an All India study, coordinated by AERC, Gokhale Institute of Politics and Economics, Pune. Five other AERCs in different parts of the country also participated in the study.

The study noted that India is the largest producer of ginger and turmeric in the world, having 35.2 percent share in ginger and 78 percent share in turmeric production. About 50 percent of the ginger production is consumed as fresh and only 20 percent is processed, while in case of turmeric about 66percent is processed into powder. Barely, 1 to 2 percent of the crop is used for producing high value products such as oils and oleoresins. The production of curcumin, which is the main biologically active phytochemical compound of turmeric and gaining importance in pharmaceutical, food and other segments has still to be capitalized as only 1.5 percent of production is utilized for curcumin extraction.

Both crops suffer from intra seasonal and inter seasonal price fluctuations. Although there exists a futures market for turmeric, farmers are still guided by the prices prevailing in the preceding year, for allocation of area, which often causes gluts and shortages which have their impact on prices.

High domestic consumption and lack of competitiveness in international markets has served as a constraint on exports and the full export potential is not realized. Infact India is also importing ginger and turmeric, mainly to produce value added products. The main policy issue to be addressed is that the productivity of both crops must be increased and disease free rhizomes must be used for seed, besides scientific practices. The quality of produce with low fibre and more oil content must be introduced. The potential of turmeric crop can only be realized by producing varieties which have high yield and high curcumin content. This will increase production, make the country competitive and broaden markets.

I thank Prof Sangeeta Shroff and participating centres for undertaking this study which will be useful for framing suitable policies for the spice sector, which in turn will strengthen the agricultural sector.

Professor Rajas Parchure,
Officiating Director
Gokhale Institute of Politics and Economics,
(Deemed to be university Under Section 3 of the UGC Act, 1956)
December, 2020

Acknowledgement

Indian Spice sector has a rich legacy and the country is considered to be the home of spices. Spices have huge potential to strengthen the agricultural sector as there exists tremendous scope to increase production, as well as expand and diversify markets in the domestic as well as international sphere. In view of this, the Ministry of Agriculture and Farmers' Welfare, Government of India, felt the need to conduct a study, in order to understand the usage of ginger and turmeric and their value added products among different segments. Accordingly, AERC, Gokhale Institute of Politics and Economics, Pune, was assigned the task of undertaking the study and coordinating it with five participating centres, spread across the country. My sincere thanks to Shri P.C. Bodh and the entire staff of Ministry of Agriculture and Farmers' Welfare, Government of India, for entrusting our Centre with this study.

The study has been conducted with the help of inputs from all stakeholders in the value chain of the spice crops. All participating centres have conducted detailed field surveys on every aspect related to the selected crops and submitted a report with their observations. I am therefore very grateful to all participating centres, because without their inputs and full support, the study could not have taken such a fine shape.

A major support for this study comes from our Officiating Director-Prof Rajas Parchure, who has always been very encouraging, cooperative and motivating. Our Registrar-Prof P. Rath and also our Librarian-Prof Nanaji Shivale have also offered full cooperation for this study.

Given the multi-faceted nature of the project, a number of stakeholders along the value chain were to be interviewed. The project was initially discussed with Mr. Anand Chordia, Director, Technical & Innovations, Pravin Masalewale, Pune as they are major buyers and processors of spice products and operate throughout the country. We had several meetings with him and his team, notably Shri Kailash, who gave us an entire overview of the markets and market operations of ginger and turmeric.

Sangli market in Maharashtra, is considered to be the biggest market for turmeric, not only in India, but also in Asia. Shri Marda, a well established trader in Sangli, explained to me the entire turmeric trade and also the usage of turmeric for value added products. I also benefitted from young researchers based in Sangli, notably Dr. Sandeep Hegade, Director-Research and Projects, Centre for Advanced Studies in Policy Research Foundation, who facilitated my discussions with those in the value chain.

Discussions were held with Mr. Shailesh Shah, Director, Jabs International Pvt. Limited, Mumbai, and I thank him for providing me with useful insights on the spice sector. Spice extracts such as oils and oleoresins are a high value product and the entire procedure and economics of extraction was explained to me by Mr. Nishesh Shah, Partner, Universal Oleoresins, Kochi. I sincerely thank him

for his valuable inputs and useful discussions. Mr. Mayur Vora, Managing Director, Mapro Foods Private Limited, Mahableshwar, also provided immense support during this study and I am grateful to him. I thank Mr. Mohan Rao, Spice Board, Guntur, and Mr. Sasikanth Parlakimidi, Tarang Foods, Odisha for discussions and useful insights on spice economy of the country.

An important part of the study was to observe the trade that takes place with respect to these two crops as India is the major producer of ginger and turmeric. All detailed data pertaining to exports was provided by Mr. Manoj Kumar, Statistical Investigator, Directorate of Arecanut & Spices Development, Government of India, Calicut, and I thank him for his sincere efforts in furnishing the data to me without which the study could not have been complete.

I thank all the farmers and traders who have patiently provided their data on cost of cultivation, and method of marketing of their produce. They serve as major stakeholders in the value chain and I am grateful to them for continuous support during the study.

Finally, I thank my colleagues, notably, Prof Jayanti Kajale and Dr. Manasi Phadke with whom I had useful discussions. I thank Mr. Anil Memane, Research Fellow, Gokhale Institute of Politics and Economics, for computer assistance and Shri Dete for data collection. The entire administrative staff of the Institute, has been directly and indirectly involved in the project and I owe my gratitude to each and every one of them.

Last but not the least, I thank Prof S. Kalamkar, Director Agro-Economic Research centre, Sardar Patel University, Vallabh Vidyanagar, Anand, Gujarat, for carefully reading the draft and making suitable suggestions.

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December 2020

Executive Summary

Backdrop:

India is well known as the home of spices with a rich history in spice trading. The wide range of spices produced in the country, are also converted into value added products. Among the various spices cultivated in the country, which occupy an area of about 3.91 million hectares, the share of ginger is 4.4 percent, while that of turmeric is 6.3 percent. With respect to production, the share of ginger is 12.5 percent while that of turmeric is 13 percent. Hence, together, both these crops account for about one-fifth of the country's spice production. Although both these crops are largely used for culinary purposes, some part is also dried and converted into value added products. Turmeric is largely dried in the field of the farmer itself, as a part of post harvest operations, as fresh turmeric, unlike ginger, has limited demand. The dried produce has a wide variety of uses in food industry, pharmaceutical, nutraceutical cosmetic and other uses. The application of the value added produce in different sectors is gaining importance in both domestic and international markets. This has served as a backdrop for this study, so that suitable strategies can be implemented to promote the cultivation of these low volume but high value crops. This in turn will strengthen the agricultural sector.

Objectives of the Study:

The study is sponsored by Ministry of Agriculture and Farmers' Welfare, Government of India, New Delhi, with the following broad objectives:

- 1. To observe state-wise, the trend in area, production and yield of ginger and turmeric, and to observe production of ginger in fresh and dry form across states;*
- 2. To try and estimate the usage of ginger and turmeric in different forms such as culinary, powder, volatile oils, oleoresins, and other value added products.*
- 3. To study the inter seasonal and intra seasonal fluctuations in prices of ginger and turmeric;*
- 4. To study the trade with respect to both crops as well as their value added products;*
- 5. To suggest policy measures for both crops.*

Methodology:

The data on area, production and yield was collected mainly from the Spice Board website. However other websites such as indiastat.com and Economic and Political Weekly Research Foundation website were also referred. The website of the state governments with respect to both crops was also used to observe the major producing districts.

Field visits were made in major states such as Assam, Andhra Pradesh, Telengana, West Bengal, Kerala, Chennai and Maharashtra to Agricultural Produce Market Committees to observe if the sale of the produce was in wet or dry form. It was also observed, whether the produce was further sold to another trader or to a processing unit. Further, all stakeholders in the value chain were interviewed, such as manufacturers of value added products such ginger paste, processors of oils and oleoresins, etc. to understand the usage of the rhizomes in different forms for various purposes.

Data on prices of both crops were obtained from agmarknet.gov website in order to observe the intra seasonal and inter seasonal fluctuations in prices with the help of simple statistical tools. The data on exports and imports of the crops and their value added products was obtained from Ministry of Commerce, Directorate of Arecanut & Spices Development, Kozikhode. Relevant information was also collected from Spice Board website.

Main Findings:

The study was conducted with respect to two major spice crops, viz. ginger and turmeric. The following are the major findings:

Ginger:

- 1. India is a leading producer of ginger in the global economy, having 45 percent share in area and 35.2 percent share in production. Three countries, comprising India, Nigeria and China together occupy 77.3 percent of world area under ginger. However, in terms of productivity, India is lagging behind that of several countries.*
- 2. The area under ginger in India which was 53900 hectares in 1990-91, showed a gradual increase over the years, and was 172040 hectares in 2019-20. During the last three decades, the rate of growth in area of ginger was 4.08 percent per annum.*
- 3. It is important to note that Kerala was one of the traditional ginger producing states in the country and area under ginger was 14300 hectares in 1990-91 which was 26.5 percent of the area under ginger in the country. However, by 1999-2000, a declining trend in area*

under ginger in Kerala was observed and in 2009-10 there was a sharp decline to 5410 hectares which was 4 percent of the area under ginger in the country. In 2019-20, the area under ginger in Kerala was 4265 hectares which constitutes 2.48 percent of the total area in the country. This decline in area was explained by high cost of cultivation which made ginger farming and processing unprofitable. While area under ginger reduced in Kerala, the same increased in Karnataka. Notably, during the period 2000-01 to 2009-10, there were major changes in area, in these two states. While area under ginger in Karnataka was 10700 hectares in 2000-01, it increased to 44830 hectares in 2009-10, thus registering a growth rate of 17.26 percent per annum during this period. In Kerala however, there was a fall in area which declined from 11600 hectares in 2000-01 to 5410 hectares in 2009-10, indicating a negative growth rate which was -8.13 per cent per annum during the decade of 2000s. The main reason for this reversal in share was that farmers in Kerala found ginger farming unprofitable as there was rising cost of cultivation and also because the soil began to lose fertility, as ginger is a nutrient exhausting crop. Further, there was also the threat of diseases like root wilt. These conditions made them shift ginger cultivation to neighbouring state of Karnataka, where land was available on lease and labour was relatively cheap. Hence considerable cultivation of ginger in Karnataka is done by migrants from Kerala and this explains why area under ginger declined in Kerala but increased in Karnataka.

- 4. Assam, has a share of 11.25 percent in total area under ginger. Infact, ginger is gaining popularity in the eastern belt of the country with considerable increase in area under ginger in Assam, Odisha, West Bengal, Sikkim, Meghalaya and other eastern states. The share of these combined eastern states constituted almost half the area under ginger.*
- 5. The yield of ginger has not shown much improvement over the years and the North Eastern states experience even lower yields as they practise organic farming. While observing production and productivity of ginger, it may be pointed out that certain states such as Karnataka, Mizoram, Orissa, Madhya Pradesh and Kerala often report the produce as dry and other states like Maharashtra, West Bengal, Meghalaya and Arunachal Pradesh report the produce as fresh. Sources of data on production and yield sometimes report the figures of certain states as fresh ginger and of some states as dry ginger. Hence, the production and productivity figures may not be comparable over states. The dry recovery of ginger is normally 19 percent to 23.5 percent from fresh ginger. The data reveal that in 2019-20 the production of dry ginger was 4.19 lakh tonnes with a yield of 2.44 tonnes per hectare.*

6. *The share of dry ginger to the value of output from spices is 6 percent. The produce is sold in both wet /fresh form as well as dry form, but discussion with traders revealed that the sale is mostly in fresh form as ginger is mainly used as vegetable. The dry form is mainly for value addition into other products. The farmers in Maharashtra, both in Aurangabad and Satara districts, which are the major ginger producing districts in the state indicated that almost the entire produce is sold as fresh form. Kerala has lost its status as a ginger growing state where ginger was mainly traded as dry form. However, with sharp fall in area under ginger in Kerala and limited production in both major centres-Wayanad and Palakkad, the produce is mostly sold in wet form. The farmers were of the view that dry ginger did not fetch a premium price for the labor and other costs involved in drying the produce. However, there is a processing unit in Ernakulum district, where the yield from Vadakkancherry region is sold in dry form for further processing. In North-East region of the country, where the produce is mostly organic, the farmers sell it mostly as fresh to major assembling markets, from where it further reaches distant markets in Delhi, West Bengal, etc.*
7. *Besides consuming fresh ginger as a vegetable, several value added products are prepared from fresh ginger such as ginger paste and ginger candy.*
8. *Ginger paste offers convenience to consumers alongwith easy storage, long shelf life and authentic taste, to suit the requirements of consumers. The demand for such convenient and better packaged products whose usage saves considerable time for consumers, is rising, due to increase in urbanisation, working population, and higher per capita incomes. The major consumers of these products are hotels, restaurants, fast food joints, super markets, households and culinary schools. Further, the companies which manufacture ginger paste/ginger garlic paste are able to maintain their prices despite wide fluctuations in price of raw material as they purchase in bulk and much in advance. Consumers can therefore substitute these products by the fresh produce in off season or in years of high price of raw produce, besides other conveniences involved. It can be observed that conversion of ginger into ginger paste/ginger garlic paste brings about considerable value added as for every quintal of paste produced the profit is Rs 4770. Discussion with major producers reveals that the market for ginger/ginger garlic paste is about Rs 200 crores and it can be roughly estimated that about 10 percent of the fresh produce is utilized for the production of ginger paste. Ginger candy is another product from fresh ginger in the confectionary segment. This product is not popular in the market due to its pungency and dark colour and only a very negligible part of fresh ginger is converted into ginger candy.*

9. *Dry ginger has a longer shelf life as compared to fresh and a number of products are made from dry ginger. Not all varieties that are cultivated in the country are suitable for drying, and processing into dry ginger is presently done only on a conservative scale. The extent of drying also varies across states, as different states produce different varieties. Discussion with several traders and other stake holders in the ginger economy revealed that about 20 percent ginger may be processed into dry. The following are the products manufactured from dry ginger :*

Ginger Flakes: Dehydrated ginger products can be stored for long as compared to green ginger, if suitable packaging is undertaken. Dried ginger prepared by farmers in their fields was not easily acceptable by consumers due to unsatisfactory sensory attributes from a commercial point of view. Hence mechanical drying of ginger was undertaken to produce ginger flakes. The value addition of ginger flakes indicated that for every quintal of ginger flakes produced the profit was Rs 8327.

Ginger Powder: Ginger powder is made by grinding dry ginger into powder and hence the main raw material is dry ginger. When dry ginger is converted into powder, the grinding loss is about 8 percent. Normally, ginger powder is a by product of dry ginger, ginger flakes and low quality rhizomes. Ginger powder has wide applications across multiple industries such as food processing, beverages, pharmaceutical, etc.

Ginger Essential Oils and Oleoresins: The spice flavour of ginger is due to two factors, the volatile oil contributing to aroma and the resinous non-volatile portion that is responsible for pungency. Oleoresin is the total extract which contains both volatile oil and pungency. It can be extracted by solvent extraction of powdered ginger with suitable solvents like alcohol, acetone, etc. Ginger oleoresin is a viscous liquid and dark brown in color with a volatile content which greatly varies, depending upon the variety. Ginger oleoresin has several uses and used in food industry as well as for medicinal purposes. Oleoresins are more shelf stable than the original produce of ginger and the concentrated liquid from the spices that clearly reproduce the character of the spice. Ginger oil is used as a flavourant in food processing, pharmaceuticals and also in the nutraceutical sector. The demand for ginger oil and oleoresin is increasing, especially in developed countries due to huge demand by fast food chains with standardized tastes. Also, there is increase in demand for natural flavours which can be obtained from the use of oleoresins. Consumers are increasingly getting averse to synthetic flavors in view of their possible side effects on human health. Hence products such as oleoresins and essential oils are useful in giving natural flavors, clean label products and also

for preparation of herbal medicines. There are also strict regulations regarding artificial colors and flavors in food which has increased the demand for such value added products in pharmaceutical and nutraceutical industries.

Discussion with certain producers of ginger oil and oleoresin, indicated that the oil extracted from dry ginger normally ranges between 1.6 to 1.8 percent while in case of oleoresin, the yield is 6.5 percent. This percentage varies across different varieties that are cultivated. They also indicated that the price of oleoresin is about Rs 2650 per kg while that of pure ginger essential oil would be about Rs 12,000 per kg.

In order to produce ginger oil and oleoresin, the manufacturers normally purchase dry ginger. Discussion with some units who produce ginger oil and oleoresins, revealed that often the units besides purchasing dry ginger from the domestic market, also import dry ginger. Data on imports of dry ginger reveals that India is importing dry ginger at very competitive prices. Further, there are very limited varieties of ginger which give a good yield of oil whereas those imported from countries like Nigeria give good oil yield. In India, farmers especially from Kerala, opined that due to high ginger prices of fresh produce, the conversion from fresh ginger to dry ginger is not remunerative enough for processors to dry the produce. For example, in certain markets in Kerala, in 2013-14, while fresh ginger was trading at Rs 93.27 per kg, the price of dry ginger was as low as Rs 152.76 per kg. The processors therefore refrained from conversion, as the price of dry ginger did not provide any incentive for processing. Discussions with ginger traders also revealed that high quality ginger, namely Cochin ginger, had considerable demand in the international market due to unique characteristics such as low fibre content, pleasant flavour and acceptable pungency. Idukki district in Kerala, which was traditionally a ginger producing district, had a variety called Ellakalan which had a high oil content. The oil and oleoresin units, which earlier purchased this variety for its high oil content, gradually began to import varieties from Nigeria which were cheaply available. Dry ginger from Nigeria is available even at Rs 73 per kg and discussion with several manufacturing units of oil revealed that their raw material was normally sourced from global markets due to considerably lower prices as compared to the domestic markets. Further, even ginger powder is imported at prices much lower than domestic prices. Hence cheap imports, gradually led to the disappearance of quality varieties in India.

Barely 1 to 2 percent of ginger available for consumption, which included domestic supplies plus imports is used for manufacturing essential oils and oleoresins. It is also important to note

that these products are mainly produced for export markets. The domestic demand of households in India is met through consumption of fresh ginger and since essential oils and oleoresins are expensive, the local consumer will refrain from purchasing these products. A negligible portion may be used by food processing industries.

10. The ginger produced in the country has wide varieties, each having their own characteristics and used for different purposes. Discussion with several farmers, traders and units using ginger as raw material, unanimously revealed that large part of ginger produced in the country is consumed as fresh form by households and hospitality sector. In Maharashtra, about 90 percent of the ginger is consumed as fresh form for culinary purposes. This however includes about 40 percent of the produce in the state which is converted in to ginger paste. In Karnataka, however, discussion with traders revealed that 50 percent of the produce is utilized for processing into dry form. Kerala too, till 1990s, was a ginger growing state which was largely processed into dry ginger. The major ginger growing districts were Wayanad, Idukki and Palakkad which were well known for processing ginger into dry form. However, as mentioned earlier there was a sharp fall in area under ginger and hence fall in volume of produce that was traded. The traders therefore began to sell the produce in fresh form rather than process it as the price realized for dry ginger was not remunerative. However, there is one unit operating in Ernakulam where the ginger is processed into dry form and the produce from Karnataka and Pallakad region transport their produce to this unit. In Assam, the produce cannot be easily converted into dry form due to high moisture content as the state suffers from considerable humidity. Sikkim is declared to be a 100 percent organic state. The ginger produced in Sikkim contains high oleoresin content of about 6 to 10 percent and gives high oil recovery of 2 to 3 percent. Stakeholders of ginger crop in Sikkim revealed that out of the total production of ginger in Sikkim, about 65.50 percent is sold as fresh while 13.86 percent is sold as dry. About 18.95 percent is used as seed and the remaining 1.7 percent which is considered as low quality produce is used for home consumption by the cultivating households.

11. Overall, after discussing with various stakeholders and considering the varieties grown in each state, the infrastructure available for processing, and taking into consideration the ruling market prices of fresh and dry ginger, not only in the domestic markets but also in global markets, it can be roughly estimated that in the ginger economy of the country, the farmers retain about 20 percent as seed and 20 percent is processed into dry ginger. Out

of the remaining 60 percent, about 10 percent is converted into ginger paste and the remaining 50 percent is consumed as fresh in vegetable form for culinary purposes. Ginger flakes and ginger powder are made from dry ginger. Ginger powder is normally a by product, while processing dry ginger. Further, dry ginger is also purchased by manufacturers of oil and oleoresin units, who also depend upon imports for their raw material. About 5 percent of produce is exported.

- 12. Ginger crops suffers from intra seasonal as well as inter seasonal fluctuations in prices. The index number of wholesale prices of fresh ginger (Base 2012-13), which was 121.4 in 2013-14, sharply increased to 280.2 in 2014-15, i.e an increase of 131 percent. This increase in price was due to shortage of the crop which could not cope up with the demand. The high prices since 2013-14, led to increase in area under the crop especially in Karnataka, where area which was 18900 hectares in 2013-14, increased to 30780 in 2014-15, i.e increase in area by 63 percent. The increase in area again brought about increase in production which had a dampening impact on prices.*
- 13. The markets of ginger, both fresh and dry, have huge intra seasonal fluctuations in prices. Often prices decline in the post harvest period and increase in the lean period. For eg. Hassan and Shimoga districts in Karnataka are major producers of ginger and together these two districts occupy 63 percent of the area under ginger in Karnataka. In 2018 season it was observed that the price of fresh ginger was ruling at around Rs 1000 per quintal in these markets between January to April which is the harvest and post harvest period. However, the price showed a gradual increase and was around Rs 2500 in November and December, i.e just before harvest. Prices in several years, in many major markets had a tendency to move up during the sowing season.*
- 14. Inter seasonal fluctuations in prices of ginger were also observed. The coefficient of variation of ginger prices in Shimoga market during the period 2002 to 2020 was as high as 70.11 percent indicating huge year to year fluctuations in prices. In Satara market also considerable inter seasonal fluctuations in prices was observed as the coefficient of variation in prices during the season 2010-11 to 2019-20 was 42.85 percent.*
- 15. In case of dry ginger Kozikhode market showed a coefficient of variation in prices between 2007-08 to 2018-19 of 42.92 percent, while Cochin showed a coefficient of variation of 36.83 percent during the corresponding period. Sharp fluctuations in prices are often observed because if prices are ruling high, the farmers have a tendency to increase area under the crop which brings about increase in production. This increased production*

increases the arrivals in the markets and pushes down the prices. As a result, often, inter seasonal fluctuations in prices are observed.

- 16. India is the largest producer of ginger in the world but also the largest consumer. Hence most of the produce is consumed in the domestic economy and barely 5 percent of produce is exported. The produce that is exported is not only of fresh and dry ginger but also that of value added products such as ginger powder, ginger oil and oleoresin and other forms either crushed or non-crushed. The total quantity of ginger and ginger products exported was 25731.31 tonnes in 2015-16 valued at Rs 359.83 crores. This share showed an increase of about 31 percent in the following year but there was a drastic fall of exports in 2018-19 by 32 percent from 2016-17 levels. However, the exports picked up in 2019-20 and were of the order of 51136.86 tonnes -i.e increase by 123 percent from 2018-19. The value of exports in 2018-19 was Rs 549.28 crores.*
- 17. With respect to fresh ginger, it can be observed that there was a sudden increase in quantity exported in 2019-20 with a corresponding increase in unit price. While 10140.44 tonnes were exported in 2015-16 and mild fluctuations in exports of fresh ginger over the next three years, there was a huge increase to 38,774.03 tonnes in 2019-20, i.e increase by 3.82 times. The unit price at which ginger was exported increased from Rs 30.13 per kg to Rs 54.61 per kg in the corresponding period. Out of the total ginger exported in 2019-20, 75.82 percent was fresh ginger and the share in value was 38.55 percent. This increase has been attributed to increase in demand for ginger due its medicinal properties in preventing infection due to corona.*
- 18. With respect to dry ginger (bleached and unbleached), there was a decline in quantity exported as the growth rate during 2015-16 to 2019-20 was -4.27 percent per annum. However, the growth rate in unit price was 8.94 percent, mainly due to increase in price from Rs 167.60 per kg in 2015-16, to Rs 236.08 per kg in 2019-20, i.e increase by 41 percent. However, during the period 2015-16 to 2018-19 the prices showed a declining trend and was as low as Rs 121.93 in 2017-18. The prices picked up and in 2019-20 the export price of dry ginger increased by 46 percent over 2017-18 levels.*
- 19. In case of ginger powder, the share in value of total exports which was 14.76 percent in 2015-16, declined to 11.86 percent in 2019-20. Further, there has been decline in unit price during this period as the growth rate in unit price was -2.41 percent per annum.*
- 20. Ginger oil and oleoresins are high value products but have low share in the total quantity of exports. However, while the quantity of exports of ginger oil showed a growth rate of 7.97 percent during 2015-16 to 2019-20, the growth rate in unit price showed a decline*

and was -1.39 percent during the corresponding period. A similar picture arose with respect to ginger oleoresin where the growth rate in quantity of exports was 7.14 percent, but that of unit price was -1.97 percent during 2015-16 to 2019-20. This reveals that the country is not able to capitalize on high value, low volume products.

21. India exports fresh ginger mainly to Bangla Desh and over the eleven year period from 2007-08 to 2017-18, about 50 percent of exports of fresh ginger were to Bangla Desh. This is possibly due to its close proximity to the North Eastern states of India which are also important ginger growing regions. Exports to Nepal and Pakistan also take place due to the same reason and small quantities are exported to further destinations such as UAE, Saudi Arabia, Spain, Morocco, Egypt and Yemen. Dry ginger is mainly exported to Spain, Morocco, Saudi Arabia, USA and UAE. The average price at which dry ginger is exported shows a growth rate of 5.28 percent. However, it is important to note that the price at which dry ginger was exported in 2015-15, was Rs 198.45 per kg and declined to Rs 122.26 per kg in 2017-18.
22. USA and UK are major countries to which ginger powder is exported. Infact many western countries import ginger powder from India. The average price at which ginger powder is exported however showed a decline from Rs 237.33 per kg in 2015-16 to Rs 192.66 per kg in 2017-18.
23. The major countries to which exports of ginger oil take place are, U.K, USA and South Africa. However, ginger oil is exported to several other countries such as Netherlands, France and Germany. The average price at which ginger oil is exported has shown huge fluctuations over the years. The price which was as high as Rs 9220.69 per kg in 2015-16, declined to Rs 6957.26 per kg, in 2017-18, i.e a sharp fall of about 25 percent. Ginger oil is a low volume but high value product and a fall in price is a revenue loss for the country.
24. The main countries to which ginger oleoresin are exported is USA, UK, and South Africa. However other countries which have a lower share to which oleoresin is exported are Australia, Germany and South Korea. There was a sharp fall in average export price of oleoresin from Rs 2346.16 per kg in 2014-15 to Rs 1446.89 per kg in 2015-16, i.e a fall by 38 percent.
25. Large number countries are involved in export of ginger and it was estimated that in 2018 the amount of fresh ginger exported worldwide was 564,000 tonnes and the value of this trade was \$872.3 million.

26. *China is a leading exporter of ginger with a share of 69.14 percent of world exports with respect to volume of trade. While Thailand ranks second, its share is far lower at 9.57 percent. The share of India is 3.72 percent and although the country ranks 3rd, alongwith Peru, it has a very small share in world exports of ginger. Perhaps the reason why India is not able to export ginger is because there is a huge domestic demand. Although India is the largest producer of ginger, it is also the largest consumer and most of the production goes in meeting the domestic requirements as ginger forms an important ingredient in the food habits of an Indian consumer. Other countries however, are not major consumers of ginger and hence have surplus to export.*
27. *China again leads in the export of crushed or ground ginger and had a share of 37 percent in the world exports in 2019 in value terms. India ranks second, but its share is much lower at 14.63 percent in the corresponding period. The crushed and ground ginger from India that is exported is mainly the varieties cultivated in Kerala. However, India cannot be competitive as labor costs are very high in Kerala. Chinese and Nigerian ginger is available in the international markets at lower rates. Discussion with manufacturers of ginger oil and oleoresins also revealed that they import dry ginger and crushed ginger largely from Nigeria as the price is much lower. Also, the ginger from Nigeria is renowned for its pungency and oleoresin extraction is higher.*
28. *India also imports ginger, as it is a major consumer of ginger. The world area under ginger increased from 2.64 lakh hectares in 2010 to 3.73 lakh hectares in 2018, i.e increase of 41 percent. Most countries have increased their area and production with a view to export as their domestic requirements are limited. The total quantity of ginger and ginger products imported was 30338.19 tonnes in 2015-16 which increased to 37696.93 tonnes in 2018-19 but declined to 18928.34 in 2019-20. Out of total volume of ginger imported, the share of fresh ginger is highest and ranged from 46.15 percent in 2019-20 to 80.83 percent in 2017-18. The share of dry ginger was 23.96 percent in 2018-19 and 28.65 percent in 2019-20 in volume terms while in value terms the corresponding figures were 40.12 percent and 41.12 percent.*
29. *Dry ginger was mainly imported from Nigeria and the share of dry ginger in total quantity of ginger and ginger products imported from Nigeria in 2019-20 was as high as 40.98 percent with a unit price of Rs 88.16 per kg. The price at which dry ginger is imported from Nigeria indicates a negative growth rate of -15.06 percent per annum during the period*

2015-16 to 2019-20. This indicates that India is able to import dry ginger, each year at lower prices from Nigeria and the price is far lower than domestic price. A negligible share of dry ginger is imported from China. The price at which it is imported also indicates a negative growth rate of -19.12 percent per annum, during 2015-16 to 2019-20. Hence the overall picture is that it is much cheaper for India to import dry ginger as international prices are lower than domestic prices.

30. World imports of ginger were 6.47 lakh tonnes and the main importer was USA, followed by Japan and Netherlands. The share of USA was 13.75 percent, followed by Japan which has a share of 10.51 percent and Netherlands with a share of 9.27 percent. In Europe, Netherlands is the not only the largest importer but also trader of ginger. And the country is a trade hub for intra-European trade. Netherlands imports ginger and then re-exports it by adding value to imported dried ginger by further processing and packaging it. United Kingdom is the second largest importer of ginger in Europe and this could possibly be due to the fact that there is a large Indian population residing in Europe. Germany and other European countries also import ginger although their share is small. While some of these countries import from Netherland, many of them also source it from India. The growing demand for dried ginger in European markets is stimulated by consumers becoming health conscious and ginger is well known to have medicinal properties. In 2018-19, the average import price of ginger was \$1275 per tonne, which works out to approximately Rs 89.25 per kg.

31. The world trade in ginger imports in value terms was \$ 976.42 in 2019-20 and the share of USA was highest with a share of 13.13 percent, followed by Japan which had a share of 10.32 percent. Netherlands ranks third, but as noted earlier, Netherlands imports ginger, and after processing and packaging exports it to other European countries. Hence, it also emerges as one of the exporters of ginger. Many countries like Pakistan, UAE, Bangla Desh import ginger as it is an ingredient in their food while western countries import as ginger has medicinal properties. Overall, imports of ginger have potential to increase, as all countries are not in a position to cultivate, especially European countries, but the demand is likely to increase in view of its usage for medicinal purposes.

Turmeric:

1. Turmeric is an important spice crop cultivated in India since times immemorial and the country is the world leader in production and consumption of the crop. The share of India

in production of turmeric is 78 percent, followed by China which has a share of 8 percent. Myanmar has a share of 3 percent while that of Nigeria and Bangla Desh are 3 percent each. This it is clear that by and large, India is the main producer of turmeric in the global economy.

- 2. The total area under turmeric in the country in 2019-20 was 2.45 lakh hectares and the increase was more pronounced in the decades of 1990s when the area which was 1.19 lakh hectares in 1990-91 increased to 166.21 lakh hectares in 1999-2000, thus registering a growth rate of 3.78 percent per annum during the period 1990-91 to 1999-2000. Over the period 1990-91 to 2019-20, the growth rate in area was 2.63 percent per annum.*
- 3. The state-wise area under turmeric reveal that Telengana had highest area under turmeric with a share of 19.52 percent in 2019-20. Prior to 2014, Telengana was a part of Andhra Pradesh and together these two states had a share of 36.1 percent in 2013-14. Karnataka ranks second in area under turmeric with a share of 10.94 percent and the share of Tamil Nadu is 9.54 percent in 2019-20. Thus turmeric cultivation is dominant in south India and the four states together have a share of 47.24 percent. Orissa has a share of 11.33 percent and is well known for organic turmeric that is cultivated by tribals. Though the state of Maharashtra has 6.24 percent area under turmeric, the district of Sangli in the state is a turmeric hub and a major trading centre.*
- 4. Turmeric is often referred to as the Indian saffron a very and has varied uses in different sectors. It is however important to note that unlike ginger, turmeric is almost entirely sold as dry form. Infact, the drying of the produce takes place in the field of the farmer and only a negligible amount of the produce, perhaps 1 to 2 percent is sold as fresh. The harvesting of this plant is done when the leaves start turning yellowish after 7 to 10 months of plantation. The harvested turmeric rhizomes, before being traded in the market, are converted into a stable commodity through a number of postharvest processing operations such as boiling, drying and polishing. Boiling is normally undertaken within 3 to 4 days of harvest. The fingers are separated from bulbs which are known as mother rhizomes and are cured separately as the latter take longer time to cook. The dry recovery normally ranges from 19 to 23 percent.*
- 5. Curcumin is the main biologically active phytochemical compound of turmeric. It is one of the three curcuminoids of turmeric and is extracted, concentrated and standardized for usage in several products. Curcumin gives yellow colour to turmeric and has a wide range of medicinal properties. It is a water soluble, orange-yellow coloured powder. There are few players involved in manufacturing curcumin. Some of the majors ones are – Akay*

Flavours & Aromatics Private Limited, Arjuna Natural Extracts Limited, Naturite Agro Products, Boimax Life, etc.

6. *The usage of curcumin in various products is gaining increasing importance, but this product is mainly exported. About 1.5 percent of production of dry turmeric is utilized for production of curcumin. As Indian diet is very rich in turmeric, the demand for this product by households does not exist. The price of the product ranges between Rs 7000 to Rs 8000/kg.*

7. *Discussion with major traders of turmeric revealed that about one percent of the production of turmeric is possibly used for the production of curcumin powder. The production of curcumin produced was approximately estimated to be 500 tonnes.*

The global curcumin market share indicates the following uses :

Pharmaceutical: 58 %

Food : 37%

Cosmetic : 4%

Other : 1%

8. *Dried turmeric rhizomes yield about 5 to 6 percent volatile oil and about 10 percent oleoresin which is mainly used for pharmaceutical purposes. Turmeric oleoresin is in great demand in the global food and pharmaceutical sector as it contributes to the aroma of turmeric and contains the flavour compounds and colour in the same proportion as is present in turmeric. Discussions with stakeholders revealed that barely 2 percent of production may be utilized for the production of turmeric oil and oleoresins.*

9. *Turmeric is being used as a spice crop from a very early period of recorded history because of its coloring, flavour, and medicinal properties. Out of total production of turmeric, about 1 percent is sold as fresh and further used for medicinal purposes. Trade for the rest of the produce is mostly in dry form. The seed rate for turmeric is about 2000 to 2500 kgs per hectare and about 15 percent of produce is retained as seed by farmers. India is also one of the biggest exporters of turmeric and about 13 to 15 percent of the crop is exported. The exports are in different forms, such as fresh, dry, powder, oil and oleoresins. About 1 percent of the crop is used to manufacture curcumin which is further converted into medicinal uses, nutraceutical and cosmetic uses. About 2 percent of production is used for producing oil and oleoresins because it appears that manufacturers of these products normally source their produce from other countries such as Indonesia and Vietnam where the rates are more competitive and the curcumin content is higher. Finally, 66 percent of*

the produce is converted into powder which is used for culinary purposes and also mixed with other spices and products.

- 10. The index number of wholesale prices of turmeric is indicated that in 2011-12, the WPI for turmeric was as low as 79.8 (2010-11 base year) indicating a steep fall in prices. The fall in prices was due to increase in supply of the crop which pushed the prices down. Prices were ruling at very high levels in the previous two years, i.e , 2009-10 and 2010-11 and perhaps this served as an incentive for farmers to increase area under turmeric. Tamil Nadu is a major turmeric producing state and in Salem market, the price which was ruling at Rs 6500 per quintal between April to July 2009 began to increase rapidly and touched Rs 14,000 per quintal in March 2010. This rising trend continued and peaked in January 2011 when the price touched Rs 18875 per quintal. Hence prices increased by 190 percent between July 2009 and January 2011. Erode market, in Tamil Nadu experienced a price rise of 223 percent during the corresponding period.*
- 11. Discussion with stakeholders revealed that this drastic increase in price in 2009-10 and 2010-11 was due to speculation, as on line trading too was taking place in turmeric. As prices began to show a rising trend, the traders began to hoard the produce in the hope of higher prices. This reduced the supply and further pushed up the prices of turmeric. The prices however did recover, but since 2015-16 the prices have moved in a narrow range.*
- 12. The high prices of turmeric in 2009-10 and 2010-11, led to increase in area under the crop in Tamil Nadu, which increased from 33366 hectares in 2009-10 to 51446 in 2010-11, i.e increase of 54 percent. As prices continued to rule high, the area further increased to 67246 hectares, i.e. increase of 31 percent. This increased area brought alongwith it, increased output which increased by 33 percent between 2010-11 and 2011-12 in Tamil Nadu. A similar increase in area was observed in Andhra Pradesh in 2010-11 and the area which was 69160 hectares increased to 75 000 hectares in 2011-12, ie. an increase of 8 percent. Both the states of Tamil Nadu and Andhra Pradesh together contributed 54 percent of area in turmeric in 2010-11 and 65 percent of area in 2011-12. Hence in 2011-12 the prices of turmeric began to decline which brought the index of wholesale prices of turmeric to 79.8 percent.*
- 13. Turmeric prices experienced intra-seasonal variations in prices and the coefficient of variation in prices within the season ranged from 5 .01 percent in 2017-18 to 21.16 percent in 2011-12. There were also major inter seasonal fluctuations in prices and the average price in major trading centres which was Rs 8879 per quintal in 2010-11, declined to Rs 6708 per quintal in 2018-19 and till date is hovering around Rs 6000 per quintal. The*

coefficient of variation in prices between seasons ranged from 20 to 40 percent across major turmeric markets. The growth rate in prices during the period 2010-11 to 2018-19 was -3.44 percent per annum. This indicates that turmeric prices have revealed a declining trend.

- 14. The total exports of turmeric and turmeric products which were 89321 tonnes in 2015-16, increased to 139184 tonnes in 2019-20, registering a growth rate of 11.73 percent per annum. The value of exports registered a growth rate of 10.52 percent per annum during the corresponding period. However, unfortunately the average unit price of all turmeric products exported registered a negative growth rate of -1.08 percent per annum. This indicates that the value of turmeric exported increased only due to increase in quantity but not in unit price.*
- 15. Out of total exports of turmeric, the share of dry turmeric was highest in quantity and value terms. In quantity terms, the share ranged between 44.38 percent in 2016-17 to 59.84 in 2019-20 while in value terms, the share ranged from 24.67 percent in 2018-19 to 31.51 percent in 2019-20.*
- 16. Turmeric powder was also an important item of export and the share in quantity ranged from 30.27 percent in 2019-20 to 37.47 percent in 2015-16. In 2019-20, the share of dry turmeric and turmeric powder in terms of quantity exported was 90.11 percent while the value was 55.88 percent. However, both items showed negative growth rate of -5.78 percent per annum and -1.72 percent per annum respectively during the period 2015-16 to 2019-20 in terms of average exported price.*
- 17. The quantity of turmeric oil exported showed a decline over the period 2015-16 to 2019-20. While the quantity exported was as high as 84.56 tonnes in 2016-17, it declined sharply to 27.41 tonnes, thus showing a negative growth rate of 9.30 percent per annum. There was sharp decline in average export price from Rs 8343.96 per kg in 2015-16 to Rs 2168.75 per kg in 2017-18. There was again an increase in average exported price to Rs 4225.76 per kg but during the period 2015-16 to 2019-20, the growth rate in average export price was -15.64 percent.*
- 18. Turmeric oleoresin however showed a steady increase in exports and the quantity exported increased from 814.68 tonnes in 2015-16 to 2090.53 tonnes in 2019-20. The per unit export price however showed a negative growth rate of -5.60 percent per annum during the period. The share in total quantity of exports was 1.50 percent but the share in value of exports was 28.45 percent which indicates that it is a low volume but high value product.*

19. *India is a major exporter of dry turmeric and several countries import the product from India. The highest exports of dry turmeric are to Iran and since 2013-14 to 2019-20 the average share of exports to Iran is 20.7 percent. While UAE also had a considerable share in imports of turmeric powder till 2011-12 when one-fourth of the exports were sent to UAE, the share has declined over the years and was as low as 3.97 percent in 2015-16 with slight recovery in the following years. Bangla Desh, Malaysia and Sri Lanka also import dry turmeric from India.*
20. *The highest share of exports of turmeric powder is to USA which was 15.33 percent in 2019-20. UAE also has a relatively high share in imports and in 2012-13 the share in imports was 14.94 percent. European countries such as UK, Netherlands and Germany also import turmeric powder. Infact turmeric powder is imported by large number of countries in the world.*
21. *The exports of turmeric oil from India were negligible and picked up slightly since 2015-16. It can be observed that in 2017-18, turmeric oil was exported mainly to USA and Canada*
22. *The main importer of turmeric oleoresin is USA and from 2007-08 to 2019-20, the share of USA in imports of turmeric oleoresin approximately ranged from 40 percent to 58 percent. Besides, USA, a large number of European countries import turmeric oleoresin. European countries prefer to import value added products such as oleoresins as they are more convenient to use, more hygienic with less scope for contamination and can be more easily transported.*
23. *Although India is the dominant producer of turmeric in the world, the product is still imported. The quantity that was imported in 2015-16 was 15922 tonnes and this figure increased to 28613 tonnes in 2019-20 registering a growth rate of 15.78 percent. Other countries are able to export at competitive rates and are not major consumers of their domestic production. India therefore imports turmeric and it is mainly those who produce value added products such as essential oils and oleoresins that import turmeric.*
24. *There are several reasons why India still imports turmeric from other countries despite being a major producer of turmeric. An important factor that is responsible for imports is the price differential. Discussion with traders who mainly sell to processors and extraction units reveal that the price in the domestic market are higher than that in the international markets and hence processors find it cheaper to import the produce. Secondly, in India there are few varieties such as Alleppey and Lakadong which have high curcumin content. The demand from extraction units of essential oils and oleoresins is mainly of varieties*

which have high curcumin content. Lakadong variety is grown in North Eastern part of India and transport to extraction units has inherent problems which makes imports more convenient. Finally the production of turmeric also depends upon climatic conditions and is subject to fluctuations which can have an impact on prices. Hence price volatility in domestic markets can also induce imports of the product.

25. *While Ethiopia and Myanmar were the main countries from which India was importing turmeric from 2015-16 to 2017-18, in the recent years, i.e 2018-19 and 2019-20, imports are mainly from Vietnam.*

Policy Implications:

The spice sector has immense growth potential which can be capitalized only if it is strengthened at every stage, i.e production stage, harvesting and post harvesting stage. Further the value chain also requires interventions and overall development of this sector will help to not only meet the increasing domestic demand but also promote exports. The following policy interventions emerge from our study:

1. *India ranks first in the production of ginger and turmeric with a share of about 35 percent in world ginger production and 78 percent share in world turmeric production. However, the country is lagging behind in productivity and there is tremendous scope to increase the same. This is possible by using quality, disease free planting material and better input management which can greatly increase the yield. Both ginger and turmeric crops are impacted by abiotic and biotic stress which leads to crop loss. The crops cannot withstand waterlogging and hence soils with good drainage are required. A number of diseases such as soft rot, bacterial wilt, stem borer, leaf spot etc often destroy the crop. Certain diseases such as bacterial wilt are not easily eradicated and if the farmers use saved seeds which have been impacted by diseases then the productivity is likely to be reduced. There is therefore need to use certified seeds which are free from diseases and quality planting material in order to enhance yield. Seed replacement with improved varieties is a priority in order to enhance productivity. Integrated Pest Management also plays an important role for quality produce and higher yield. High yield will reduce the cost of production and this will benefit the farmers.*
2. *Ginger and turmeric are nutrient exhausting crops and if grown continuously on the same soil, the productivity is likely to get reduced. It is therefore important to shift the cultivation of the crop and also apply suitable nutrients in order to enhance productivity.*

Intercropping with leguminous crops, crop rotation and organic manure are some practises which must be followed to maintain the fertility of the soil.

- 3. Suitable storage facilities are also important so that no damage is caused, especially if the crop is used as seed in the next season. Non-availability of cold storages and godowns lead to huge post harvest losses. Hence intervention is required to increase the availability of scientific storage facilities. Processing of ginger and turmeric is largely in the form of sun drying and modern infrastructure such as mechanical driers should be encouraged to expedite the drying process and also produce high quality clean produce.*
- 4. Ginger and turmeric are gaining importance in North East and they have the potential to promote the agricultural sector. However, there are several constraints to achieving this as farmers are resource poor and there are infrastructure bottlenecks. Majority of farmers use their own seed which suffer from quality and thus the crop suffers from diseases such as rhizome rot which lowers the yield. The North Eastern states also suffer from labour shortage, and obsolete post harvest practises. While marketing the produce also, the farmers have small lots to offer and there is poor connectivity in the interiors. Hence these issues must be addressed by providing farmers with disease free seeds and also promoting mechanization to cope up with labor shortage.*
- 5. Sikkim is an entirely organic state and hence the produce of ginger and turmeric is purely organic. However, farmers are not able to realize a premium price for their produce. There is no organized wholesale market in Sikkim and the produce is aggregated by traders who operate in procurement centres in Sikkim. The produce after being aggregated is normally transported to a regulated market in Siliguri which is a nearby regulated market in West Bengal. The market infrastructure in Siliguri is not suitably designed to handle organic produce. Often the organic produce in such markets is mixed with conventional produce which lowers the price realized by producers. Hence while attempts are being made to ensure that organic produce fetches a premium price, more emphasis must be placed on branding the produce so that the grower can benefit from organic farming.*
- 6. Organic turmeric is also produced in Erode in Tamil Nadu. While the cost of cultivating the produce was much higher, some farmers stated that they also benefitted from premium price especially in export markets. However, several farmers are reluctant from cultivating organic turmeric because they have to pay unaffordable fees for certification. If the produce is rejected as organic produce by the certification agency, then the farmers find it difficult to sell their output even in domestic markets. Therefore the loss to the farmers is on two counts, i.e high cost of cultivation as well as loss of markets if the produce is not*

accepted as organic. Hence, subsidy should be given for certification and proper training to farmers who practise organic farming so that their produce is pure.

7. *Ginger and turmeric both suffer from intra seasonal as well as inter seasonal price fluctuations. If prices of the products are high in a particular season and farmers make reasonable profits, then they tend to increase the area under the crop in the next season. This leads to excess production and without corresponding demand the prices tend to fall thus causing losses to farmers. Hence efforts should be made to ensure that huge fluctuations in prices do not occur as it brings instability in the ginger and turmeric economy. In case of turmeric, there is a futures market which can reveal the assessment of anticipated future demand and supply. Hence the price in the futures market must serve as a guiding factor to the farmer to make the decision on allocation of area to the crop. This will enable the farmer to withstand price fluctuation and the demand and supply can also match. However, most farmers are small and marginal and cannot directly participate in futures market because of minimum trading quantity thresholds and also maintaining daily mark to margins is difficult. The farmers also have limited knowledge about market operations on futures trading. Hence farmers can benefit from futures trading only if producer organizations are formed which can participate in the market on behalf of farmers. The farmers must also be trained on the benefits of futures markets as the prices in these markets will be more useful in deciding their cropping pattern, as compared to resorting to the previous year's price as a guiding force.*

Farmers must also bring quality produce to the markets as this will enable them to fetch higher prices. It was noted that in certain markets such as Nizambad market, the turmeric that is brought to the market has very high moisture content. Normally moisture content should not exceed 12 percent, and if the moisture exceeds this limit, the produce has to be sold at a discount. Farmers should be given suitable training to ensure that they bring quality produce to the market.

8. *While India is a world leader in the production of ginger and turmeric, the produce is largely consumed in the domestic market. Although exports have high potential, only a limited portion of the produce is exported. There is tremendous scope to increase the productivity of the crops and hence increase the production. The increased production will not only satisfy the domestic demand but also make the country competitive in the export markets. Value addition of both the products have huge demand in international markets and India has huge opportunity to capitalize on this potential. Barely 5 percent of ginger produced is exported, although the demand is increasing in the international markets.*

World export trade in quantity of ginger exported reveals that the share of China is 69.14 percent (2018) while that of India is 3.72 percent. This reveals that India can increase its share in world trade, by increasing productivity and this opportunity must be capitalized as developed countries largely source their requirements from developing countries.

- 9. China also leads in export of crushed or ground ginger in value terms, with a share of 37 percent while India ranks second but is far below with a share of 14.63 percent. The ground ginger exported from India was mainly from varieties grown in Kerala which had good flavour, low fibre and high oil content. However, India can no longer be competitive as labor costs are high in Kerala. Efforts must be made to promote cultivation of such varieties at competitive prices.*
- 10. The export of ginger products such as ginger oil and turmeric oil from India is negligible and constitute even less than 1 percent of total quantity of exports. The demand for such products is increasing in developed countries by fast food chains and pharmaceutical sector because they provide consistency in flavour, have low microbial load and easy to transport. Hence efforts should be made to increase the export of such value added products.*
- 11. India also imports ginger and the value of dry ginger imported constitutes about 40 percent of the total ginger and ginger products imported. Discussion with stakeholders revealed that dry ginger is imported for further processing into value added products such as ginger essential oils and oleoresins. The country must ensure that suitable varieties with high yield are cultivated so as to make the product available in domestic markets at competitive prices.*
- 12. In order to promote exports of turmeric to countries such as USA and West Europe, it is necessary to improve the production of varieties which have high curcumin content. In India, Lakadong variety in North East, and a few other varieties in the south are known to have high curcumin content and hence all post harvest management with respect to these varieties which is must be practised so as to capitalize on export earnings. The demand for curcumin is increasing by the pharmaceutical and food sector in domestic as well as international markets. Hence the production which is less than one thousand tonnes, must be increased as it will bring considerable gains to the turmeric economy of the country.*
- 13. While India produces about three fourth of the world production of turmeric, the country still imports the product. While the product was traditionally imported from Ethiopia and Myanmar, in recent years, Vietnam has become a major exporter to India. Hence it is*

important that the country produces high yielding varieties of turmeric with high curcumin content in order to restrict imports but instead be a major exporter of the produce.

Overall it can be concluded that there is tremendous potential for ginger and turmeric to strengthen the agricultural sector by adopting suitable strategies. But this needs to happen scientifically at every stage from production to post harvest and processing stage. There is scope to widen markets in both domestic and international markets for both the crops as well as their value additions. The government no doubt is aware of the potential of spice crops and several schemes are in place. If the bottlenecks are addressed, the spice economy will certainly give impetus to the agricultural sector.

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Chapter I

Introduction

Backdrop:

India is well known as the home of spices with a rich history in spice trading. The agro-climatic conditions in the country are conducive for the cultivation of a wide variety of spices which are in great demand, not only in the domestic, but also in international markets. The share of India in the global production of spices is as low as 5 percent for garlic but as high as 80 percent for mint. Further, the wide range of spices produced in the country, are also converted into value added products. The spices as well as their value added products have several useful properties not only for culinary purposes, but for several processed products as well as for medicinal herbs. Among the various spices cultivated in the country which occupy an area of about 3.91 million hectares, the share of ginger is 4.4 percent, while that of turmeric is about 6.3 percent (2019-20). In case of production, the share of ginger is 12.5 percent while that of turmeric is 13 percent (Government of India, 2019). Hence, together these two crops account for about one-fourth of the country's spice production. Further, although these two crops, are largely being used for culinary purposes, some part is also dried and converted into powder, largely in case of turmeric, which has a much longer shelf life as compared to fresh produce. This dried and powdered produce has a wide variety of uses in food industry, pharmaceutical, nutraceutical and cosmetic industry.

1.1 Status of ginger in global and domestic economy:

Ginger rhizomes are cultivated in several countries in the world and India stands to be the major producer. Within India, ginger is cultivated in several states and the area is showing an increase over the decades. In this section therefore, the status of ginger cultivation across countries and also within states in India is observed.

1.1.1: Comparison among major countries in Area, Production and Yield of ginger:

Ginger is an ancient medicinal plant and one of the earliest known of spices having a wide variety of uses. While ginger is cultivated in around 36 countries, the production is concentrated only in few countries as can be observed in Table 1.1.1 India is a leading producer of ginger, having a share of 45 percent in area and 35.2 percent in production in the global map. This indicates that India occupies a little less than half the world area of ginger and produces a little less than one-third of the world production of ginger. This clearly indicates the dominance as well as importance of India in the global economy of ginger. While Nigeria ranks second in

terms of area, China ranks second in terms of production. Three countries comprising India, Nigeria and China together occupy 77.3 percent of world area under ginger. This indicates that the cultivation of ginger is dominated in a few countries. The share goes up to 83.37 percent when Nepal is included. About 28 countries together cultivate 5.89 percent of world area under ginger.

The picture which emerges with respect to productivity of ginger reveals wide variations across countries. While India ranks first with respect to area and production, the productivity levels are lower than world average. Countries like USA and Japan which have negligible share, even less than one percent in area have very high productivity levels which are about 3.5 times world average. About 58 percent of countries have productivity levels higher than India. This indicates that India has tremendous scope to increase yield.

Table 1.1.1: Share of Major countries in Area, Production, Productivity of Ginger

Area: hectares; Production: tons (2017), Yield: tons per hectare

Country	Area	Percentage	Production	Percentage	Productivity
India	168000	45	1070000	35.21	6.3
Nigeria	66446	17.87	349895	11.52	5.2
China	53515	14.4	583126	19.2	10.9
Nepal	22649	6.1	279504	9.2	12.3
Indonesia	10556	2.84	216587	7.1	20.5
Thailand	10081	2.72	167479	5.5	16.6
Cameroon	9338	2.5	91821	3.02	9.8
Bangladesh	9307	2.5	77478	2.55	8.3
Others	21924	5.89	202230	6.7	-
World	371816	100	3038120	100	8.1

Source : <http://www.factfish.com/statistic/ginger>

1.1.2 State-wise Area under ginger in India:

It was observed from Table 1.1 that India is a major producer of ginger in the global economy. The area under ginger in India is about 1.64 lakh hectares (2016-17) but had increased gradually over the decades. The area which was 53,900 hectares in 1990-91, increased to 83,400 hectares in 2000-01 which means an increase of about 55 percent. By 2010-11, the area was 137,500 hectares which further increased to 171730 hectares in 2016-17. This means that from 1990-91 till 2016-17, the area cultivated under ginger increased three times.

Within India however, the area under ginger varies across states and the state wise distribution can be observed from Table 1.1.2

Table 1.1.2: State-wise Area under Ginger (hectares)

State	2016-17		2017-18		2018-19		2019-20	
	Area	Area (Percent Share)	Area	Area (Percent Share)	Area	Area (Percent Share)	Area	Area (Percent Share)
Madhya Pradesh	23153	13.48	23431	13.87	24964	15.19	25402	14.77
Karnataka	23088	13.44	20809	12.31	15858	9.65	21663	12.59
Assam	17632	10.27	18105	10.71	17865	10.87	19351	11.25
West Bengal	11990	6.98	12250	7.25	12418	7.56	12219	7.10
Orissa	16568	9.65	16575	9.81	16575	10.09	16573	9.63
Gujarat	4651	2.71	4870	2.88	5037	3.07	4853	2.82
Kerala	5151	3.00	4370	2.59	3275	1.99	4265	2.48
Sikkim	12300	7.16	12300	7.28	15637	9.52	13412	7.80
Meghalaya	10349	6.03	9944	5.88	9953	6.06	9963	5.79
Mizoram	8553	4.98	8553	5.06	8553	5.21	8553	4.97
Arunachal Pradesh	8500	4.95	7650	4.53	4001	2.44	5479	3.18
Uttaranchal	2047	1.19	2325	1.38	4911	2.99	3094	1.80
Telangana	2017	1.17	1840	1.09	1623	0.99	1827	1.06
Andhra Pradesh	509	0.30	381	0.23	296	0.18	294	0.17
Maharashtra	9248	5.39	9450	5.59	9450	5.75	7833	4.55
Others	15974	9.30	16136	9.55	13894	8.44	17259	10.03
Total Including Others	171730	100.00	168989	100.00	164310	100.00	172040	100.00

Source: www.indianspices.com/sites/default/files/majors

It can be observed that in 2016-17, Madhya Pradesh and Karnataka had highest share in the cultivation of ginger which was 13.48 percent and 13.44 percent respectively. The share of Madhya Pradesh started increasing in 2012-13 when the area increased by 73 percent over 2011-12. However, it is important to know that Kerala was one of the traditional ginger producing states in India. Infact, in 1990-91, Kerala had highest area in the country, in the cultivation of ginger which was 14300 hectares constituting about 26.5 percent share. The state continued to be a major producer of ginger in the decade of the nineties though there was a gradual decline in area over the years. The declining trend continued with a sharp decline to 5410 hectares in 2009-10 and has declined to 4980 hectares in 2016-17. The area under ginger reduced considerably in Kerala due to high cost of cultivation. The main reason for the reversal of this share is that farmers in Kerala not only found their cost of cultivation increasing, but the soil also began to lose fertility and there was threat of diseases like root wilt. These conditions made them shift ginger cultivation to Karnataka where land is available on lease and labour is relatively cheap. During the period 2000-01 to 2009-10, the rate of growth in area in Kerala

was -8.13 per cent per annum, when the area declined from 11600 hectares in 2000-01 to 5410 hectares in 2009-10, i.e a decline of 53.36 percent. The state of Karnataka during the corresponding period experienced a growth rate in area of 17.26 percent per annum, i.e an increase of 319 percent (Appendix 1.1) Hence considerable cultivation of ginger in Karnataka is done by migrants from Kerala and this explains why area under ginger declined in Kerala but increased in Karnataka.

Assam is also an important ginger growing state with a share of 11.25 percent in the country's area. Infact ginger has an important role to play in the agricultural economy of the eastern states. The share of the combined eastern states constitutes about half the area under ginger in the country. Thus, there is relative concentration of area under ginger in eastern part of the country. In the western part, the area in Maharashtra was 7833 in 2019-20 hectares in 2019-20, contributing to 4.5 percent of area.

1.1.3 Comparison of Production and Productivity Across States:

It was earlier observed that though India has a major share in world area of ginger, it ranks quite low in terms of productivity. In Table 1.1.3, the state-wise productivity and production of ginger is indicated. An important point to note is that the data reported by states is not uniform. While some states such as Karnataka, Mizoram, Orissa, Madhya Pradesh and Kerala report the production of ginger in dry form, other states such as Assam, West Bengal, Maharashtra, Meghalaya and Arunachal Pradesh report the produce as fresh. Hence the production and productivity of ginger across states is not comparable. In Food and Agriculture Organization of United Nations (2002) Report, the varieties for cultivars of Indian Institute of Spice Research were indicated. It was observed that the yield of fresh ginger across varieties ranged from 13.5 tons per hectare to 23.2 tons per hectare. The dry recovery ranged from 19 percent to 23.5 percent. Using these figures of dry recovery percentage, the data for all states with respect to production and productivity was made uniform. The same is indicated in Table 1.1.3. It may be further noted that sources such as National Horticulture Board or indiastat.com may present the state wise data in such a manner that while for some states the data refers to dry ginger, in case of other states the data refers to fresh ginger. In Table1.1.3 the appropriate conversion factor is used such that dry ginger is about 22.7 percent of fresh ginger and the state-wise data is made comparable.

Table 1.1.3 : State-wise share of Production and Yield of ginger (2016-17 to 2019-20) (Production in Tonnes, Yield in Tonnes per hectare)

State	2016-17					2017-18					2018-19					2019-20				
	Prod. Fresh	Production Dry	Yield Fresh	Yield Dry	Prod. (Percent)	Prod. Fresh	Production Dry	Yield Fresh	Yield Dry	Prod. (Percent)	Prod. Fresh	Production Dry	Yield Fresh	Yield Dry	Prod. (Percent)	Prod. Fresh	Production Dry	Yield Fresh	Yield Dry	Production (Percent)
Madhya Pradesh	372640	84666	16.09	3.66	20.36	377470	85789	16.11	3.66	21.03	414280	94182	16.6	3.77	23.16	410950	93410	16.18	3.68	22.29
Karnataka	271490	61708	11.76	2.67	14.83	249920	56799	12.01	2.73	13.93	244070	55467	15.39	3.50	13.64	278000	63167	12.83	2.92	15.08
Assam	156660	35585	8.88	2.02	8.56	161600	36745	8.93	2.03	9.00	166270	37801	9.31	2.12	9.29	183160	41649	9.47	2.15	9.94
West Bengal	130400	29648	10.88	2.47	7.12	133750	30402	10.92	2.48	7.45	135560	30819	10.92	2.48	7.58	133240	30270	10.9	2.48	7.23
Orissa	127950	29069	7.72	1.75	6.99	128020	29082	7.72	1.75	7.13	128020	29082	7.72	1.75	7.16	128000	29078	7.72	1.75	6.94
Gujarat	102850	23371	22.11	5.03	5.62	108250	24605	22.23	5.05	6.03	110401	25093	21.92	4.98	6.17	107170	24353	22.08	5.02	5.81
Kerala	95220	21646	18.49	4.20	5.20	86270	19605	19.74	4.49	4.81	70330	15981	21.47	4.88	3.93	83940	19076	19.68	4.47	4.55
Sikkim	55900	12691	4.54	1.03	3.05	55900	12691	4.54	1.03	3.11	85139	19333	5.44	1.24	4.76	65650	14906	4.89	1.11	3.56
Meghalaya	73290	16652	7.08	1.61	4.00	66200	15052	6.66	1.51	3.69	66270	15065	6.66	1.51	3.70	66290	15058	6.65	1.51	3.60
Mizoram	62740	14268	7.34	1.67	3.43	60130	13665	7.03	1.60	3.35	60130	13665	7.03	1.60	3.36	61000	13860	7.13	1.62	3.31
Arunachal Pradesh	70000	15918	8.24	1.87	3.82	56580	12866	7.4	1.68	3.15	23770	5401	5.94	1.35	1.33	39110	8891	7.14	1.62	2.12
Uttaranchal	20530	4666	10.03	2.28	1.12	25710	5844	11.06	2.51	1.43	48468	11016	9.87	2.24	2.71	31569	7172	10.2	2.32	1.71
Telangana	14090	3204	6.99	1.59	0.77	12980	2948	7.05	1.60	0.72	11221	2549	6.91	1.57	0.63	12760	2898	6.98	1.59	0.69
Andhra Pradesh	8230	1871	16.17	3.68	0.45	1440	327	3.78	0.86	0.08	2492	566	8.42	1.91	0.14	3200	727	10.88	2.47	0.17
Maharashtra	138000	31359	14.92	3.39	7.54	141000	32044	14.92	3.39	7.86	141561	32173	14.98	3.4	7.39	113144	25715	14.44	3.28	6.14
Others	130600	29682	8.18	1.86	7.13	129340	54716	14.92	3.39	7.21	222549	46986	14.92	3.39	10.79	126347	28715	7.32	1.66	6.85
Total Including Others	1830590	416005	10.66	2.55	100.00	1794560	433181	10.62	2.41	100.00	1788970	435179	10.89	2.48	100.00	1843530	418945	10.72	2.44	100.00

Source : [www.indianspices.com>sites>default>files>majors](http://www.indianspices.com/sites/default/files/majors)

It can be observed that the average yield of ginger since 2016-17 has shown no major change and hovers around 2.5 tonnes per hectare for the country on an average across states. However, the yield in North-Eastern states by and large appears to be below All India average.

It was observed in a study by Indian Council of Agricultural Research (2014) that the peculiar feature of ginger farming in Odisha is that it is mostly cultivated in tribal dominated districts by small and marginal farmers. These farmers use mostly indigenous methods of production due to which the productivity is low. The varieties used were mainly local and non-descript varieties and do not have irrigation facilities. These factors contribute to lower yields. Infact for the same reasons, the productivity of ginger is low in North Eastern parts of the country. Sikkim has a yield of only 1.1 tons per hectare of dry ginger. Since Sikkim mainly cultivates organic produce, the yield is expected to be lower. While North East states have increased their area under ginger, which presently accounts for about half the area in the country, their contribution to production is about 38.4 percent. This indicates that their yield levels are very low, mainly due to organic cultivation. It is however important to note that an important variety of ginger cultivated by tribals in Assam, namely, *Karbi Anglong*, has been accorded Geographical Indication tag. The ginger produced has low fibre content and considered to be one of the best organic ginger in the world.

Certain states however have yield levels which are higher than national average. The state of Gujarat has a yield of 5.02 tonnes per hectare, while that of Kerala is 4.47 tonnes per hectare (2019-20). However, while production varies across states depending upon area and yield, it can be observed that ginger does form a part of the cropping pattern of most states.

1.2 Status of turmeric in global and domestic economy:

Turmeric is mainly native to Asia and India. The consumption however is gradually spreading to countries across the world, mainly due to its medicinal properties. However, India continues to be the world leader in production and consumption of turmeric. In this section, the status of turmeric in the global and domestic economy is observed.

1.2.1 Country-wise Comparison in Turmeric Cultivation:

Turmeric is an important spice crop cultivated in India since times immemorial. It is reported to have originated in India and is scientifically known as *Curcuma longa*. India is the largest producer and consumer of turmeric in the world. There appear to be no reliable sources

of data on area and production of turmeric across countries, although some estimates are available. In Table 1.2.1, the share of countries in turmeric production is indicated

Table 1.2.1.: Country-wise share in Production of turmeric

Country	Percentage share in Production
India	78
China	8
Myanmar	4
Nigeria	3
Bangladesh	3
Others	4

Source: shodhganga.inflibnet.ac.in.bitstream

It is clear from Table 1.2.1, that India has a major share in the production of turmeric. Infact, the share of other countries is negligible as compared to India. Thus it is clear that production of turmeric in the global scenario is mostly dominated by India.

1.2.2 State-wise share in Area under Turmeric:

The state-wise area under turmeric is indicated in Table 1.2.2. The total area under turmeric in the country is 245958 hectares in 2019-20. If one refers to past data, it can be observed that the area which was 119000 hectares in 1990-91 gradually increased to 166210 in 1999-2000 registering a growth rate of 3.78 percent per annum. From the period 2000-01 to 2009-10, the area increased in certain years and reduced in certain years (Appendix 1.2) indicating a growth rate of -0.43 percent per annum. However, since 2010-11 the area again gradually increased till 2019-20, registering a growth rate of 1.29 percent per annum.

The area under turmeric varies across states with Telengana having highest share of 19.52 percent in 2019-20. Infact, when considered with Andhra Pradesh, then both these two states together constitute about 26.76 percent of area (2019-20) which is about one-fourth of the area in the country. Orissa has a share of 11.33 percent followed by Karnataka with a share of 10.94 percent and Tamil Nadu with a share of 9.54 percent. These five states, alongwith West Bengal, Assam and Maharashtra contribute to 79 percent of the area under turmeric in the country. However, one-fifth area is concentrated in Telengana, which is the highest share in the country.

Table 1.2.2 State-Wise Area under Turmeric (hectares)

State	2016-17		2017-18		2018-19(Est)		2019-20	
	Area	Area (Percent Share)	Area	Area (Percent Share)	Area	Area (Percent Share)	Area	Area (Percent Share)
Telangana	50580	20.43	50150	21.65	53100	20.95	48000	19.52
Karnataka	19330	7.81	19340	8.35	26579	10.49	26905	10.94
Tamil Nadu	35800	14.46	25500	11.08	23461	9.26	23460	9.54
Andhra Pradesh	19180	7.75	19620	8.47	20359	8.03	17800	7.24
West Bengal	18000	7.27	17450	7.53	17747	7.00	17731	7.21
Orissa	27860	11.25	27870	12.03	27869	11.00	27866	11.33
Maharashtra	14050	5.67	15760	6.80	17224	6.80	15342	6.24
Mizoram	7480	3.02	7740	3.34	7738	3.05	7650	3.11
Assam	16800	6.78	16870	7.28	15896	6.27	17629	7.17
Gujarat	3710	1.50	4010	1.73	4425	1.75	4047	1.65
Haryana	1500	0.61	830	0.36	921	0.36	1083	0.44
Others	33340	13.46	26487	11.45	38087	15.03	38445	15.63
Total Including Others	247630	100.00	231637	100.00	253406	100.00	245958	100.00

Source : [www.indianspices.com>sites>default>files>majors](http://www.indianspices.com/sites/default/files/majors)

1.2.3 State-wise Production and Yield of Turmeric:

The production of turmeric is reported by most states in dry form. This is apparently because drying the rhizome is a part of the harvesting process of turmeric. The turmeric crop is ready for harvest approximately 7 to 10 months after planting. The rhizomes which are dug out from the soil are cleaned by fresh water under pressure for removal of soil and other foreign matter. The cleaned rhizomes are submerged in hot water and boiled uniformly. Cured rhizomes are then poured to a bamboo basket to drain the water and dried in yards. This process gives attractive colour and characteristic aroma to turmeric. Boiling of fresh rhizomes kills their growth, eliminates the odour, reduces the time of drying, ensures even distribution of colour and overall improves the quality of the product. Sun drying takes about 10 to 15 days, till the rhizome becomes thoroughly hard and brittle. The moisture content of dried turmeric is kept at 8 to 10 percent for better storage. Mechanical drying is also used and gives better results particularly for sliced turmeric. Polishing of rhizomes is also done with a polishing drum or manual method. Turmeric is also graded into bulbs and fingers based on their size.

The state –wise production and yield of turmeric is indicated in Table 1.2.3. It can be observed that highest production of turmeric is in the state of Telengana which constitutes 33.23 percent of total production in the country. Karnataka ranks second in the production of turmeric with a share of 15.98 percent. It can be observed that it is the south Indian states which are dominant in turmeric production and the share of Telengana, Karnataka, Tamil Nadu and Andhra Pradesh is 67.35 percent in the production of turmeric.

Among the turmeric cultivating districts of Tamil Nadu, the district of Erode has highest share in area and production, contributing to about one fourth of area and one-third of production in the state. This region is often referred as *Turmeric City* and huge trade in turmeric takes place in Erode. In March 2019, *Erode* turmeric got a Geographical Indication tag for the uniqueness of quality parameters of Erode turmeric. The mean length of the finger is 4.15 cms and mean circumference is 3.03 cms. The mean bulb of the mother rhizome is about 4.54 cms and mean circumference is 6.54 cms. The curcumin content ranges from 2.5 to 4.5 percent and the rhizome is resistant to pests after boiling.

Table 1.2.3: State-wise Production and Yield of Turmeric

State	2016-17			2017-18			2018-19			2019-20		
	Production	Yield	Production (Percent)	Production	Yield	Production (Percent)	Production	Yield	Production (Percent)	Production	Yield	Production (Percent)
Telangana	305100	6.03	32.97	294560	5.87	34.11	345270	6.5	35.97	312000	6.5	33.23
Karnataka	114510	5.92	12.38	122760	6.35	14.22	153770	5.79	16.02	150000	5.58	15.98
Tamil Nadu	129560	3.62	14.00	103020	4.04	11.93	79844	3.4	8.32	90220	3.85	9.61
Andhra Pradesh	79730	4.16	8.62	79730	4.06	9.23	85500	4.2	8.91	80100	4.50	8.53
West Bengal	45500	2.53	4.92	44700	2.56	5.18	45460	2.56	4.74	45220	2.55	4.82
Orissa	43600	1.56	4.71	43610	1.56	5.05	43615	1.57	4.54	43610	1.56	4.64
Maharashtra	44940	3.2	4.86	38590	2.45	4.47	38310	2.22	3.99	40140	2.62	4.27
Mizoram	28890	3.86	3.12	29820	3.85	3.45	29820	3.85	3.11	29510	3.86	3.14
Assam	16750	1.00	1.81	20790	1.23	2.41	19395	1.22	2.02	22830	1.3	2.43
Gujarat	14630	3.94	1.58	15780	3.94	1.83	17386	3.93	1.81	15930	3.94	1.70
Harayana	4400	2.93	0.48	2180	2.63	0.25	2195	2.38	0.23	2930	2.71	0.31
Others	97660	2.93	10.55	67920	2.88	7.87	99232	2.61	10.34	106465	2.77	11.34
Total Including Others	925270	3.74	100.00	863460	3.73	100.00	959797	3.79	100.00	938955	3.82	100.00

Source : [www.indianspices.com>sites>default>files>majors](http://www.indianspices.com/sites/default/files/majors)

Besides *Erode* turmeric, in the state of Odisha, turmeric is popularly cultivated by tribal farmers which is organic and has high potential for medicinal and industrial use. This variety named *Kandhmal turmeric* has also been accorded a Geographical indication tag. The yield however is quite low, being organic in nature and much below national average.

Overall, it can be observed that cultivation of turmeric is spread across several states in the country but the concentration is more in South India. The varieties of turmeric differ in each state and while *Allepey* finger turmeric is well known in Kerala, *Erode and Salem* are

major varieties in Tamil Nadu. In the state of Maharashtra, *Rajapore and Sangli* turmeric are cultivated, while *Nizambad bulb* is well known in Andhra Pradesh and Telengana. In Meghalaya, the *Lakadong* variety has great commercial value in view of high curcumin content.

The yield of turmeric varies across states but is below national average in eastern states. This is mainly due to organic cultivation. However, the quality of the turmeric has important properties and there is scope to capitalize on these varieties.

1.3 Need for Study:

It is clear from the above sections, that ginger and turmeric are important spice crops and cultivated in several states of the country. While ginger is cultivated in many countries, India ranks first in production. There is considerable world trade in ginger in view of its increasing realization as a medicinal herb. The cultivation of turmeric is restricted to Asia, with India being the dominant producer. However, the beneficial properties of turmeric are being realized in the western world and infact in all countries across the globe. Both the crops besides being used for culinary purposes, are also processed into several value added products. The demand for these products is increasing in view of several useful properties tested in these crops in both domestic and international markets. This can provide substantial opportunities for India to capitalize on its production. Realizing the importance and potential of these two crops, the Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi, sponsored a study on “*Assessment of Ratio of Different Products/Forms of Spices Being Marketed : Study Based on Ginger and Turmeric*”. The main purpose of the study was to try and understand the extent of consumption of these two rhizomes, in various forms, for different uses. This would enable the government to prepare suitable development programmes for these two spice crops. Further, both these rhizomes are harvested as fresh, but also processed and sold in dry form. This is more so with respect to ginger. While certain states report the produce in fresh form, other states report it in dry form. Hence, an attempt was made to present the production in both fresh and dry form with respect to ginger. In case of turmeric, a very negligible portion is sold as fresh fo and drying the rhizome is a part of the post harvesting operations. Hence the data is presented in dry form only.

1.3.1 Objectives of the study:

In view of the above, the study has the following objectives:

1. To observe the trend in area, production and yield of ginger and turmeric, and to observe production of ginger in fresh and dry form across states;
2. To try and estimate the usage of ginger and turmeric in different forms such as culinary, powder, volatile oils, oleoresins, and other value added products.
3. To study the inter seasonal and intra seasonal fluctuations in prices of ginger and turmeric;
4. To study the trade with respect to both crops as well as their value added products;
5. To suggest policy measures for both crops.

1.3.2 Methodology:

The study is based on primary and secondary data. The study was coordinated by AERC, Pune, Gokhale Institute of Politics and Economics, with the following participating centres:

1. ADRT, Institute of Social and Economic Change, Bangalore, did the data collection, field work and analysis for the state of Karnataka for ginger and turmeric.
2. AERC, Chennai, University of Madras, conducted data collection, field survey and analysis for ginger in the state of Kerala and for turmeric in the state of Tamil Nadu.
3. AERC Santiniketan, Vishwabharati, did data collection, field work and analysis for Sikkim, for the crops of ginger and turmeric.
4. AERC Jorhat, conducted field work, data collection and observations for ginger and turmeric in the state of Assam
5. AERC, Waltair conducted field work, and analysis for turmeric in the state of Andhra Pradesh and Telengana.

The data on area, production and yield was collected mainly from the Spice Board website. However other websites such as indiastat.com and Economic and Political Weekly Research Foundation website were also referred. The website of the state governments with respect to both crops was also used to observe the major producing districts.

Field visits were made to major states such as Assam, Andhra Pradesh, Telengana, West Bengal, Kerala, Chennai and Maharashtra to Agricultural Produce Market Committees to observe if the sale of the produce was in wet or dry form. It was also observed whether the produce was further sold to another trader or to a processing unit. Further, all stakeholders in the value chain were interviewed, such as manufacturers of value added products such ginger paste, processors of oils and oleoresins, etc. to understand the usage of the rhizomes in different forms for various purposes.

Data on prices of both crops were obtained from <https://agmarknet.gov.in/> website in order to observe the intra seasonal and inter seasonal fluctuations in prices with the help of simple statistical tools. The data on exports and imports of the crops and their value added products was obtained from Ministry of Commerce, Directorate of Arecanut & Spices Development, Calicut. Relevant information was also collected from Spice Board website.

With the help of the above data, an attempt was made to study the objectives outlined for the project. After, the first introductory chapter on status of ginger and turmeric in the global and domestic economy, in Chapter II, an attempt has been made to observe the uses of ginger and turmeric that is produced in different forms and for different uses. In Chapter III, the inter seasonal and intra seasonal fluctuations in prices in different states have been observed. In chapter IV, the trade with respect to ginger and turmeric and their value added products have been studied in detail to observe the international potential of these crops. Finally, in chapter V, the policy issues have been addressed.

Appendix 1.1

State wise Area Under Ginger (Area in 000 hectares)

Year	Assam	Karnataka	Kerala	Odisha	Sikkim	West Bengal	Others	India
1990-91	-	2	14.3	8.7	3	5.3	19.63	53.93
1991-92	-	2	14.8	9.7	3.5	9.8	20.03	59.83
1992-93	-	2.1	15.3	9.6	3.5	6.9	22.47	59.87
1993-94	-	2.3	13.9	10.9	3.5	7.2	22.78	60.58
1994-95	-	2.9	11.5	11.4	3.8	8	23.49	61.09
1995-96	-	3.5	14	11.7	4.5	8.1	24.18	65.98
1996-97	18.14	4.41	12.81	9.83	4.6	8.85	11.65	70.29
1997-98	18.15	3.62	14.1	13.18	4.94	9.14	12.47	75.6
1998-99	16.24	3.94	14.57	13.52	2.49	9.4	17.44	77.6
1999-00	16.24	10.24	12.7	13.1	4.9	9.2	14.42	80.8
Gr. Rate 1990-91 to 1999-00	-3.62	19.90	-1.31	4.65	5.60	6.32	-3.37	4.59
2000-01	17.01	10.7	11.6	12.1	5	9.3	37.5	86.2
2001-02	17.87	12.17	10.7	13	5.1	9.3	41.03	91.3
2002-03	17.97	10.9	9	15.3	5	9.4	38.6	88.2
2003-04	17.98	10.15	8.5	15.5	6.5	9.4	35.05	85.1
2004-05	18.18	20.21	8.9	15.7	6.5	9.1	34.89	95.3
2005-06	18.56	21.67	9.3	15.8	6.5	7.7	49.63	110.6
2006-07	18.86	17.47	11.1	16.1	6.5	9.8	45.13	106.1
2007-08	15.62	14.78	8.9	16.1	7	10.9	46.39	104.07
2008-09	15.22	25.48	7.42	16.53	9.24	11.13	23.62	108.64
2009-10	15.69	44.83	5.41	16.84	6.7	11.22	6.85	107.54
Gr. Rate 2000-01 to 2009-10	-0.89	17.26	-8.13	3.74	3.31	2.11	-17.21	2.49
2010-11	16.39	46.5	6.09	17.12	6.7	11.41	44.79	149
2011-12	16.34	29.39	5.83	15.84	8.51	11.5	67.59	155
2012-13	16.72	16.51	6.36	15.84	9.25	11.5	59.82	136
2013-14	15.68	18.96	4.44	15.84	9.3	11.5	56.9	132.62
2014-15	16.52	30.78	4.8	15.84	9.3	11.5	53.26	142
2015-16	16.31	29.28	4.88	15.84	10.03	11.89	75.77	164
2016-17	17.63	23.08	4.98	16.57	12.3	11.99	81.45	168
2017-18	18.79	20.8	4.37	16.57	12.3	11.99	75.18	160
2018-19	17.86	15.85	3.27	16.58	15.63	12.41	92.4	174
2019-20	19.35	21.66	4.26	16.57	13.41	12.22	84.53	172
Gr. Rate 2010-11 to 2019-20	1.86	-8.14	-3.89	-0.36	8.01	0.76	7.31	1.61
Growth rate 2000-01 to 2019-20	0.68	3.78	-5.14	1.67	5.33	1.45	4.37	3.70
Growth Rate Entire Period	0.28	8.56	-4.09	2.25	5.30	2.92	5.16	4.08

Appendix 1.2

State-Wise Area under Turmeric (Are in 000 hectares)

Years	Andhra Pradesh+ Telengana	Telangana	Karnataka	Maharashtra	Odisha	Tamil Nadu	West Bengal	Others	India
1990-91	46.3	-	3.5	6.8	23.9	8.8	9.9	19.8	119
1991-92	45.8	-	4.3	7	23.7	9.9	9.8	19.8	120.3
1992-93	49.2	-	3.4	7.1	24.3	15.8	10.9	19.5	130.2
1993-94	56.8	-	4.6	6.1	25.8	22.1	11.2	21.8	148.4
1994-95	58.1	-	5.6	7.2	25.2	19.7	11.6	22	149.4
1995-96	52.5	-	4.7	7.3	26	15.6	11.4	21.8	139.3
1996-97	52	-	4.8	7.2	19.7	16	12.6	23.25	135.55
1997-98	48.1	-	4.3	7.3	26.5	18.2	12.5	23.16	140.06
1998-99	60	-	5	7.2	27	24.8	12.8	24.79	161.59
1999-00	64	-	7.5	6.9	28	32.5	13.3	14.01	166.21
Gr. Rate 1990-91 to 1999-00	3.66	-	8.84	0.16	1.77	15.62	3.33	-3.77	3.78
2000-01	73.9	-	9.3	7	28.1	33	13.9	26.5	191.7
2001-02	61.7	-	7.1	7	27.1	23.64	12.8	27.4	166.74
2002-03	56.8	-	6.6	7	23.6	17.3	11.7	27.1	150.1
2003-04	58	-	5.4	7	23.8	16.2	12.6	27.1	150.1
2004-05	61	-	5.9	7	23.9	21.6	12.4	27.4	159.2
2005-06	70	-	6.3	7	24	26	11.8	27.8	172.9
2006-07	65	-	7.48	7	24.7	30.5	13.7	30.11	178.49
2007-08	63	-	13.5	7	24.7	27.3	14.9	29.86	180.26
2008-09	61.61	-	14.16	6.8	25.11	29.87	15.21	32.05	184.81
2009-10	59.48	-	17.9	6.8	25.32	33.37	15.46	26.11	184.44
Gr. Rate 2000-01 to 2009-10	-2.38	-	7.55	-0.32	-1.15	0.12	1.19	-0.16	-0.43
2010-11	69.16	-	14.16	13.88	26.83	51.45	15.78	27.8	219.07
2011-12	75	-	25.52	6.76	2.48	67.24	15.8	42.5	235.29
2012-13	67.78	-	19.69	11	2.48	46.15	15.8	45.3	208.21
2013-14	67.46	-	13.36	11	2.48	31.96	15.8	44.8	186.89
2014-15	60.01	-	12.82	13.48	2.48	26.07	15.8	47.3	178
2015-16	59.56	42.54	14.9	9.61	2.48	29.87	16.71	49.9	183.04
2016-17	70.18	50.58	19.32	14.05	27.86	35.79	18	62.43	247.63
2017-18	69.33	50.15	19.39	15.76	27.86	25.5	18	55.8	231.64
2018-19	73.45	53.1	26.58	17.24	27.86	23.64	17.74	66.9	253.41
2019-20	65.8	48	26.9	15.34	27.86	23.46	17.73	68.87	245.96
Gr. Rate 2010-11 to 2019-20	-0.55	3.06	7.39	1.12	0.42	-8.36	1.3	10.61	1.29
Growth Rate 2000-01 to 2019- 20	-0.61	0	11.33	4.37	0.81	5.3	3.11	6.78	3.9
Growth Rate Entire Period	1.22	0	7.29	2.85	0.53	3.44	2.03	4.39	2.54

Chapter II

Usage of ginger and turmeric

Backdrop:

Spice crops have potential in augmenting the income of farmers as well as being a source of foreign exchange earnings. The contribution of spices to the value of output from horticultural crops in 2013-14 (2011-12 prices) was 11 percent, ranking second in importance after fruits and vegetables. Indian spices have exquisite aroma, texture, taste and the diverse agro-climatic conditions which prevail in different parts of the country are conducive to producing a wide variety of these products. The country is also promoting the cultivation of organic spices, as consumers, both in the domestic and international market are becoming more health conscious and having increasing preference for chemical free produce. Spices, besides being used in fresh form mainly for culinary purposes, are also processed into different forms and also value added products, which have a wide variety of uses in several sectors. It is therefore important to observe these different forms of spices as well as their potential for usage by consumers. This in turn will stimulate production of spices as well as augment the income of farmers. A policy can also be designed to capitalize the potential of these crops.

2.1. Forms of ginger:

Ginger is an important commercial crop and contributed Rs 2980 crores in 2013-14 (2011-12 constant prices) to the value of output from agriculture. The share of dry ginger powder to the value of output of total spices and condiments is 6 percent. Several varieties of ginger are cultivated in the country and important ones as reported by the Indian Institute of Spice Research and other Research centres are *Rejatha*, *Mahima*, *IISR Varada*, *Suprabha*, *Suruchi*, *Suravi*, *Himagiri*, *Wyad local*, *Maran*, *Nadia*, *Wardha*, *Narasapattam Himachal*, *Karakkal* and *Rio-de Janerio*. Traditionally, *Cochin ginger* and *Calicut ginger* were popular ginger varieties. Each variety has its own characteristics in terms of pungency, flavour, aroma, color, yield, maturity, dry recovery and oil extraction (FAO, 2002). Ginger attains full maturity in 210-240 days after planting. However, harvesting of ginger for vegetable purposes starts after 150-180 days depending on the demand for the produce. At an early maturity, they are fit for fresh consumption as the rhizomes are less fibrous and tender. This rhizome gradually

becomes more fibrous and strong flavoured after 210 days or so and hence not used as fresh but mainly dried.

There are two primary products of the ginger rhizome –fresh and dried. Fresh ginger is consumed as a vegetable. In order to increase the shelf life, it is also converted into paste by blending and slight cooking to which warm oil is added. It must be packed in a sterilized jar.

The process of drying ginger involves several steps such as cleaning, sorting, peeling and then dried. The rhizomes are to be washed in sanitized water with hypochlorous acid. Sorting is the process of grouping according to size, shape, weight, image and color. Ruptured or blot skin with bacterial or fungal infected rhizomes are not recommended for processing. Peeling is normally done before drying but it is not always carried out as there is a possibility of reduction in oil and oleoresin, if the process is not done carefully. Slicing of ginger is also important as large size of ginger will be difficult to process into dried ginger due to high moisture content. Drying of rhizomes is the process of removing the moisture upto a pre-determined level by providing heat. There are several methods of drying ginger but the very common and traditional method mostly used by the farmer in India is sun drying. The final drying should normally have a moisture of 8-10 percent and should not exceed 12 percent. During drying there is a weight loss upto 80 percent. Packaging of final processed product is one according to the homogeneity in size and quality (Bijaya B. Bag 2018). The dried product is used directly as a spice and also for manufacturing further products such as ginger powder, ginger oil and ginger oleoresin.

It is important to note that ginger is propagated by portions of the rhizomes, known as seed rhizomes. These rhizomes are cut into smaller portions of 2.5 to 5.0 cms in length and weighing 20-25 grams with one or two buds. The seed rate varies from 1500 kgs to 1800 kgs per hectare depending upon the region. Discussion with farmers however revealed that upto 2500 kgs per hectare of rhizomes are used as seed. The seeds undergo treatment with dithane M 45 and then drained and planted at an appropriate spacing. About 15 to 20 percent of the crop that is produced is retained as seed. In this section, an attempt is made to observe the usage of ginger in different forms and for different applications.

2.1.1. Products of Fresh Ginger:

Discussion with stakeholders in ginger trade revealed that farmers normally sell the produce as fresh ginger. Karnataka is a major producing state and largely grown in the districts

of Hassan and Shivamogga. A trader in Hassan revealed that he had purchased 1.13 lakh quintals of ginger in 2019-20 season, out of which 69 percent was fresh and 32 percent was dry. Another trader in Shivamogga stated that out of his purchases of 3.02 lakh quintals, almost 99 percent was purchased as wet. Similarly, the farmers in Maharashtra, both in Aurangabad and Satara districts, which are the major ginger producing districts of the state indicated that almost the entire produce is sold in fresh form. Kerala has lost its traditional status as a ginger growing state where ginger was mainly traded in dry form. However, the area under ginger in Kerala has witnessed a sharp fall and the limited production in both major centres-Wayanad and Palakkad is mostly in wet/fresh form. The farmers were of the view that dry ginger did not fetch a premium price for the labor and other costs involved in drying the produce. As the volume to be sold is less, it is sold as vegetable in the local markets. However, there is a processing unit in Ernakulam district, where the yield from Vadakkancherry region is sold in dry form for further processing. In North-East region of the country, where the produce is mostly organic, the farmers sell it mostly as fresh to major assembling markets, from where the produce reaches major markets like West Bengal, Delhi, etc.

The crop is normally sown in the month of May and harvested from 150 days upto 250 days. If the rhizomes begin to rot in the field due to fungal disease, the farmers begin to dig the rhizomes from the fifth month itself. Normally, only after nine months, when the leaves begin to turn yellow, the crop has full aroma, flavour and pungency. The crop is then ready for harvest and the farmers dig out and sell the produce mainly to local traders. The farmers harvest the crop before full maturity, if the price is favourable. Also, at the time of harvest, if the price is not satisfactory, then perennated crop is practised when the matured rhizome is left in the field without harvesting, in the hope of higher market prices. The farmers normally sell the produce as fresh which is consumed for culinary purposes. However, the traders who purchase from farmers, further sell the produce to retail markets or to companies or informal units who manufacture value added products from fresh ginger.

Besides consuming fresh ginger as a vegetable, several value added products are prepared from fresh ginger such as ginger paste, ginger candy, dry flakes and ginger powder. Companies such as Samrat, Sparsh, Aachi Masala and few others were selected to understand the economics of value added products from ginger. The following products are processed from ginger:

(i) Ginger Paste: This product offers convenience to consumers along with easy storage, long shelf life and authentic taste, to suit the requirements of consumers. The demand for such convenient and better packaged products whose usage saves considerable time for consumers, is rising, due to increase in urbanisation, working population, and higher per capita incomes. The major consumers of these products are hotels, restaurants, fast food joints, super markets, households and culinary schools. Further, the companies which manufacture ginger paste/ginger garlic paste are able to maintain their prices despite wide fluctuations in price of raw material as they purchase in bulk and much in advance. Consumers can therefore substitute these products by the fresh produce in off season or in years of high price of raw produce, besides other conveniences involved.

Discussion with producers of ginger paste revealed the conversion to produce one quintal of ginger paste as indicated in Box 2.1.

Box 2.1

Value Added Product : Ginger paste	Cost>Returns (Rs per quintal)
Fresh Ginger (2 quintals)	7200 (3600 per quintal)
Other raw materials & Processing Cost Per Quintal	6530
Total Cost Per Quintal	13730
Sale Price of Ginger Paste Per quintal	18500
Profit per quintal	4770

Source: Survey, ADRT, ISEC, Bangalore

It can be observed that conversion of ginger into ginger paste/ginger garlic paste brings about considerable value added as for every quintal of paste produced the profit is Rs 4770. Discussion with major producers reveals that the market for ginger/ginger garlic paste is about 200 crores and it can be roughly estimated that about 10 percent of the fresh produce is utilized for the production of ginger paste.

(ii) Ginger Candy: Fresh ginger is seasonal and perishable in nature and cannot be preserved for long after harvesting due to high moisture content. The rhizome is also subject to weight loss, shrinkage, rotting and sprouting after harvesting, if kept for a reasonable period of time. Due to limited processing and value addition of ginger, there is considerable post-harvest loss of this crop. Further, farmers also face fluctuations in prices and often sell the produce at a price which does not even cover the cost of production. A possible solution to this problem is agro processing and ginger candy can emerge as an important product in the confectionary segment. This product does not

appear to be very popular in the market due to its pungency and dark color (NAIP, Orissa, 2014). The value added for one quintal of candy is as indicated in Box 2.2.

Box 2.2

Value Added Product: Ginger Candy	Cost/Returns (Rs per quintal)
Fresh Ginger (3.5 quintals)	12600 (3600 per quintal)
Other raw materials Processing Cost and	6653
Total Cost Per Quintal	14525
Sale Price of Ginger Candy /quintal	19253
Profit Per Quintal	4728

Source: Survey, ADRT, ISEC, Bangalore

2.1.2: Products of dry Ginger:

Ginger is consumed in both fresh and dry form. Dry ginger has a longer shelf life as compared to fresh and a number of products are made from dry ginger. Not all varieties that are cultivated in the country are suitable for drying, and processing into dry ginger is presently done only on a conservative scale. The extent of drying also varies across states, as different states produce different varieties. Discussion with several traders and other stake holders in the ginger economy revealed that about 20 percent ginger may be processed into dry. The following are the products manufactured from dry ginger:

- (i) **Ginger Flakes:** Dehydrated ginger products can be stored for long as compared to fresh ginger, if suitable packaging is undertaken. Dried ginger prepared by farmers in their fields is not easily acceptable by consumers due to unsatisfactory sensory attributes from a commercial point of view. Hence mechanical drying of ginger and suitable machinery is utilized to produce ginger flakes. The value addition of ginger flakes can be observed in Box 2.3

Box 2.3

Value Added Product: Ginger Flakes	Cost/Returns (Rs per quintal)
Fresh Ginger (8 quintals)	20800 (Rs 2600 per quintal)
Other Raw materials & Processing Cost	223
Total Cost Per Quintal	21023
Sale Price of Ginger Flakes /quintal	29350
Profit Per Quintal	8327

Source: Survey, ADRT, ISEC, Bangalore

(ii) Ginger Powder:

Ginger powder is made by grinding dry ginger into powder and hence the main raw material is dry ginger. When dry ginger is converted into powder, the grinding loss is about 8 percent.

Box 2.4

Value Added Product:	Cost/Returns (Rs per quintal)
Ginger Powder	
Fresh Ginger (10 quintals)	26000 (2600 per quintal)
Other Raw materials & Processing Cost	575
Total Cost Per Quintal	26575
Sale Price of Ginger Powder /quintal	39500
Profit Per Quintal	12925

Source: Survey, ADRT, ISEC, Bangalore

Often, ginger powder is a by product of dry ginger, ginger flakes and low quality rhizomes. Ginger powder has wide applications across multiple industries such as food processing, beverages, pharmaceutical, etc. The demand for such products is increasing because there is rising consumer preference for natural flavours rather than synthetic flavours which may be harmful for health. The product also has a long shelf life, if well packaged.

Dried ginger when powdered has several uses. However, some important products made from ginger powder are essential oils and oleoresins.

(iii) Ginger Essential Oils and Oleoresins:

The spice flavour of ginger is due to two factors, the volatile oil contributing to aroma and the resinous non-volatile portion that is responsible for pungency. Oleoresin is the total extract which contains both volatile oil and pungency. It can be extracted by solvent extraction of powdered ginger with suitable solvents like alcohol, acetone, etc. Ginger oleoresin is a viscous liquid and dark brown in color with a volatile content which greatly varies, depending upon the variety. Ginger oleoresin has several uses and used in food industry as well as for medicinal purposes. Oleoresins have more shelf life and are more stable than the original produce of ginger. They are the concentrated liquid form of the spice which clearly represent the character of the spice.

The amount of essential oil is an important factor in evaluation of oleoresin. It is also termed as “gingerin”. Oil can be obtained from ginger through steam distillation or solvent

extraction. However, the steam distillation method is more popular for oil extraction. Oil is concentrated in the epidermal tissue of ginger and the essence in the oil is due to the presence of essential oils which have aroma and flavour but not pungency. It is important to note that ginger oil was extensively produced only by USA and Europe but gradually major ginger producing countries, such as China, India, Indonesia, etc. also began producing oil. Although ginger oil is produced mainly from dry ginger, it was reported that essential oil from fresh ginger is of better quality than that of dry ginger with respect to fragrant flavour. Further, the oil can also be obtained from the ginger peel. The colour content of the oil is generally yellowish and fresh in color with characteristic aroma and flavour (Bijaya B Bag, 2018).

Ginger oil is used as a flavourant in food processing, pharmaceuticals and also in the nutraceutical sector. The demand for ginger oil and oleoresin is increasing, especially in developed countries due to huge demand by fast food chains with standardized tastes. Also, there is increase in demand for natural flavours which can be obtained from the use of oleoresins. Consumers are increasingly getting averse to synthetic flavors in view of their possible side effects on human health. Hence products such as oleoresins and essential oils are useful in giving natural flavors, clean label products and also for preparation of herbal medicines. There are also strict regulations regarding artificial colors and flavors in food which has increased the demand for such value added products in pharmaceutical and nutraceutical industries. Overall, oils and oleoresins are preferred to dried spices, especially because they are more stable, cleaner, free from contamination and can be standardized. They provide consistency in flavour, convenient to use, they have a longer shelf life, can be customized and have low microbial load.

As observed earlier, there are several varieties of ginger, and the percentage of essential oil extracted from each variety is different. The *Mahima* variety gives the highest percentage of oil which is 2.4 percent while the lowest is extracted from *Himgiri* which is 1.6 percent. The oil yield from dried rhizomes generally ranges from 1.5 percent to 3 percent. The rhizome powder left out from its oil comprises of about 50 percent starch and is sometimes used as livestock feed. It may also be further dried and powdered to produce an inferior spice. The oleoresin content depends upon the variety and ranges between 4 to 10 percent. Discussion with certain producers of ginger oil and oleoresin, indicated that the oil content ranges normally between 1.6 to 1.8 percent while in case of oleoresin, the yield is 6.5 percent. They also indicated that the price of oleoresin is about Rs 2650 per kg while that of pure ginger essential oil would be about Rs 12,000 per kg.

In order to produce ginger oil and oleoresin, the manufacturers normally purchase dry ginger. Discussion with some units who produce ginger oil and oleoresins, revealed that often the units besides purchasing dry ginger from the domestic market, also import dry ginger. Data on imports of dry ginger reveals that India is importing dry ginger at very competitive prices. Further, there are very limited varieties of ginger which give a good yield of oil whereas those imported from countries like Nigeria give good oil yield. In India, farmers especially from Kerala, opined that due to high ginger prices of fresh produce, the conversion from fresh ginger to dry ginger is not remunerative enough for processors to dry the produce. For example, in certain markets in Kerala, in 2013-14, while fresh ginger was trading at Rs 93.27 per kg, the price of dry ginger was as low as Rs 152.76 per kg. The processors therefore refrained from conversion, as the price of dry ginger did not provide any incentive for processing. Discussions with ginger traders also revealed that high quality ginger, namely *Cochin* ginger, had considerable demand in the international market due to unique characteristics such as low fibre content, pleasant flavour and acceptable pungency. Idukki district in Kerala, which was traditionally a ginger producing district, had a variety called *Ellakalan* which had a high oil content. The oil and oleoresin units, which earlier purchased this variety for its high oil content, gradually began to import varieties from Nigeria which were cheaply available. Dry ginger from Nigeria is available even at Rs 73 per kg and discussion with several manufacturing units of oil revealed that their raw material was normally sourced from global markets due to considerably lower prices as compared to the domestic markets. Further, even ginger powder is imported at prices much lower than domestic prices. Hence cheap imports, gradually led to the disappearance of quality varieties in India.

Overall, it appears that for production of oil and oleoresin, the manufacturers depend more on raw material from cheap global markets rather than domestic suppliers. Barely 1 to 2 percent of ginger available for consumption, which included domestic supplies plus imports is used for manufacturing essential oils and oleoresins. It is also important to note that these products are mainly produced for export markets. The domestic demand of households in India is met through consumption of fresh ginger and since essential oils and oleoresins are expensive, the local consumer will refrain from purchasing these products. A negligible portion is perhaps used by food processing industries.

2.1.3 Ratio of different forms of usage of ginger:

The area under ginger in the country has shown a steady increase over the decades. The area which was as low as 21,600 hectares in 1970-71 increased almost three times to 60,000 hectares in 1979-80. By 2000-01, the area increased to 86200 hectares and by 2016-17 the area was 160090 hectares. In 2019-20, the area under ginger was 172040 hectares. With respect to productivity however, the country did not show remarkable success over the years. The productivity of fresh ginger in 2019-20 was 10.72 tonnes per hectare, which indicates a total production of 18.43 lakh tonnes.

The ginger produced in the country has wide varieties, each having their own characteristics and used for different purposes. Discussion with several farmers, traders and units using ginger as raw material revealed unanimously that large part of ginger produced in the country is consumed as fresh. The demand for fresh ginger is increasing for vegetable purposes by households as well as hospitality and catering services. In the state of Maharashtra, about 90 percent of the ginger is consumed in fresh form as vegetable. This however includes about 40 percent of the produce in the state which is converted into ginger paste.

Karnataka is a major ginger growing state and has a share of 20 percent in the country's production. Discussion with traders and manufacturing units revealed that about 50 percent of the produce is utilized for dry ginger. Kerala too, till the 1990s, was traditionally a ginger growing state which was largely processed into dry ginger. However, the area under ginger began to fall gradually since early 1990s and the area which was about 14300 hectares in 1990-91 has declined to 3280 hectares in 2019-20. The major ginger growing districts are Wayanad, Idukki, and Palakkad which were traditionally processing the ginger into dry. However, because the conversion of fresh ginger into dry form was no longer viable and in view of the small volume involved, the traders began to sell the produce in fresh form in the domestic vegetable market. In Pallakad too, which is a comparatively dry district, the form of trade was mostly in dry form. However, the price realized for dry ginger was not remunerative and hence gradually farmers began to sell only in fresh form for domestic consumption. However, there is still one region in Pallakad –Vadakkancherry, where the local ginger is still traded in dry form. The yield from this region is directly transported to processing units in Ernakulam district. Further, ginger from Karnataka is also transported to units in Ernakulam for processing into dry. Overall, it appears that in the state of Karnataka and Kerala, about 50 percent of the produce is converted into dry form.

Assam is also a major ginger growing state and a geographical indication tag was obtained for *Karbi Anglong* ginger which is purely organic. A considerable part of this ginger is dried and exported to Europe which is experiencing an increased demand for ginger. However, in several parts of Assam, the produce cannot be converted into dry form due to high moisture content, as the state suffers from considerable humidity level. In North-east also the produce is mostly organic. Infact in 2016, Sikkim was declared as a 100 percent organic state. The ginger produced in Sikkim contains high oleoresin (6-10 percent) and gives a higher oil recovery of 2 to 3 percent. A major portion of the produce is of high quality and sold through traders to be further sold in major wholesale markets in other states. Discussion with stakeholders of ginger crop in Sikkim revealed that out of total production of ginger in Sikkim, about 65.50 percent is sold as fresh while 13.86 percent is sold as dry. About 18.95 percent is used as seed and the remaining 1.7 percent which is of low quality is used for home consumption by the cultivating households.

The share of Odisha in the area under ginger in the country is about 9.63 percent. The peculiar feature of ginger farming in Odisha is that it is mostly dominated in tribal dominated districts of the state. The farmers mostly cultivate traditional varieties and less exposed to modern scientific farming. About 75 percent of the area under ginger was covered with local non-descript varieties and only 25 percent had improved varieties. The crop suffered from huge post harvest losses and absence of a value chain. However, due to interventions, the farmers were encouraged to cultivate improved varieties such *Suprabha* and *Suruchi* which brought about increase in yield. Organic farming and certification is also being promoted. In addition, there were interventions for value added products such as dehydrated ginger, ginger flakes, ginger powder ginger paste and for usage in beverages. Two agro-processing centres were established in order to produce value added products. Hence, interventions in ginger cultivation enabled a part of the produce in Odisha to be converted in to value added products (NAIP, 2014).

Overall, after discussing with various stakeholders and considering the varieties grown in each state, the infrastructure available for processing, and taking into consideration the ruling market prices of fresh and dry ginger, not only in the domestic markets but also in global markets, it can be roughly estimated that in the ginger economy of the country, the farmers retain about 20 percent as seed and 20 percent is processed into dry ginger. Out of the remaining 60 percent, about 10 percent is converted into ginger paste and the remaining 50 percent is consumed as fresh in vegetable form for culinary purposes. Ginger flakes and ginger powder

are made from dry ginger. Ginger powder is often a by product, while processing dry ginger. Further, dry ginger is also purchased by manufacturers of oil and oleoresin units, who also depend upon imports for their raw material. About 5 percent of domestic production is exported.

It may however be noted that the above estimates are rough and subject to change as the ginger economy is very dynamic. The production, as well as the prices of ginger, fluctuate from year to year and if the price of fresh ginger is attractive, the farmers begin an early harvest and sell the crop. Farmers also revealed that, after sowing the crop in the month of May, there is possibility of excess rains in the forthcoming months. If this happens, there is every possibility that the crop will begin to rot. Hence, they are forced to harvest the crop early. In this case there is no possibility of processing the crop into dry form. The crop can be processed into dry form only when it is fully mature after about 210 days. If there is a fall in price of fresh ginger the farmers prefer to hold the crop and convert it into dry ginger. There is considerable world trade in ginger which impacts the domestic economy. India however, is the largest producer of ginger in the world, but has a huge domestic demand for fresh ginger. The scope for value addition has still to be tapped by widening markets and product diversification.

2.2 Forms of Turmeric:

Turmeric is often referred to as the Indian saffron, and has varied uses in different sectors. It is however important to note that unlike ginger, turmeric is almost entirely sold as dry form. Infact, the drying of the produce takes place in the field of the farmer and only a negligible amount of the produce, perhaps 1 to 2 percent is sold as fresh. The harvesting of this plant is done when the leaves start turning yellowish after 7 to 10 months of plantation. The harvested turmeric rhizomes, before being traded in the market, are converted into a stable commodity through a number of postharvest processing operations such as boiling, drying and polishing. Boiling is normally undertaken within 3 to 4 days of harvest. The fingers are separated from bulbs which are known as mother rhizomes and are cured separately as the latter take longer time to cook. The dry recovery normally ranges from 19 to 23 percent.

Trade in turmeric normally takes place in regulated markets. The produce moves from one state to markets in other states. However, in some North East states, due to infrastructure bottlenecks and absence of regulated markets, the produce is sold to aggregators who in turn sell it to traders in Siliguri or to traders in other major markets. The traders in turn sell the produce to processing units.

2.2.1 Products of dry turmeric:

(i) *Turmeric Powder:*

Discussion with several traders revealed that turmeric is largely converted into turmeric powder. Infact, atleast 80 percent of the produce, after making provision for seed, is converted into powder which is used for culinary purposes. Turmeric is an integral part of almost every meal for an Indian household and its warm mild aroma and distinctive yellow colour is essential for curry powders and used to flavour almost all Indian dishes.

Value Added Product : Turmeric Powder	Cost/Returns (Rs per quintal)
Fresh Turmeric 5 quintals @Rs 900 per quintal	4500
Other raw materials & Processing Cost Per Quintal	5000
Total Cost Per Quintal	9500
Sale Price of Turmeric Powder Per quintal	13200
Profit per quintal	3700

Source: Survey, ADRT, ISEC, Bangalore

It can be observed that a profit of Rs 3700 per quintal is obtained from the production of one quintal of turmeric powder.

(ii) *Curcumin:*

Curcumin is the main biologically active phytochemical compound of turmeric. It is one of the three curcuminoids of turmeric and is extracted, concentrated and standardized for usage in several products. Curcumin gives yellow colour to turmeric and has a wide range of medicinal properties. It is a water soluble, orange-yellow coloured powder. There are few players involved in manufacturing curcumin. Some of the majors ones are – Akay Flavours & Aromatics Private Limited, Arjuna Natural Extracts Limited, Naturite Agro Products, Boimax Life, etc.

The usage of curcumin in various products is gaining increasing importance, but this product is mainly exported. As Indian diet is very rich in turmeric, the demand for this product by households does not exist. The price of the product ranges between Rs 6000 to Rs 8000/kg.

Discussion with major traders of turmeric revealed that about 1.5 percent of the production of turmeric is possibly used for the production of curcumin powder. The production of curcumin produced was approximately estimated at 800 tonnes and major part of the production is exported.

The global curcumin market share indicates the following uses :

Pharmacuetical: 58 %

Food : 37%

Cosmetic : 4%

Other : 1% (ib.tpci/blogs/product-profile-curcumin)

It is clear that different varieties of turmeric have different curcumin content. *Alleppy* turmeric is produced in Kerala and is deep yellow to orange yellow in color and has a curcumin content of 5-6 percent which is higher than many other varieties. *Madras* turmeric is grown in Tamil Nadu and the rhizomes are mustard yellow in color and have a curcumin content of 3 to 3.5 percent. *Rajapuri* turmeric is cultivated in Maharashtra and is sometimes considered superior to *Madras* turmeric which it resembles in characteristics and possesses a curcumin content of 3.5 to 4 percent. The *Nizambad* variety and *Kadappa* finger are grown in Andhra Pradesh and Telengana. These varieties have a pale yellow color with about 2 to 3 percent of curcumin content. Other than these important varieties cultivated in different states, in the North-East there is famous variety called *Lakadong*. This variety is cultivated in Meghalaya and has a curcumin content of more than 7 percent. The crop is organic in nature and in view of its commercial properties, a number of companies have made inroads into the turmeric growing regions of Meghalaya to source the produce which can be further used for pharmaceutical purposes. The curcumin content is much higher than that in international varieties. Turmeric varieties in other countries reveal that Burma finger has a curcumin content of 2.5 to 3 percent, South Vietnam finger has a high curcumin content of 5 to 5.5 percent, Indonesia finger has a curcumin content of 4.2 to 5 percent. However, the curcumin content is quite low in Ethiopia finger and Nigeria finger which is 2.5 to 3 percent.

(iii) *Turmeric Oil* :

Dried rhizomes yield about 5-6 percent volatile oil which is an orange yellow liquid and has a tuberous odour. Volatile oil can be obtained through a process of steam distillation of dried rhizome powder or from crushed turmeric tubers. The uses of turmeric oil are largely for pharmaceutical purposes. However, the production of turmeric oil is negligible in India and mainly for export purposes. Less than half percent of the production of turmeric may be used for manufacturing turmeric oil.

(iv) *Turmeric oleoresin* :

This product is in great demand in the global food and pharmaceutical sector. It is a semi-viscous liquid which contains both volatile aromatic principles and non volatile acrid fractions.

This ingredient contributes to the aroma of turmeric and is devoid of starchy and fibrous materials. Oleoresin carries a dark yellow-brown pasty appearance and contains the flavour compounds and colour in the same proportion as is present in turmeric. Turmeric oleoresin can be obtained by a process of solvent extraction of ground turmeric. Optimum yields of oleoresin are achieved when the rhizomes are harvested at 29 weeks maturity. For best yields, the rhizomes must be harvested at 37 weeks.

Although India produces turmeric oleoresins, discussion with manufacturers indicates that oleoresin is largely made from imported turmeric. Hence barely 1 to 1.5 percent of domestic production is utilized for manufacturing turmeric oleoresin.

(v) *Other uses :*

Turmeric is also used as dyeing agent, as customers often prefer natural colors as compared to synthetic substances. Further, turmeric is also used in preparation of certain cosmetics and finally it is an integral part of religious functions in India.

2.3. Ratio of different uses of turmeric:

Turmeric is being used as a spice crop from a very early period of recorded history because of its coloring, flavour, and medicinal properties. Out of total production of turmeric, about 1 percent is sold as fresh and further used for medicinal purposes. Trade for the rest of the produce is mostly in dry form. The seed rate for turmeric is about 2000 to 2500 kgs per hectare and about 15 percent of produce is retained as seed by farmers. India is also one of the biggest exporters of turmeric and about 13 to 15 percent of the crop is exported. The exports are in different forms, such as fresh, dry, powder, oil and oleoresins. About 1.5 percent of the crop is used to manufacture curcumin which is further converted into medicinal uses, nutraceutical and cosmetic uses. About 2 percent of production is used for producing oil and oleoresins because it appears that manufacturers of these products normally source their produce from other countries such as Indonesia and Vietnam where the rates are more competitive and the curcumin content is higher. Finally, 66 percent of the produce is converted into powder which is used for culinary purposes and also mixed with other spices and products.

Hence, despite uses of turmeric in several forms and for different applications, after discussion with stakeholders, it appears that the produce is largely consumed in powder form. The powder form constitutes an integral part of an Indian diet and is reasonably priced and hence it is obvious that Indian consumers would not consume value added products of turmeric

such as oil and oleoresins, curcumin tablets etc. These products are mainly exported or used by pharmaceutical industries. Overall, it appears that there is still scope to capitalize on turmeric and value added products in domestic and international markets through broadening markets, producing varieties which have high curcumin content and product diversification. A large number of companies preparing blended spice powder as well as the pharmaceutical companies are the vendors which will drive the market for turmeric and the country should capitalize on this opportunity.

Appendix 2.1: Ginger Varieties and their Qualities

No.		Avg. No. of tiller/plant	Mean height of shoot cm.	Avg. Yield tonne / ha. Fresh	% of crude fibre	% of dry ginger to Fresh ginger
1	Rio-de-Janerio	6.7	44.2	29.35	5.19	16.25
2	V3 S1 – 8	--	--	29	3.2	22.2
3	China	5.4	35.2	25.35	3.43	15
4	Thingpuri	6	40	24.47	7.09	20
5	Nadia	3	33.8	23.9	8.13	20.4
6	Suruchi	--	--	23.5	3.8	23.5
7	Maran	5.3	40	23.22	10.04	22.1
8	Surabhi	--	--	23	4	23.5
9	Suprabha	--	--	22.8	4.4	20.8
10	Varada	--	--	22.6	4.5	19.5
11	Rajata	--	--	22.4	4	20.8
12	Hingiri	--	--	20.6	6.05	20.2
13	Thinlaidium	4.9	41.2	19.05	6.92	17.2
14	Narasapattam	9.3	33.2	18.52	4.64	21.9
15	Poona (Satari)	5	30.7	18.15	5.78	22.6
16	Wynad	7.6	41	17.44	4.32	17.81
17	Jorhat	8.2	39.9	17.35	8.56	16.4
18	Tura	6.8	35.1	17.35	8.3	20
19	Bajpai	5.7	35	14.81	6.92	18.75
20	Jujjan	8.6	40.8	14.72	9.61	19.8
21	Burdwan	8	56.6	14.43	2.22	21.9
22	Mysore	7.9	38.6	13.6	7.59	19.37
23	Himachal Pradesh	5.2	48.3	12.84	15.95	23.12
24	Karakkal	6.6	34	12.19	7.78	23.12
25	Emad Manjeri	5.1	37.8	12.07	2.43	21.25
26	Wynad	5.1	41.6	11.87	3.26	20
27	Wynad local	10.5	35.3	11.72	9.66	15.2
28	Valluvanad	5.3	39.6	11.08	5.13	21.87
29	Sierra Leone	5.6	31.2	10.7	5.86	23.12
30	Vengara	5.9	39.1	10.27	4.63	25
31	Uttar Pradesh	5.1	35.6	10.24	4.75	20.62
32	Kunnamangalam	5.8	36	10.03	6.39	17.7

Source: Shodhganga.inflibnet.ac.in>jspui>bitstream

Appendix 2.2: India: State-wise Ginger Grown Varieties

Sr No.	Area of Cultivation	Varieties
1	Jammu and Kashmir	Himachal Selection 1 (Udhampur)
2	Himachal Pradesh	H.S., Dharija, Hingiri, Kandhaghat
3	Haryana	Ambala Local
4	Rajasthan	Dungarpur Local (Udaypur)
5	Gujarat	Shamlaji, Boriyavi
6	Maharashtra	Satara Local (Mahim)
7	Karnataka	Narasapattam, Wynad Local Karakkal
8	Kerala	Maran, Nadia, Suprabha, Suruchi, Chemad,
		Jamaica, Rio-de-Janeiro, Wynad, Wynad local, Wynad Manantody
9	Tamilnadu	Maran, Nadia, Rio-de-Janeiro
10	Andhra Pradesh	Medak, Tune, Narasapattam
11	Orissa	Suprabha, Suruchi, Thingpuri, Maran
12	Madhya Pradesh	Tikamgarh local, Bustar local
13	Uttar Pradesh	China, Nadia, Narasapattam Wynad local, Wynad
		Manantody, Uttar Pradesh local
14	Bihar	Darbanga deshi
15	West Bengal	Maran, Rio-de-janeiro, Tura, Thingpuri, Burdwan
16	Assam	Maran, Nadia
17	Arunachal Pradesh	Shilong local
18	Manipur	Shing- Shingram
19	Meghalaya	China, Maran, Nadia, Thingpuri, Wynad, local,
		Rio-de-janeiro
20	Mizorum	Maran, Thingpuri, Rio-de-janeiro
21	Nagaland	Rio-de-janeiro
22	Tripura	Himachal selection I

Source: Shodhganga.inflibnet.ac.in>jspui>bitstream

Appendix 2.3: Ginger Varieties According to Different Uses

Sr.No.	Use of Ginger	Varieties
1	For dry ginger	Nadia, Maran, Wynad Manantody, Karakkal, Emad
2	For fresh ginger	Rio-de-Janeiro, Wynad local, China, Maran,
		Thingpuri, Nadia
3	For High volatile oil	Narasapatam, Emad, Chemad, Himachal Pradesh
		Local.
4	For high Oleoresin	Rio-de-Janeiro*, Emad, Chemad, China, Suprabha,
		Kuruppampadi.
5	Low fibre content	Jamica, Bankok, China, Poona, Nadia,
6	For both fresh and low fibre content	Jamaica and Bankok China (Exotic Type)

Source: Shodhganga.inflibnet.ac.in>jspui>bitstream

Appendix 2.4: Characteristics of Improved Cultivars of Ginger from the Indian Institute for Spice Research

Ginger	Fresh yield	Maturity (days)	Oleo-resin (%)	Essential oil (%)	Crude fiber (%)	Dry recovery (%)
Rejathaa	23.2	300		1.7	3.3	23
Mahima ^b	22.4	200	-	2.4	4	19
IISR Varada ^b	22,6	200	6.7	1.8	3.3-4.5	20.7
Suprabha	16.6	229	8.9	1.9	4.4	20.5
Suruchi	11.6	218	10	2	3.8	23.5
Suravi	17.5	225	10.2	2.1	4	23.5
Himagiri	13.5	230	4.3	1.6	6.4	20,6
Rio-deJaneiro	17.6	190	10.5	2.3	5.6	20

Source: www.fao.org>Post-harvest_Compedium_ginger

Appendix 2.5: Improved varieties of turmeric

Variety	Mean yield (fresh) (t/ha.)	Crop duration (days)	Dry recovery (%)	Curcumin (%)	Oleoresin	Essential oil (%)
ICAR-Indian Institute of Spices Research Kozhikode						
Suvarna	17.4	200	20	4.3	13.5	7
Suguna	29.3	190	12	7.3	13.5	6
Sudarsana	28.8	190	12	5.3	15	7
IISR Prabha	37.5	195	19.5	6.5	15	6.5
IISR Prathibha	39.1	188	18.5	6.2	16.2	6.2
IISR Alleppey Supreme	35.4	210	19.3	6	16	4
Kedaram	34.5	210	18.9	5.5	13.6	3
Tamil Nadu Agricultural University, Coimbatore						
Co 1	30	285	19.5	3.2	6.7	3.2
IISR 1	30.7	285	20.5	4.2	4	3.7
BSR 2	32.7	245	20	3.8		
Altituck Research Station, ouivr, Pot tangi, Odhisa						
Roma	20.7	250	31	6.1	13.2	4.2
Suroma	20	255	26	6.1	13.1	4.4
Ranga	29	250	24.8	6.3	13.5	4.4
Rasmi	31.3	240	23	6.4	13.4	4.4
Surangi	23.4	180-200	28	4.5-6.5	12.7	4.6
Tirhut College of Agriculture, RAU, Dhoti, Bihar						
Rajendra Sonia	42	225	18	8.4	10	5
ICA R Research Complex for NEH Region, Shillong, Meghalaya						
Mega Turmeric	23	31	16.4	6.8		
Kerala Agricultural University, Thrissur						
Konti	37.7	240-270	20.2	7.2	8.3	5.2
Sobba	35.9	240-270	19.4	7.4	9.7	4.2
Sena	21.3	240-270	18.9	7.1	10.3	4.2
Varna	21.9	240-270	19.1	7.9	10.8	4.6
Sardarkrushinagar Dantiwada Agricultural University, Jagudan						
Sugandham	15	210	23.3	3.1	11	2.7

Source: spices.icar.gov.in>file>download

Seasonal Variation in Prices of Ginger and Turmeric

Backdrop:

Ginger and turmeric are low volume crops but have the potential to become high value produce. Both these crops have experienced increase in area over the decades and while area under ginger grew at 3.88 percent per annum during the period 2000-01 to 2019-20, the corresponding figure for turmeric was 1.44 per cent per annum. Increase in area is also influenced by prices and demand as well as prices prevailing in international markets. In several instances high prices induce farmers to increase the area under the crop, which leads to excess production and fall in price. This fall in price may lead to fall in area in the subsequent season. Such factors are responsible for fluctuations in prices. Also, if any increase in production is not accompanied by increase in demand, it can cause prices to collapse. Ginger and turmeric are also produced in other countries, but their domestic consumption of these crops is not as much as it is in India. Hence, they are in a position to export and thus influence world prices. All these factors play a role in determining prices of ginger and turmeric and their fluctuations. Wide fluctuations in prices may create instability in the economy of these crops as well as for processors and exporters. In view of this, the intra seasonal and inter seasonal fluctuations in prices of ginger and turmeric are observed.

3.1 Domestic Prices of ginger :

It is well known that several varieties of ginger are cultivated within a state and also across different states of India. The price of ginger like any other product depends upon demand and supply. The demand for ginger is not only in fresh form as vegetable purpose, but also for value added products such as ginger powder, ginger oil and oleoresins. Hence, there is a huge demand by industry for ginger. The supply besides depending upon area, also depends upon production which in turn depends on climatic factors also. In certain years the crop is destroyed by floods and is therefore in short supply, which impacts prices. Prices also vary across states and differ according to varieties.

3.1.1 Index number of wholesale prices of fresh ginger :

The prices of ginger fluctuate from year to year, depending upon factors such as production and demand. The index number of wholesale prices of fresh ginger is indicated in Table 3.1.1. It can be observed that the wholesale price index of ginger which was 121.4 in 2013-14, sharply increased to 280.2 in 2014-15, i.e an increase of 131 percent. This is possibly attributed to fall in production thus having an impact on prices. There was a slight decline of 7 percent in the index in 2015-16. However, the decline was very steep in 2016-17 by 31 percent. This decline in prices was due to abundant supplies from Karnataka, which experienced increase in area. In Hassan market of Karnataka, the prices of fresh ginger, which averaged Rs 19.17 per kg in 2014, declined to Rs 13.92 per kg in 2015 and further to Rs 12 per kg in 2016. Shimoga market in Karnataka showed a similar trend where the price which was Rs 36 .35 per kg in 2014, declined to Rs 13 per kg in 2015 and further to Rs 10.96 in 2016. In Kerala, *Kozikhode* variety, which is a major variety in Kerala, experienced a fall in price to Rs 32.40 per kg in 2016-17 from Rs 45.52 per kg in 2015-16, in fresh form. This indicates that the price declined by 29 percent. Again, in 2017-18, the price further declined to Rs 27.91 per kg. Hence, the index number accordingly showed decline in ginger prices with a marked recovery only in 2019-20.

Table 3.1.1 Index Number of Wholesale Prices of Fresh Ginger (Base 2012-13 =100)

Year	Wholesale Price Index of Fresh Ginger
2013-14	121.4
2014-15	280.2
2015-16	266.2
2016-17	184.8
2017-18	141.9
2018-19	131
2019-20	215.9

Source: [statista.com/statistics/881998/india-wholesale-price-index-of-fresh-ginger](https://www.statista.com/statistics/881998/india-wholesale-price-index-of-fresh-ginger)

In 2019-20, however, the price of ginger showed a marked improvement, and the index number which was 131 in 2018-19 increased by 65 percent. In Hassan, a major market for ginger, the price of fresh produce which was as low as Rs 30 per kg, increased sharply to Rs 97 per kg. There were floods in 2019-20 and the crop was destroyed in many states. This caused a surge in prices of ginger in 2019-20.

3.1.2 State-wise Price of Fresh and Dry Ginger :

The prices of ginger vary across states due to different varieties cultivated in different states. The prices also fluctuate over years depending upon demand and supply. The prices ruling in the international markets can also influence domestic prices. The prices of ginger across states is indicated in Table 3.1.2.

Table 3.1.2 :State-Wise Price of Fresh and Dry Ginger (Rs per quintal)

Fresh Ginger					
	Year				
	2015-16	2016-17	2017-18	2018-19	2019-20
State	Average Prices Per Quintal (Modal Price)				
Karnataka	1535	1376	1559	2985	3089
Assam	3894	4290	4280	5122	5811
Odisha	3557	2782	3890	6904	9161
West Bengal	4140	3954	4795	6412	8745
Sikkim	1860	2480	3064	3600	4800
Meghalaya	1750	1914	2264	5494	6000
Maharashtra	3500	600	2700	3200	4056
Kerala	5767	4901	4995	8185	9100
Madhya Pradesh	2815	2056	2967	5965	5223
Dry Ginger					
	Year				
	2015-16	2016-17	2017-18	2018-19	2019-20
State	Average Prices Per Quintal (Modal Price)				
Karnataka	6714	6212	6599	9472	10091
Odisha	5957	4637	4502	8822	10751
Sikkim	5700	5900	7280	8400	9800
Meghalaya	3430	2372	2994	5478	7311
Kerala	9281	8585	8291	14562	14712

Source : compiled from <http://agmark.net/>; discussion with farmers and traders

It can be observed from Table 3.1.2 that there are major fluctuations in prices over the years, but notably in 2016-17, the prices registered a fall from their 2015-16 levels in many states. In Maharashtra, where fresh ginger is largely traded and consumed, the prices declined from Rs 35/- per kg in 2015-16, to as low as Rs 6 per kg in 2016-17. The prices showed recovery towards end of 2019 and in the early months of 2020. There were floods in 2019-20 season which perhaps reduced supply and brought about some upward movement in prices.

3.1.3 Seasonal Fluctuations in Prices of Ginger in Major Markets :

The prices of ginger fluctuate within a season and also each year and often this fluctuation in price also influences the area under the crop. Therefore, there are both intra seasonal fluctuations in prices, as well as inter seasonal fluctuations in prices. The same can be observed from Tables 3.1.3 (A to K). In Table 3.1.3 (A to H) the price of fresh ginger and in Table 3.1.3 (I to K) the price of dry ginger are indicated in major markets of the country. The coefficient of variation is calculated to observe the intra seasonal and inter seasonal fluctuations in prices.

In Hassan market (Table 3.1.3 A) and Shimoga market (Table 3.1.3 B), it can be observed that from the period 2002 to 2019, in certain years there is virtually no fluctuation in prices within the year, but however, in certain years there are wide fluctuations within the season. For, eg, in 2004, in Hassan market the price of fresh ginger which was as high as Rs 5500 per quintal in May 2004, kept declining rapidly in the following months and was as low as Rs1850 in December 2004, i.e a decline of 66.4 percent. The coefficient of variation of the price of ginger in 2005 was as high as 52.73 percent indicating major fluctuations in prices. In Shimoga market, in 2004, the price which was Rs 1450 per quintal in July 2004, declined to Rs 700 per quintal in December 2004. The coefficient of variation was 32.12 percent. In 2010, the price in Hassan market which was ruling at Rs 2150 per quintal in the month of January showed a declining trend and reached a low of Rs 700 per quintal in December 2010. In Shimoga market, the price which was Rs 2400 per quintal in January 2011, showed fluctuations throughout the year and was Rs 1000 per quintal in December 2011 and coefficient of variation in prices was 78.5 percent. The year 2015, also witnessed major fall in prices of ginger in Shimago, and the ruling market price which was Rs 1800 per quintal in May 2015, declined to Rs 1100 per quintal in December 2015. The growth rate in prices in Hassan market over the period concerned from 2002 to 2019 was 2.43 percent per annum, while in Shimoga market the figure for the corresponding period was 7 percent per annum.

Table: 3.1.3 (A) Year –Wise Month –Wise (Intra –Seasonal) Price of (Fresh) Ginger in Hassan Market (Karnataka)

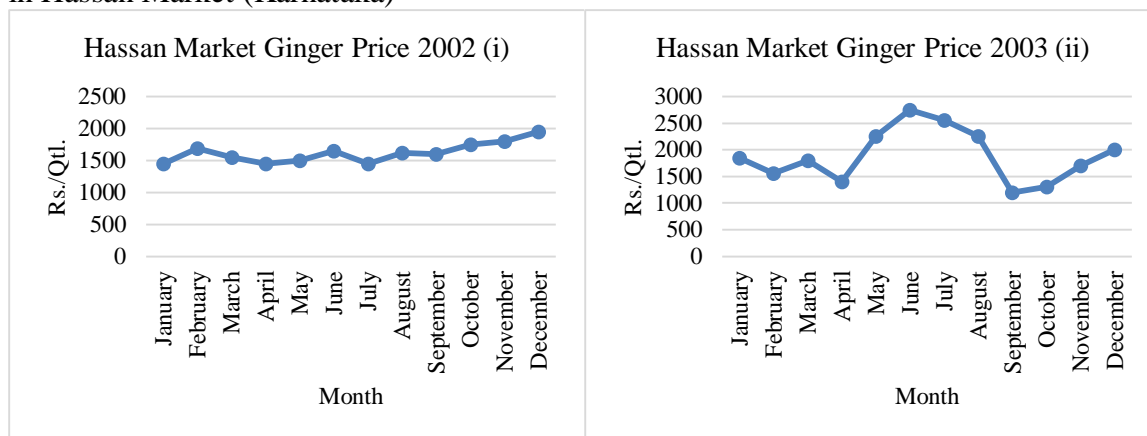
Price : Rs Per Quintal

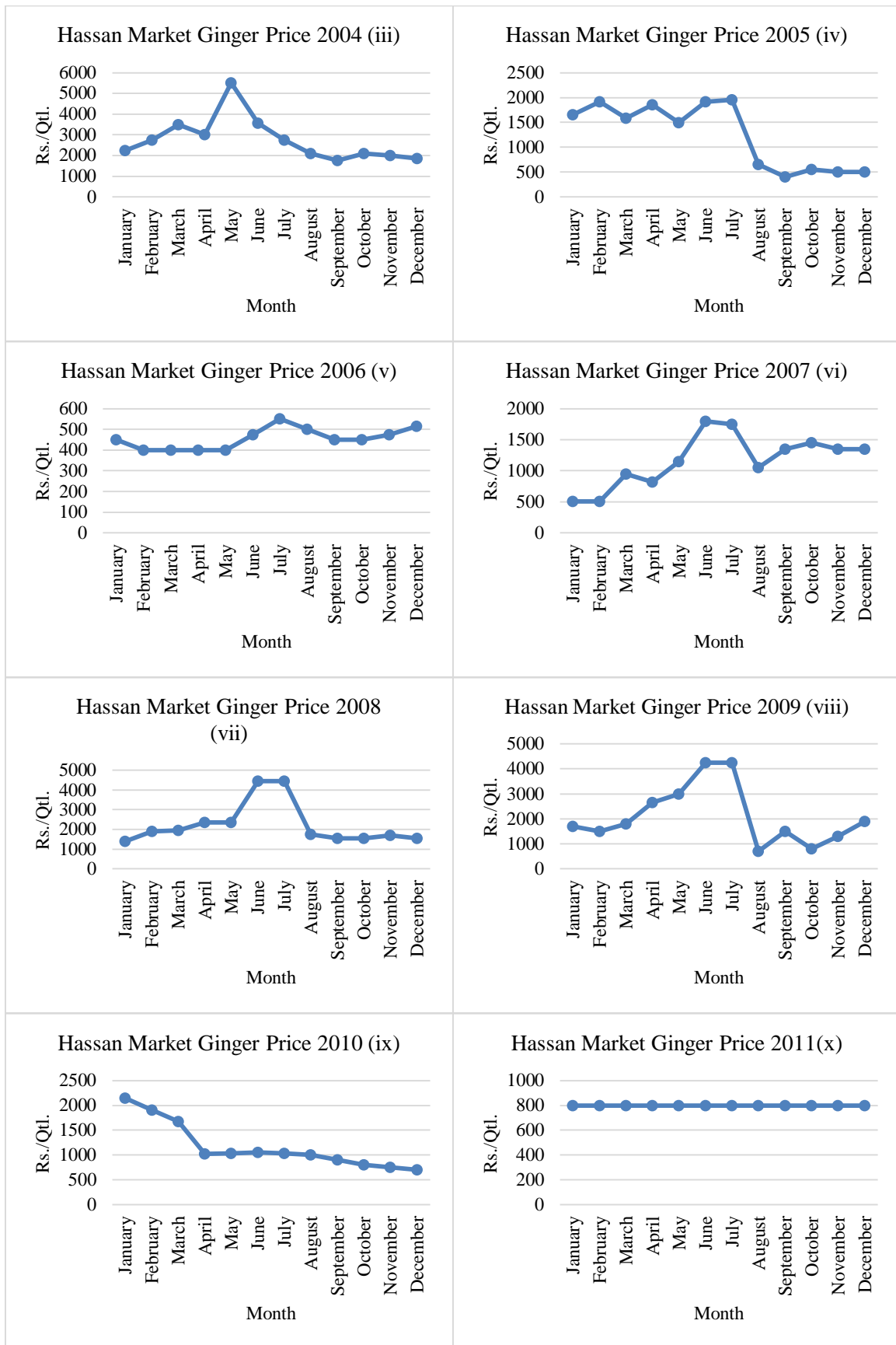
Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	% CV	Avrg.
2002	1450	1690	1550	1450	1500	1650	1450	1620	1600	1750	1800	1950	9.68	1622
2003	1850	1560	1800	1400	2250	2750	2550	2250	1200	1300	1700	2000	26.11	1884
2004	2250	2750	3500	3000	5500	3560	2750	2100	1750	2100	2000	1850	38.35	2759
2005	1650	1912	1580	1850	1490	1915	1950	650	400	550	500	500	52.73	1246
2006	450	400	400	400	400	475	550	500	450	450	475	515	10.99	455
2007	510	510	950	815	1150	1800	1750	1050	1350	1450	1350	1350	36.15	1170
2008	1400	1900	1950	2350	2350	4450	4450	1750	1550	1550	1700	1550	47.77	2246
2009	1700	1500	1800	2650	3000	4250	4250	700	1500	800	1300	1900	56.46	2113
2010	2150	1900	1675	1025	1036	1055	1036	1000	900	800	750	700	40.38	1169
2011	800	800	800	800	800	800	800	800	800	800	800	800	0.00	800
2012	700	600	600	600	600	600	800	800	1000	1000	1000	1000	23.48	775
2013	1000	1000	1000	1500	1500	1500	1500	1500	1500	1500	1500	1500	16.44	1375
2014	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	1500	1500	10.17	1917
2015	1500	1500	1500	1500	1500	1500	1500	1500	1500	1000	1000	1200	14.51	1392
2016	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	0.00	1200
2017	1200	1200	1200	1200	1200	1200	1200	1200	1200	1000	1000	1000	7.83	1150
2018	1000	1000	1000	1000	1500	1500	1500	1500	1500	1500	2500	2500	34.80	1500
2019	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	0.00	2500
2020	2500	2500	2500	2500	2500	2500							0.00	2500
Growth Rate														2.43

Sources: <https://agmarknet.gov.in/>

*CV=Coefficient of Variation

Graph No. 3.1.3 (A) : Year –Wise Month –Wise (Intra –Seasonal) Price of (Fresh) Ginger in Hassan Market (Karnataka)





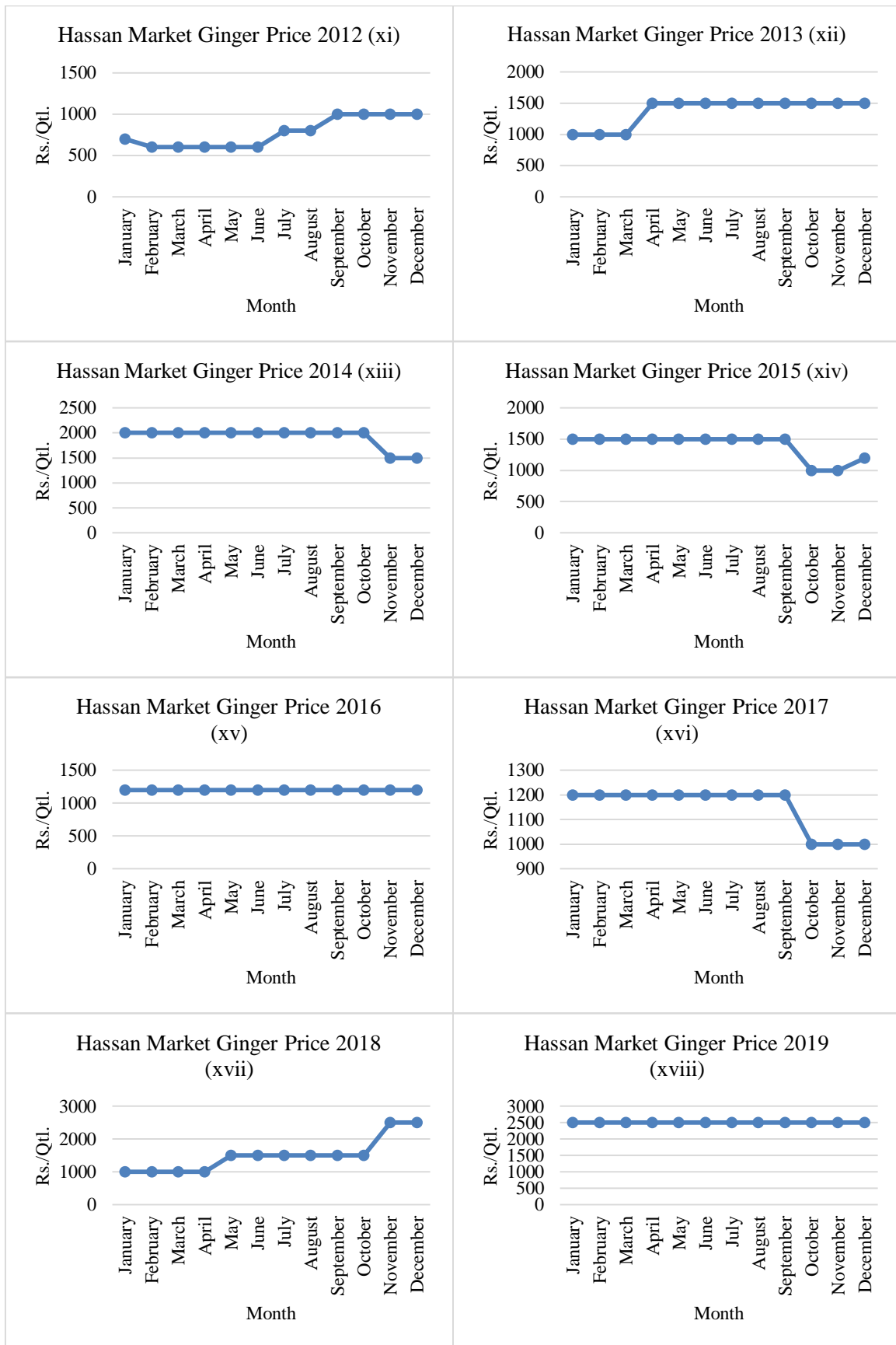


Table No.3.1.3 (B): Year –Wise Month –Wise (Intra-Seasonal) Price of (Fresh) Ginger in Shimoga Market (Karnataka)

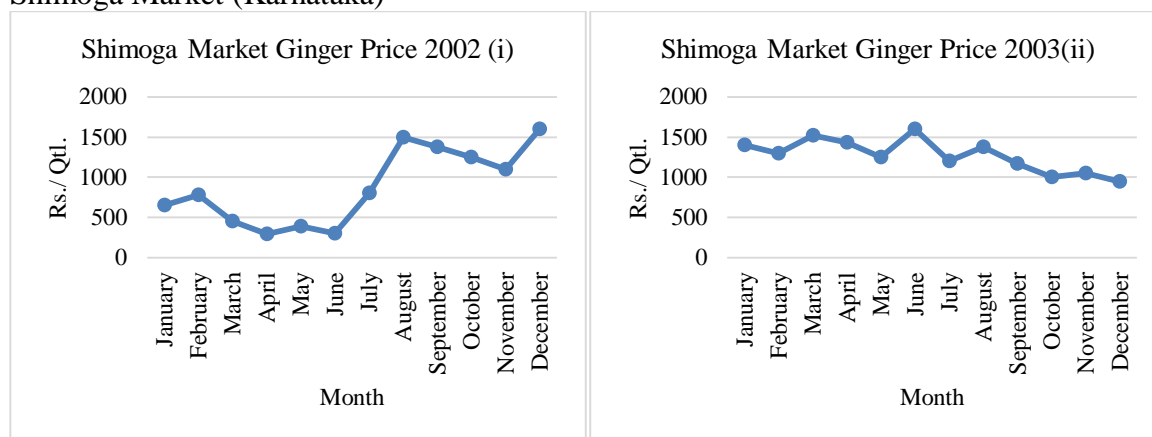
Price : Rs Per Quintal

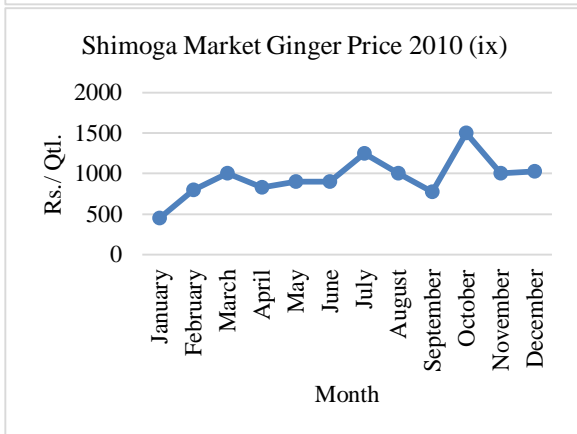
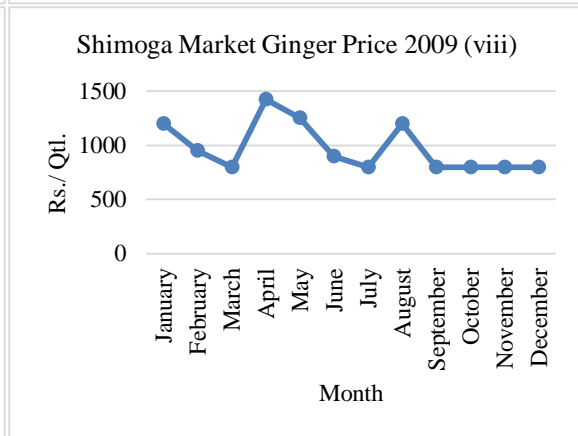
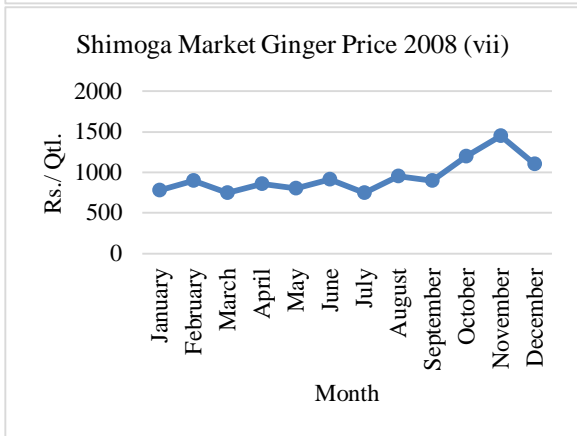
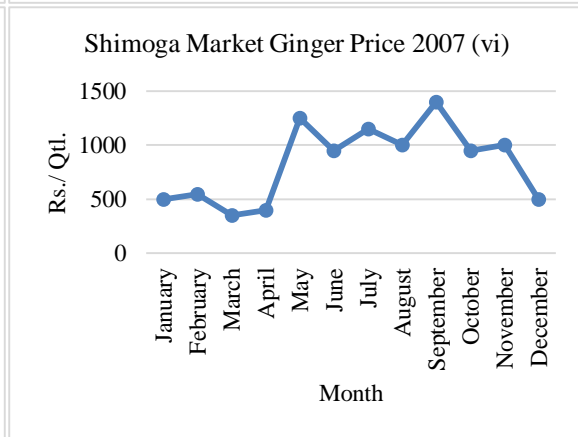
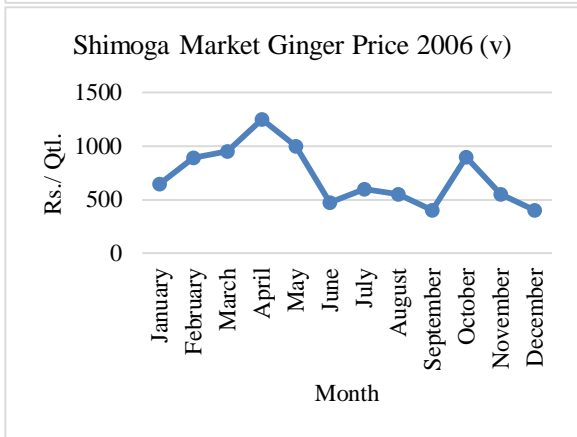
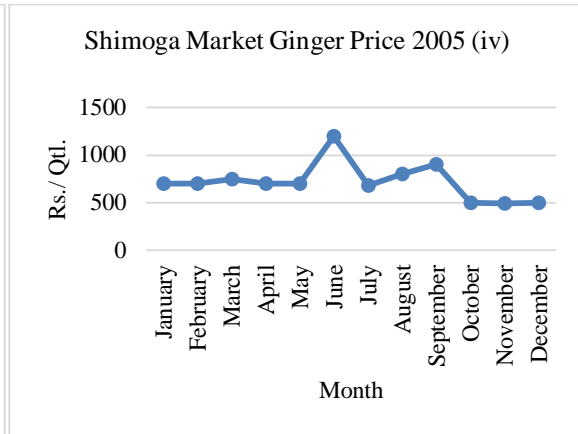
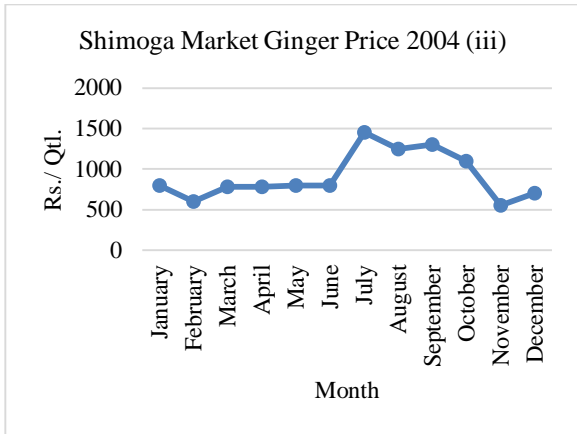
Months / Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	% CV	Avrg.
2002	650	780	450	290	388	300	800	1500	1380	1250	1100	1600	54.81	874
2003	1400	1300	1520	1430	1250	1600	1200	1375	1170	1000	1050	950	16.22	1270
2004	800	600	780	780	800	800	1450	1250	1300	1100	550	700	32.12	909
2005	700	700	750	700	700	1200	680	800	900	500	490	500	27.30	718
2006	650	890	950	1250	1000	475	600	550	400	900	550	400	37.88	718
2007	500	550	350	400	1250	950	1150	1000	1400	950	1000	500	42.86	833
2008	780	900	750	860	800	910	750	950	900	1200	1450	1100	22.09	946
2009	1200	950	800	1425	1250	900	800	1200	800	800	800	800	23.34	977
2010	450	800	1000	825	900	900	1250	1000	770	1500	1000	1025	27.10	952
2011	2400	1800	2000	5400	900	950	1100	2000	1000	666	780	1000	78.51	1666
2012	600	900	925	950	1150	1350	1500	1800	1150	2400	2900	3400	55.33	1585
2013	3400	2400	2400	3750	7075	9900	9900	3900	2900	3900	3900	3900	55.96	4777
2014	4400	4400	4350	4850	5200	5000	5000	3850	1600	1725	1800	1450	41.73	3635
2015	1650	1800	1450	1500	1800	1100	1100	1100	1100	900	1000	1100	24.69	1300
2016	1100	1100	1100	1100	1100	1100	1100	1100	1050	1100	1100	1100	1.28	1096
2017	1100	1050	1050	1050	980	980	1000	1000	1050	1000	1021	1032	3.51	1026
2018	950	980	1000	1000	1000	1000	1000	1000	1925	850	2757	2400	49.39	1322
2019	2400	2400	2500	2780	2450	2675	2850	1500	1500	2300	2400	1700	20.45	2288
2020	3000	3000	3000	3000	3000	3000							0.00	3000
Growth Rate														7.0

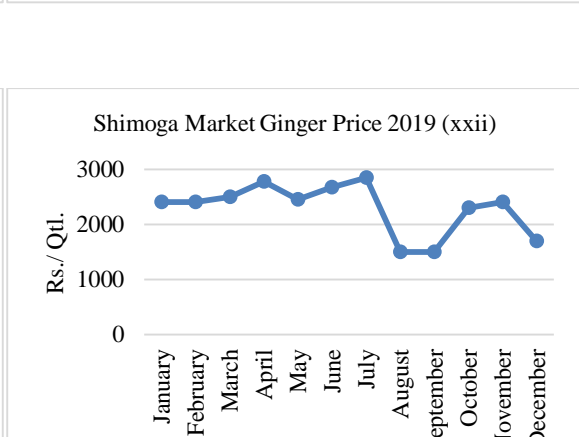
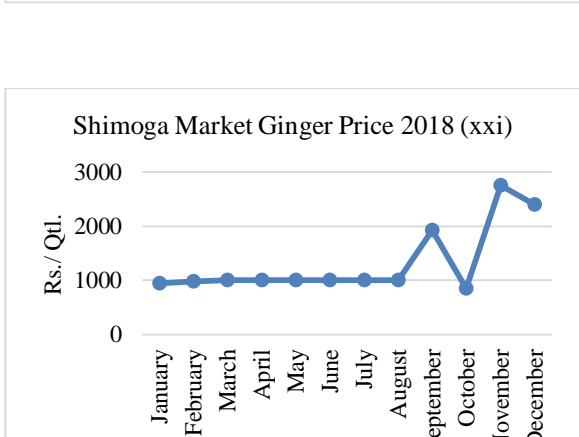
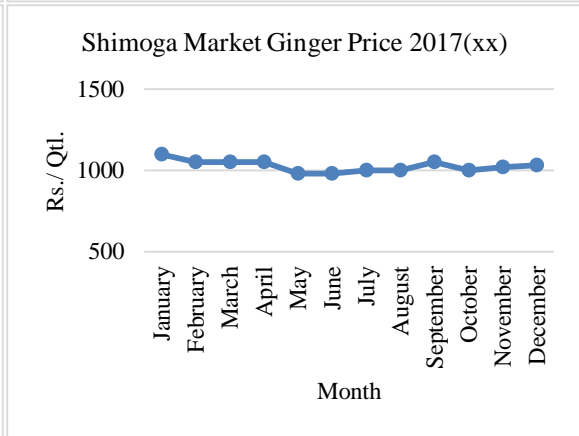
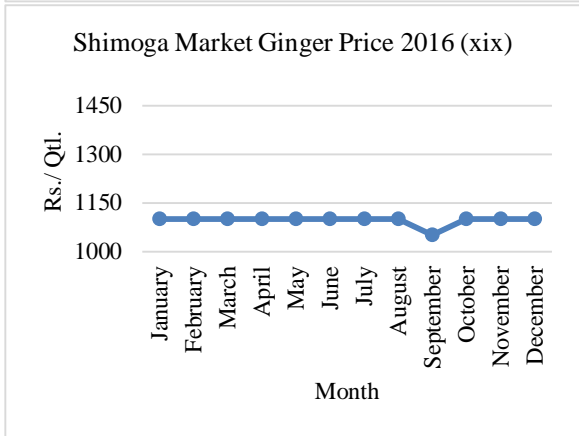
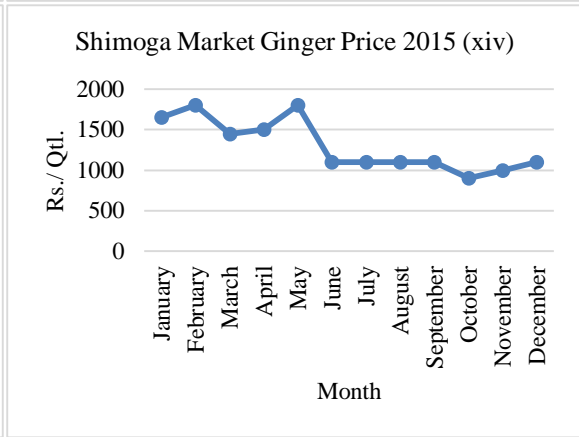
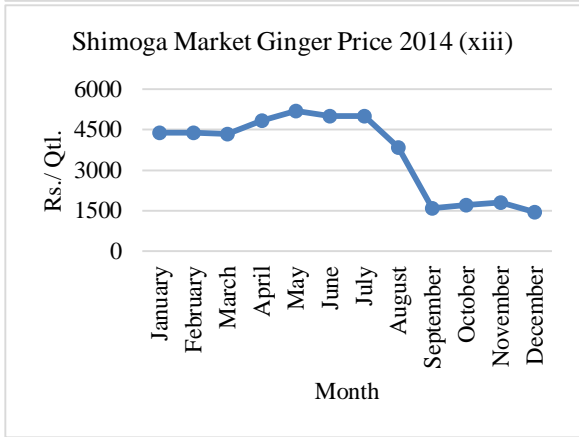
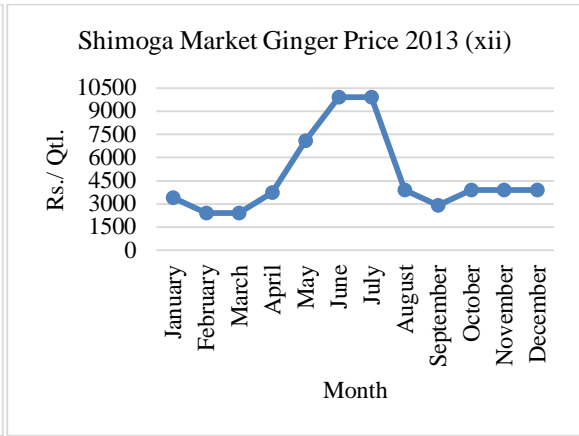
Sources: <https://agmarknet.gov.in/>

*CV =Coefficient of Variation

Graph No.3.1.3(B): Year –Wise Month –Wise (Intra-Seasonal) Price (Fresh) of Ginger in Shimoga Market (Karnataka)







In Kozikode market (Table 3.1.3 C), it can be observed that there were huge fluctuations in prices of fresh ginger in 2014-15 and 2015-16. While the price of fresh ginger was Rs 9500 per quintal in April 2014, it declined sharply to Rs 2550 per quintal in November 2014 per quintal and coefficient of variation was 48.78 percent. It is also possible that observing such high prices of ginger since April 2014, the farmers increased the area under ginger in 2015 -16 season and also harvested the crop early to take advantage of the price rise. The situation however improved as prices showed a more or less rising trend till October 2015 when the ruling market price in Kozikode of fresh ginger was Rs 6300 per quintal. However, the prices began to decline since December 2015 and touched a low of Rs 2900 in March 2016. The increase in area and supply caused a glut in the market which led to crash in prices. The situation was aggravated with huge production in China which was experiencing increase in area under cotton. This encouraged imports of ginger into the country and there was further decline in prices. Overall, in Kozikhode market, the prices of fresh ginger witnessed huge fluctuations with coefficient of variation ranging from 18.81 percent in 2017-18 to as high as 48.78 percent in 2014-15. The prices showed a growth rate of 10.96 percent during the period 2007-08 to 2018-19.

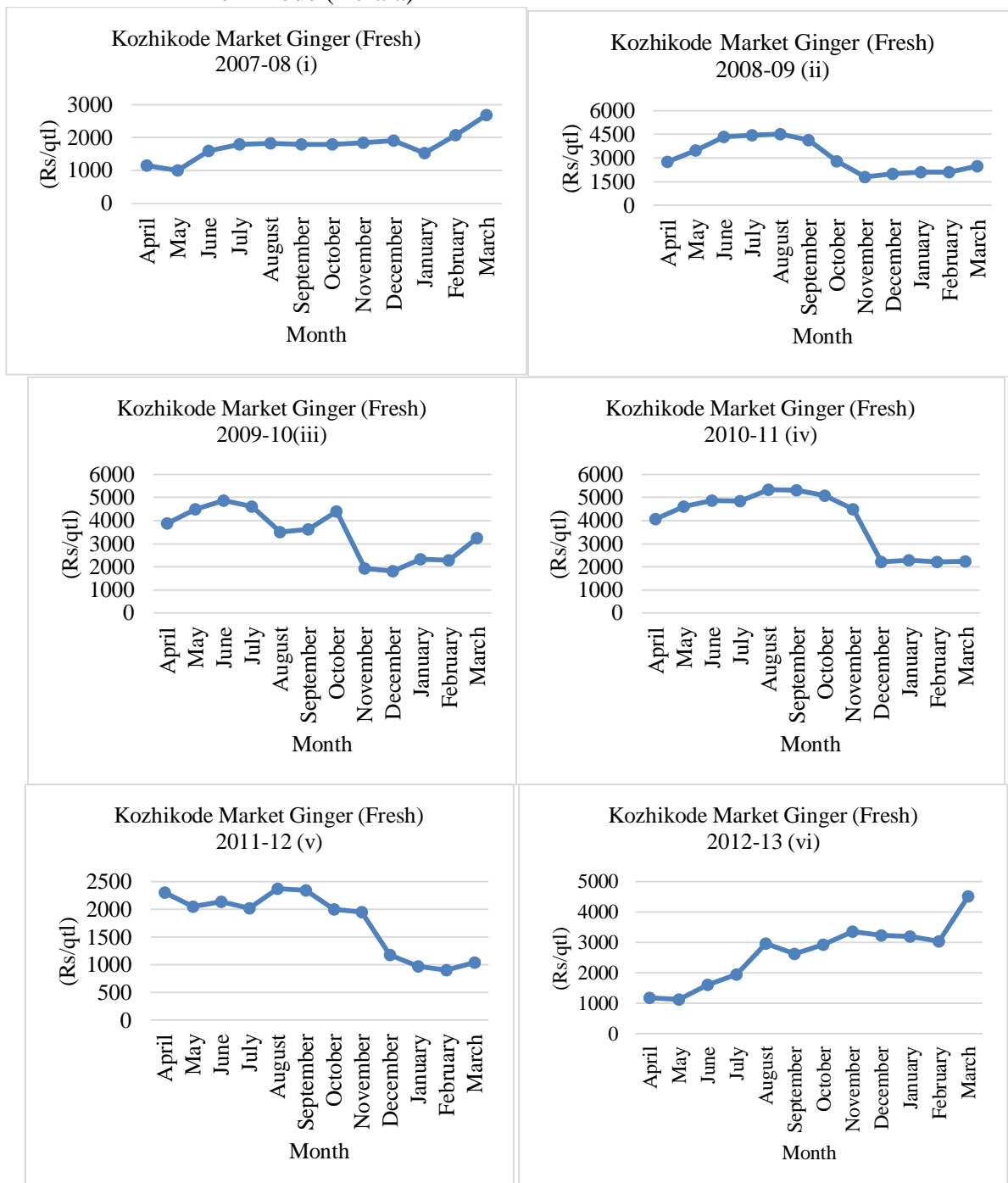
Table No:3.1.3 (C). Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Fresh) in Kozhikode (Kerala)

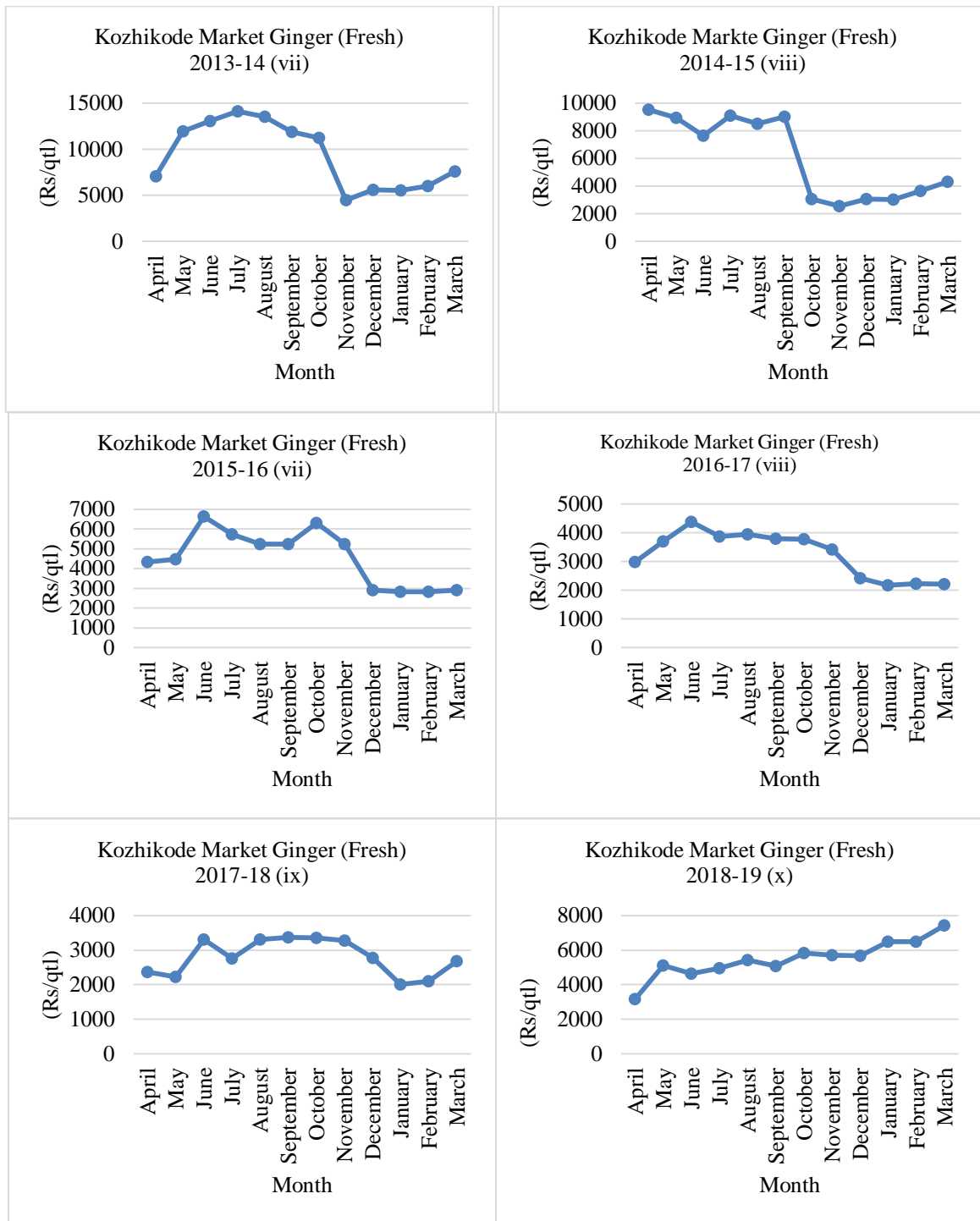
Price : Rs Per Quintal														
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	%CV	Avg
2007-08	1150	1000	1600	1800	1820	1800	1800	1850	1900	1525	2080	2675	24.40	1750
2008-09	2775	3480	4325	4460	4500	4125	2800	1800	2000	2120	2125	2500	33.69	3084
2009-10	3875	4500	4875	4600	3500	3625	4400	1925	1813	2340	2275	3260	32.08	3416
2010-11	4067	4600	4875	4840	5350	5325	5080	4500	2220	2275	2225	2250	33.27	3967
2011-12	2300	2050	2133	2020	2375	2340	2000	1950	1180	975	900	1040	32.28	1772
2012-13	1175	1125	1620	1950	2960	2625	2925	3355	3225	3200	3041	4520	37.84	2643
2013-14	7075	11900	13025	14125	13500	11875	11250	4480	5575	5540	6000	7575	38.52	9327
2014-15	9500	8940	7625	9075	8500	9000	3041	2550	3075	3000	3650	4300	48.78	6021
2015-16	4325	4460	6625	5720	5250	5250	6300	5250	2900	2820	2825	2900	30.84	4552
2016-17	2980	3700	4375	3860	3950	3800	3775	3425	2420	2175	2225	2200	24.63	3240
2017-18	2360	2225	3300	2760	3300	3375	3350	3275	2767	2000	2100	2680	18.81	2791
2018-19	3150	5100	4640	4950	5420	5075	5834	5700	5667	6500	6500	7420	19.61	5496
Growth Rate														10.96

Sources: <https://agmarknet.gov.in/>

*CV=Coefficient of Variation

Graph.3.1.3 (C): Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Fresh) in Kozhikode (Kerala)





The district of Satara is one of the major producers of ginger in the district. The farmers normally sell the produce to traders and commission agents who normally also arrange for labour to harvest the produce. The prices in Satara market have shown a growth rate of 6.11 percent from the period 2010-11 to 2019-20(Table 3.1.3D). The prices began to show an upward trend in 2012-13 and the price which was Rs 1744 per quintal in July 2012 increased rapidly to Rs 7327 per quintal June 2012, i. e an increase of 320 percent and the

coefficient of variation in prices during 2012-13 was 54.50 percent. The prices were markedly higher in 2013-14 when they touched a peak of Rs 8284 per quintal in July 2013, mainly due to produce being in short supply, not only in domestic but also international market. However, a declining trend was observed and prices showed a continuous fall not only in the 2013-14 season but in the following seasons as well. In 2016-17 the prices touched rock bottom levels and in May 2017, the price of ginger was as low as Rs 1464 per quintal. The fall in price was mainly due to increase in production in southern states which impacted the markets in Maharashtra. The market however picked up in 2018-19 and the price touched Rs 6819 per quintal in June 2019. In July 2019 the price of ginger was as high as Rs 7247 per quintal but gradually declined to Rs 3675 per quintal in June registering a fall of 49.3 percent.

3.1.3 (D) Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Fresh) in Satara

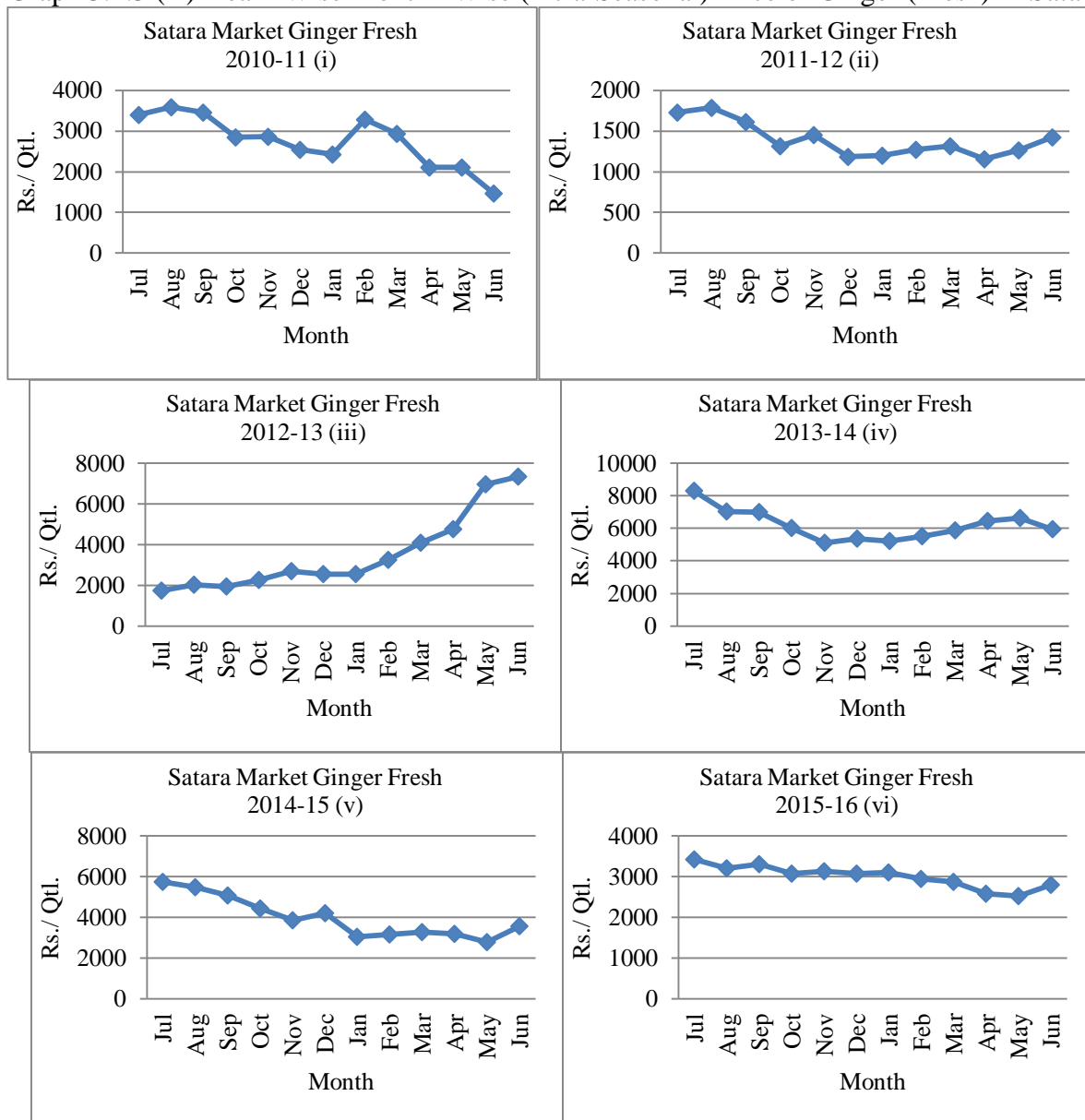
Price : Rs Per Quintal

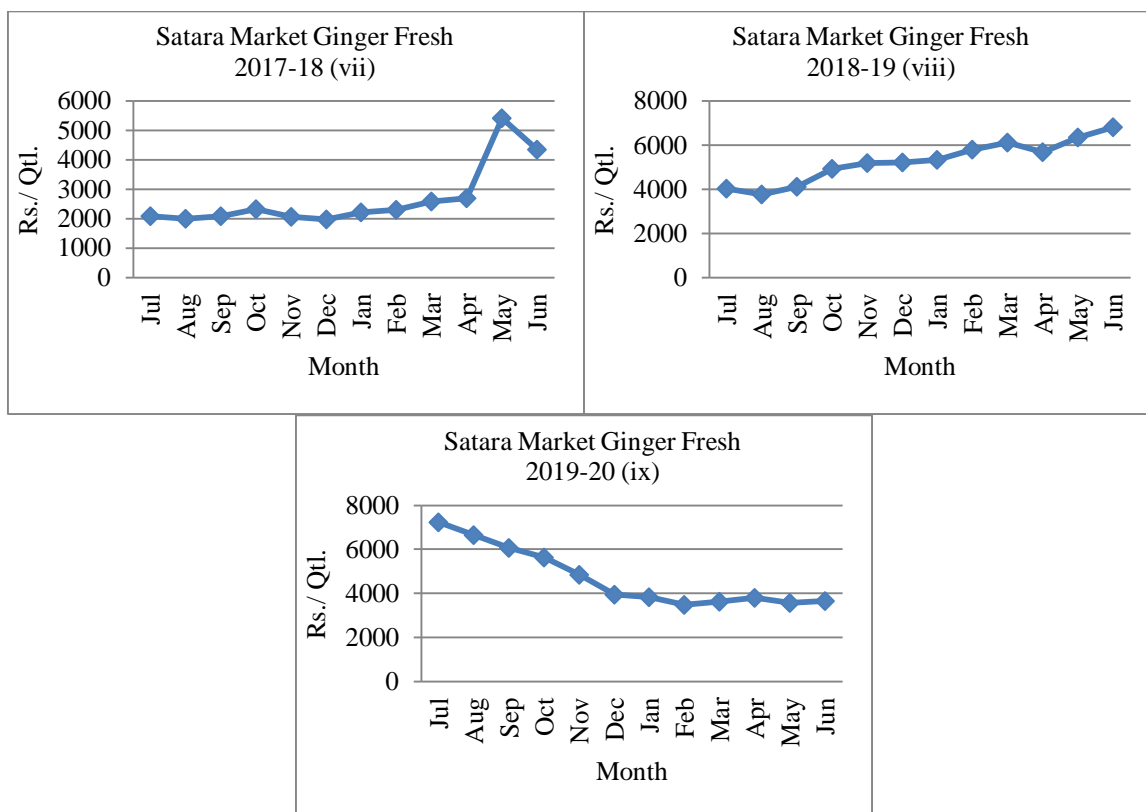
Year/ Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	%CV	Avg.
2010-11	3405	3597	3465	2858	2872	2545	2423	3282	2936	2106	2115	1470	23.48	2756
2011-12	1733	1790	1614	1318	1454	1187	1203	1273	1317	1158	1265	1424	15.32	1395
2012-13	1744	2030	1932	2264	2703	2536	2557	3253	4094	4757	6966	7327	54.50	3514
2013-14	8284	7041	7005	6022	5095	5344	5216	5486	5860	6447	6627	5953	15.06	6198
2014-15	5747	5475	5067	4433	3858	4207	3037	3164	3268	3191	2784	3554	25.23	3982
2015-16	3421	3203	3313	3080	3128	3078	3102	2948	2873	2583	2530	2807	9.01	3006
2016-17	2812	2324	2032	2072	1938	1716	1612	1591	1606	1494	1464	1787	21.12	1870
2017-18	2092	1992	2086	2321	2073	1975	2219	2295	2583	2694	5413	4355	40.35	2675
2018-19	4019	3784	4127	4939	5201	5210	5333	5793	6110	5686	6363	6819	18.00	5282
2019-20	7247	6653	6063	5626	4840	3948	3835	3499	3629	3809	3588	3675	28.70	4701
Growth Rate														6.11

Sources: <https://agmarknet.gov.in/>

*CV=Coefficient of Variation

Graph 3.1.3 (D) Year – Wise Month – Wise (Intra-Seasonal) Price of Ginger (Fresh) in Satara





Assam is an important ginger growing state. The produce is however sold mainly in fresh form by farmers. The traders from local as well as distant markets are the main buyers of the produce. The climate in Assam is humid and hence even if the produce is dried, it still has high moisture content which leads to rejection of lots. Hence the produce is mainly sold in fresh form. The produce is largely organic but farmers often did not get premium price for their product. Discussion with traders revealed that grading of the produce is in the hands of traders who are based outside the state as there is no scientific grading facilities within the state. This constraint often denies the producers a fair price for their produce. However, from Table 3.1.3 (E), it can be observed that over the years from the period 2006-7 to 2019-20, the price received by farmers is indicating an increase although there are fluctuations with upward and downward movements. The rate of growth in prices during the period 2006-07 to 2019-20 was 13.03 percent. There have been sharp intra seasonal fluctuations in prices which was highest in 2012-13 when the coefficient of variation in prices during the prices was 55 percent. The prices which were as low as Rs 2149 per quintal in July 2012, touched Rs 8370 per quintal by June 2013, i.e a increase of 289 percent.

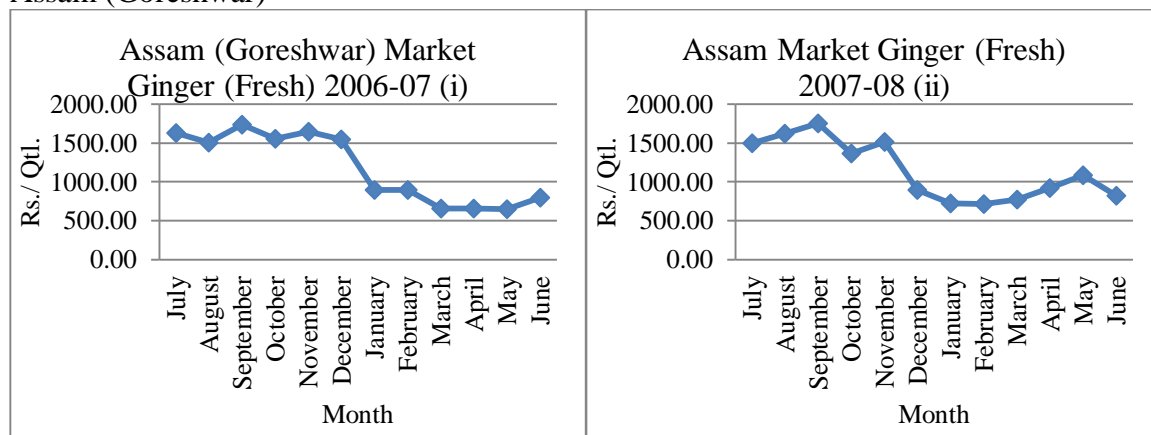
3.1.3(E) Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Fresh) in Assam (Goreshwar)

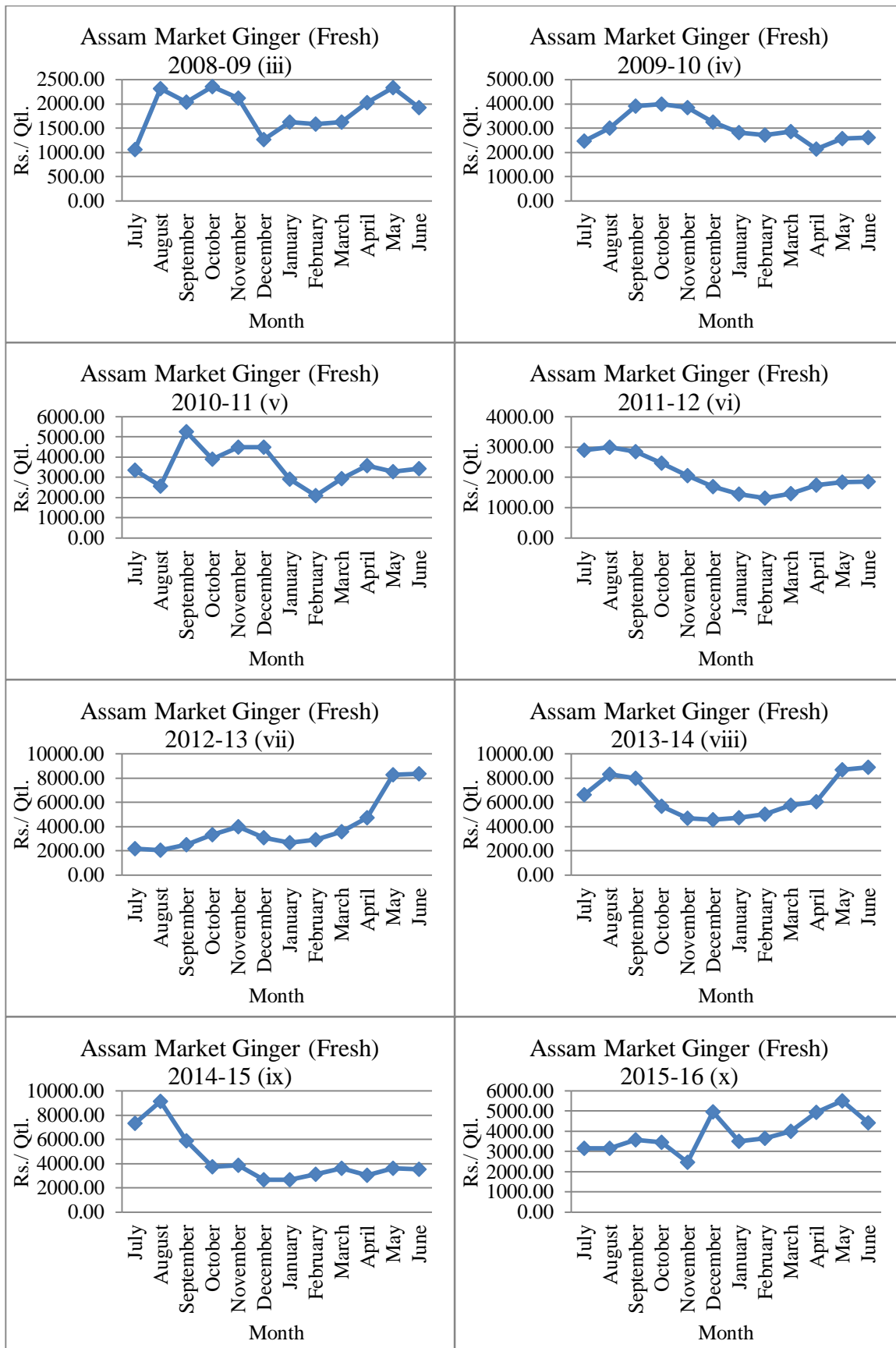
Year	Rs Per Quintal												% CV	Avrg.
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun		
2006-07	1628	1509	1735	1559	1645	1545	900	900	659	656	650	801	38	1182
2007-08	1495	1624	1757	1366	1512	894	720	711	775	919	1089	822	34	1140
2008-09	1054	2311	2035	2360	2119	1261	1626	1584	1620	2030	2336	1924	23	1855
2009-10	2466	3000	3917	3992	3847	3248	2810	2715	2855	2128	2566	2610	20	3013
2010-11	3353	2550	5250	3892	4500	4500	2904	2088	2933	3583	3268	3420	26	3520
2011-12	2903	2995	2843	2459	2053	1695	1450	1320	1458	1739	1848	1853	29	2051
2012-13	2149	2041	2482	3307	3979	3092	2676	2901	3560	4703	8276	8370	55	3961
2013-14	6634	8316	7988	5676	4674	4557	4709	5014	5748	6047	8685	8878	26	6410
2014-15	7324	9126	5873	3715	3862	2672	2648	3111	3607	3046	3609	3512	47	4342
2015-16	3157	3148	3574	3447	2461	4950	3500	3653	3989	4938	5500	4412	23	3894
2016-17	7965	3086	3702	2881	2383	2382	3619	4800	4448	4677	5931	5600	38	4290
2017-18	6149	5120	5462	3348	2910	3500	3256	3855	4015	4220	5013	4508	23	4280
2018-19	5757	5462	4246	3225	2585	3611	5636	5636	5510	6976	6976	5850	27	5122
2019-20	5167	9238	6236	2901	2901	5636	5510	5510	8000	6976	5805	5850	31	5811
Growth Rate														13.03

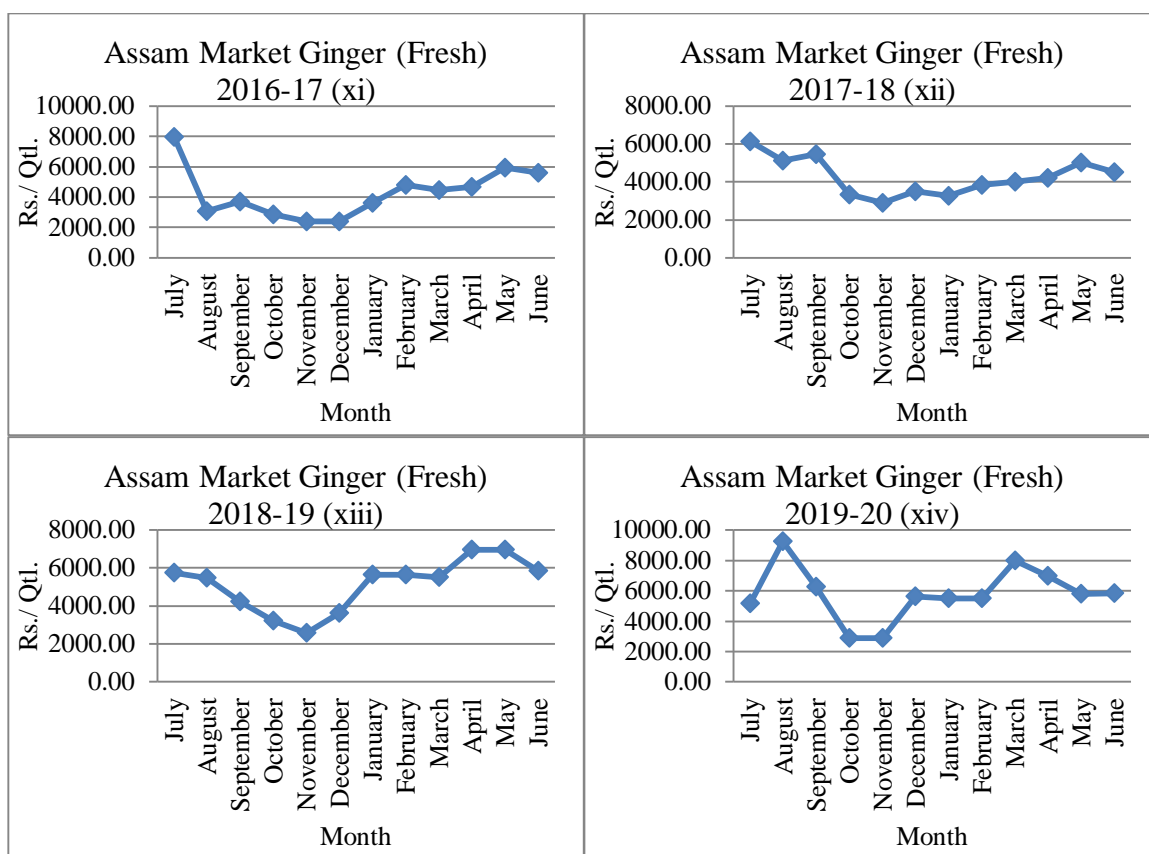
Sources: <https://agmarknet.gov.in/>

*CV=Coefficient of Variation

Graph 3.1.3 (E) Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Fresh) in Assam (Goreshwar)







In Table 3.1.3 (F), the intra seasonal prices of fresh ginger in Lashkar market in the state of Madhya Pradesh is indicated. The variation in prices was high in 2012-13, as prices which were ruling at Rs 1671 per quintal in July 2012, increased through the season and touched Rs 5286 per quintal in May 2013, i.e an increase of 216 percent. A similar picture of high intra seasonal variation in prices arose in 2017-18 when prices which were Rs 2157 per quintal in July 2017 increased to Rs 5386 per quintal in June 2018, i.e an increase of 150 percent. Over the period 2010-11 to 2019-20, the average prices over the seasons registered a growth rate of 7.75 percent with major fluctuations over the years.

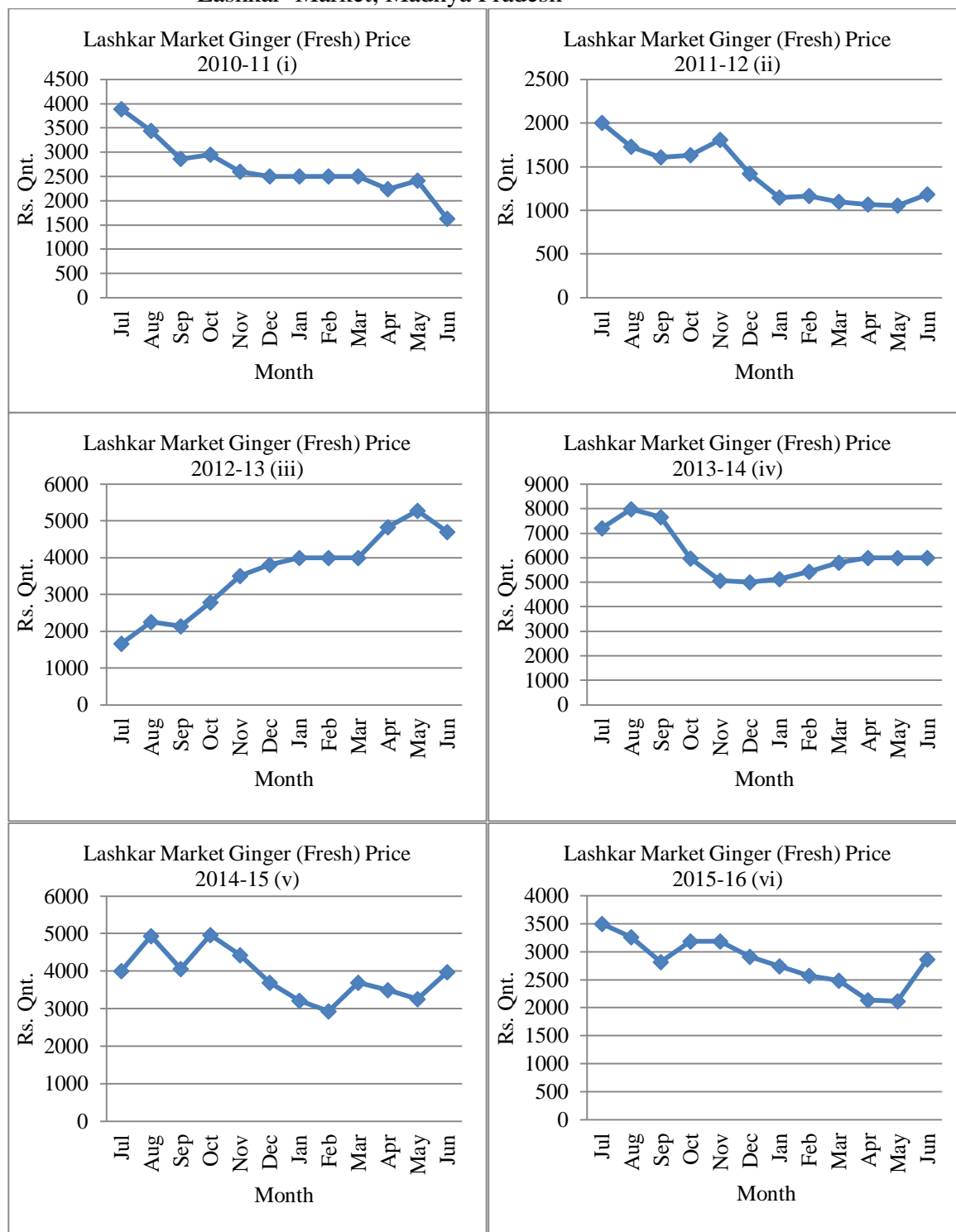
Table 3.1.3(F) Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Fresh) in Lashkar Market, Madhya Pradesh

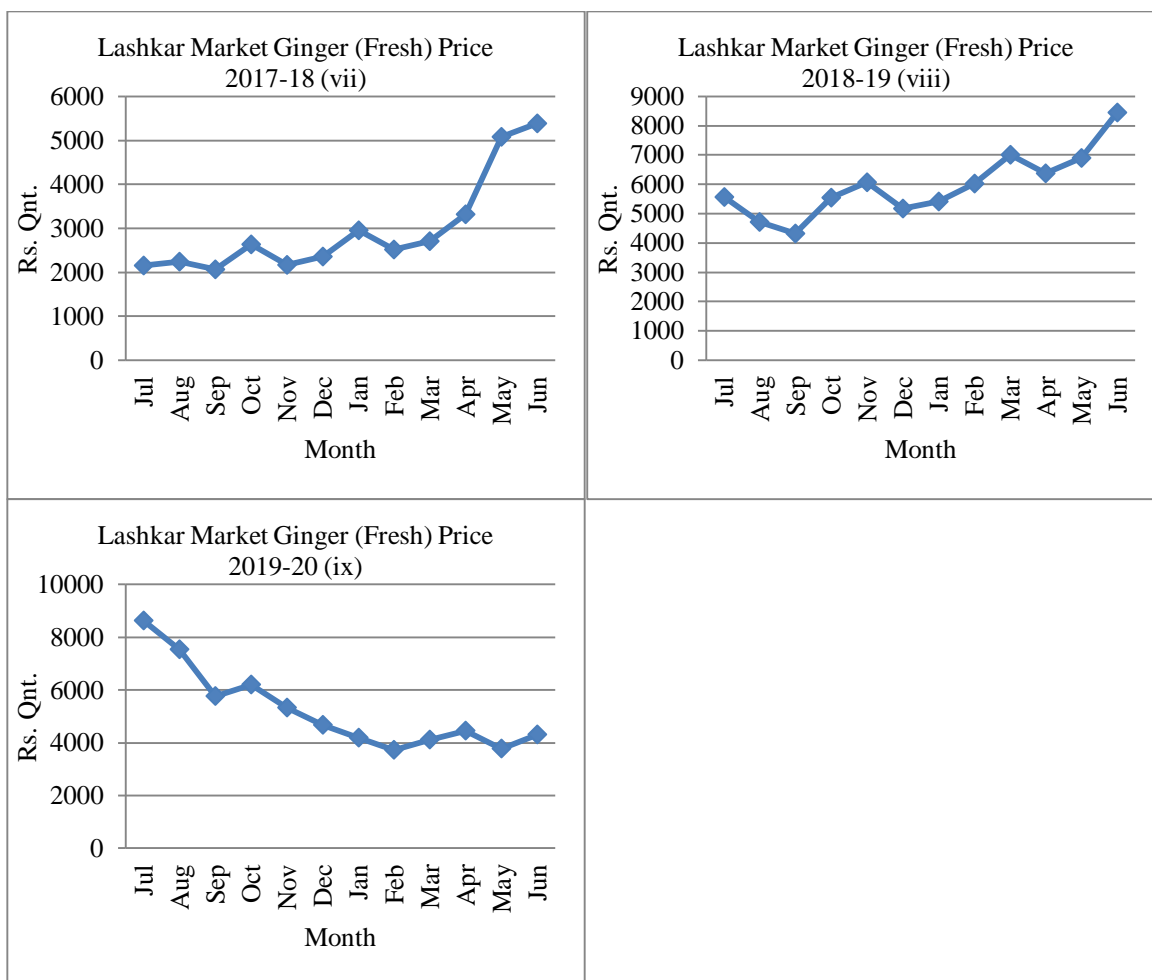
	Rs Per Quintal													CV	Avrg
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun			
2010-11	3889	3444	2861	2944	2593	2500	2500	2500	2500	2240	2413	1625	21.63	2667	
2011-12	2000	1726	1607	1632	1807	1420	1143	1164	1100	1065	1055	1182	23.63	1408	
2012-13	1671	2261	2133	2786	3511	3806	4000	4000	4000	4840	5286	4709	32.00	3584	
2013-14	7206	7989	7665	5964	5071	5000	5133	5440	5800	6000	6000	6000	16.39	6106	
2014-15	4000	4933	4063	4958	4429	3696	3219	2929	3692	3489	3255	3969	16.61	3886	
2015-16	3500	3261	2815	3183	3190	2913	2745	2569	2488	2138	2120	2863	15.41	2815	
2016-17	2885	2719	1982	2270	2210	1810	1797	1693	1725	1729	1807	2043	19.34	2056	
2017-18	2157	2247	2069	2638	2166	2352	2950	2523	2714	3325	5079	5386	37.76	2967	
2018-19	5568	4714	4320	5552	6071	5167	5414	6037	7000	6370	6906	8458	18.84	5965	
2019-20	8632	7545	5760	6190	5333	4667	4172	3724	4116	4455	3775	4306	29.81	5223	
Growth Rate														7.75	

Sources: <https://agmarknet.gov.in/>

*CV=Coefficient of Variation

Graphs 3.1.3(F) : Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Fresh) in Lashkar Market, Madhya Pradesh





In Table 3.13 (G) the intra seasonal prices of fresh ginger are indicated for Haatpipliya market in Madhya Pradesh. The fluctuation in prices is highest in 2016-17, as the coefficient of variation in prices with in the season was 61.84 percent. The price of ginger which was Rs 7388 per quintal in July 2016 showed a decline and the price touched a low of Rs 1854 per quintal in April 2017, i.e decline of 75 percent. The prices registered a growth rate of 12.71 percent during the period 2010-11 to 2019-20 with fluctuations from year to year.

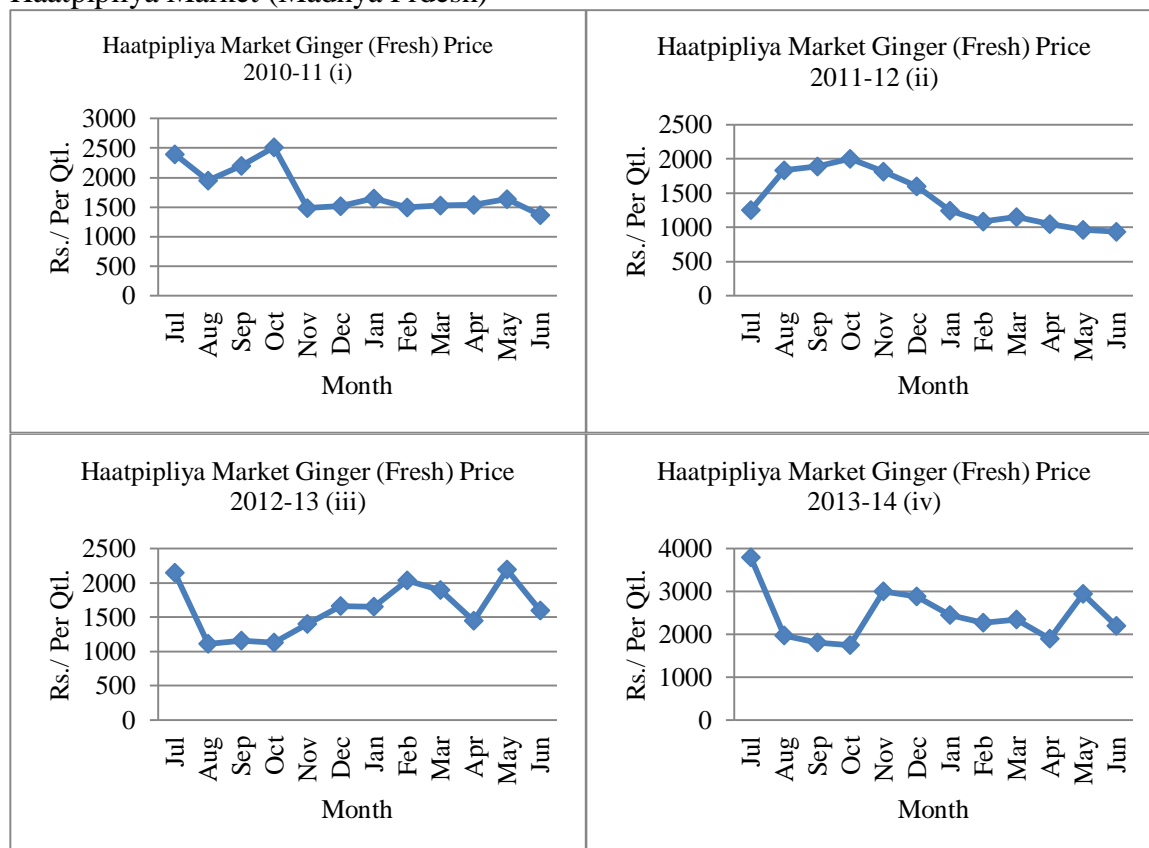
Table 3.1.3 (G): Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Fresh) in Haatpipliya Market (Madhya Pradesh)

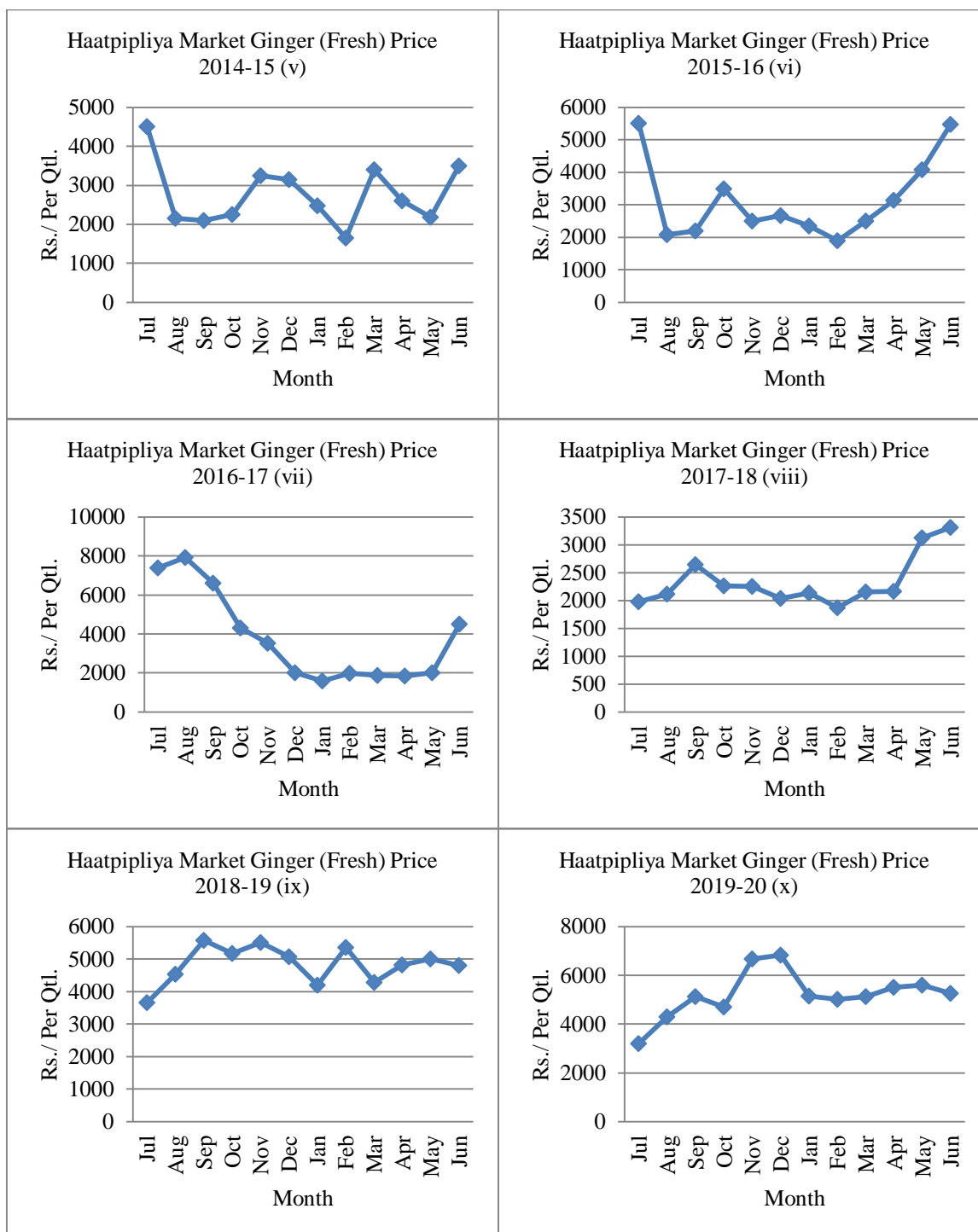
	Price Rs Per Quintal														
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	% CV	Avrag.	
2010-11	2402	1950	2200	2515	1490	1519	1648	1493	1532	1537	1641	68	22.12	1775	
2011-12	1256	1833	1889	2007	1813	1600	1248	1088	1156	1050	963	936	28.30	1403	
2012-13	2150	1110	1160	1128	1400	1659	1653	2038	1900	1450	2200	1600	24.00	1621	
2013-14	3800	1975	1800	1750	3000	2888	2450	2275	2350	1900	2950	2200	25.00	2445	
2014-15	4500	2150	2100	2250	3250	3150	2475	1645	3400	2600	2175	3500	29.12	2766	
2015-16	5500	2083	2200	3500	2500	2664	2350	1900	2500	3138	4083	5479	39.67	3158	
2016-17	7388	7930	6615	4302	3525	2018	1588	1992	1868	1854	2014	4500	61.84	3799	
2017-18	1977	2111	2643	2266	2250	2036	2138	1874	2150	2165	3127	3308	19.41	2337	
2018-19	3666	4540	5574	5179	5500	5063	4192	5350	4283	4821	5000	4800	11.88	4831	
2019-20	3210	4300	5117	4705	6672	6835	5157	5020	5122	5500	5600	5271	18.45	5209	
Growth Rate														12.71	

Sources: <https://agmarknet.gov.in/>

*CV=Coefficient of Variation

Graph No 3.1.3 (G): Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Fresh) in Haatpipliya Market (Madhya Pradesh)





In Table 3.1.3 (H), the inter seasonal prices of fresh ginger in Siliguri market of West Bengal are indicated. The prices have shown fluctuatiios within seasons, but highest fluctuation was observed in 2019-20 when the coefficient of variation in prices was 40.28. The growth rate in prices during the period 2014-15 to 2019-20 was 17.58 percent per annum.

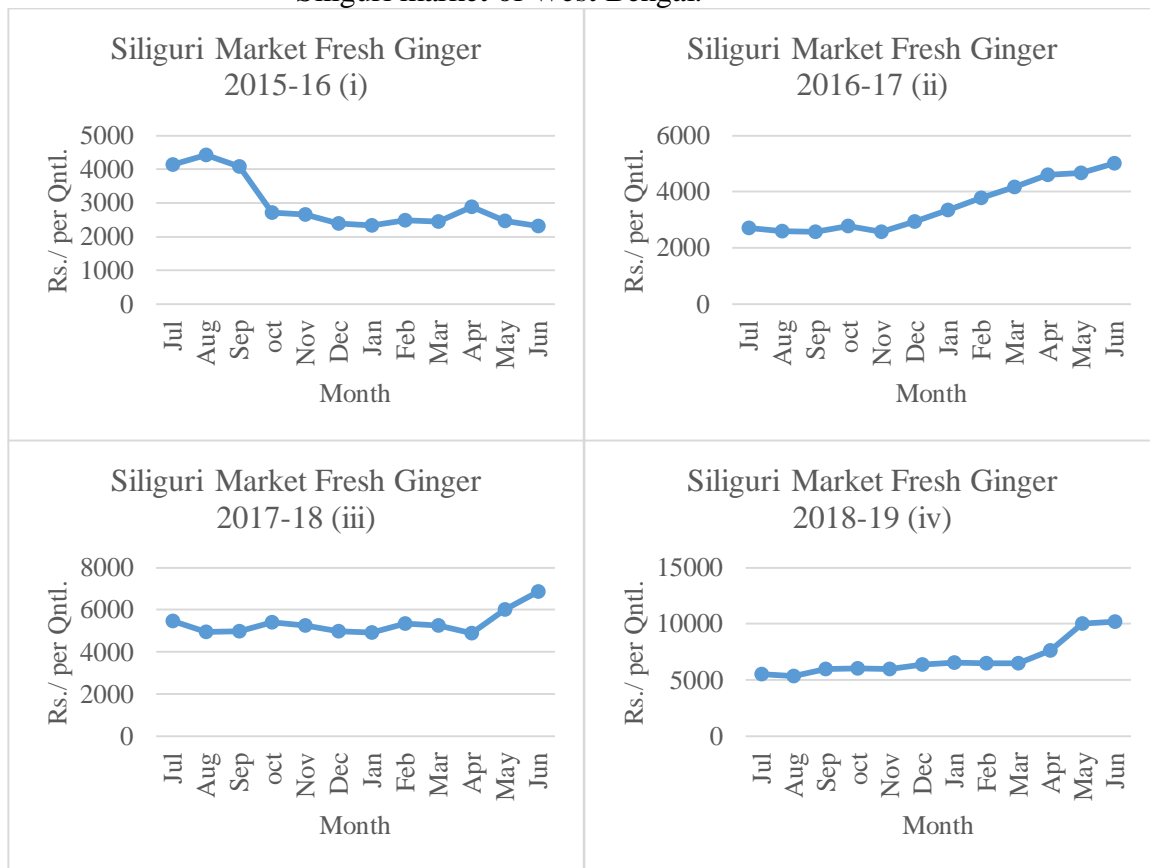
Table 3.1.3 (H): Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Fresh) in Siliguri (West Bengal)

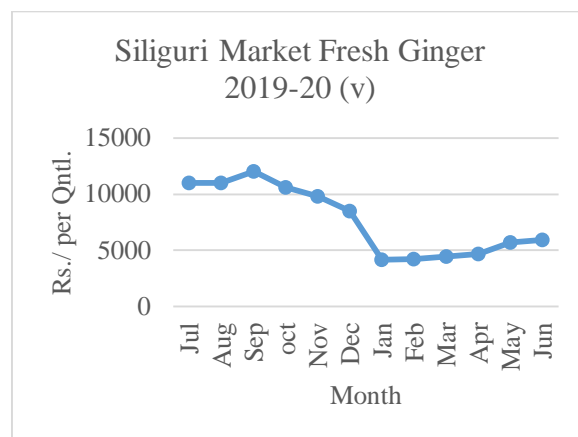
	Price per Quintal													CV	Avrg
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun			
2014-15	4177	4329	3877	3638	2723	2642	2512	2447	3075	3056	3322	5169	24.73	3414	
2015-16	4144	4417	4087	2719	2656	2389	2328	2476	2442	2889	2473	2318	26.75	2945	
2016-17	2710	2591	2574	2783	2563	2929	3350	3775	4171	4600	4661	5023	26.65	3478	
2017-18	5469	4946	4971	5412	5262	4965	4926	5354	5260	4896	6000	6854	10.61	5360	
2018-19	5535	5365	5977	6025	6000	6367	6520	6500	6500	7605	10000	10182	23.30	6881	
2019-20	11000	11000	12000	10600	9800	8500	4169	4229	4441	4669	5707	5951	40.28	7672	
Growth Rate														17.58	

Sources: <https://agmarknet.gov.in/>

The intra seasonal seasonal fluctuations in prices in Siliguri market of West Bengal are indicated in Graph 3.1.3.

Graph No 3.1.3 (H): Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Fresh) in Siliguri market of West Bengal.





Intra seasonal fluctuations in prices are also witnessed in dry ginger and their prices also depend upon prices of fresh ginger. The prices of dry ginger are indicated in Tables 3.1.3 (I to K) . In 2007-08 while the price was Rs 4200 per quintal in April 2007, the price began to show a steady decline and touched a low of Rs 3320 per quintal in August 2007. The trend however changed as prices began to rise in the season since August 2007 and touched a high of Rs 7020 in February 2007. The coefficient of variation in prices for 2007-08 was 31.94 percent indicating huge fluctuations within the year. There were major fluctuations in prices during the years 2011-12 to 2014-15 and in 2012-13 the coefficient of variation was 30.55 percent. The price of dry ginger which was as low as Rs 5475 per quintal in May 2012 increased gradually to as high as Rs 13150 per quintal in January 2012, i.e an increase of 140 percent.

Similarly, Kozikhode market also witnessed fluctuations in prices of dry ginger. In 2007-08 the price which was as low as Rs 4688 per quintal increased to Rs 8500 per quintal in March 2008, i.e an increase of 81 percent. The coefficient of variation in prices was 22.08 in 2007-08. There were huge fluctuations in prices in 2011-12 and 2012-13 with coefficient of variation being 23.3 percent and 22.9 percent respectively. In 2011-12, the price of dry ginger which was Rs 15400 per quintal declined to Rs 8500 per quintal, i.e a fall of 45 percent. This was followed by an increasing trend in prices. The price of dry ginger which was Rs 8175 per quintal in April 2012 increased to Rs 13,750 per quintal in March 2013, i.e an increase of 68 percent , while in 2013-14 the prices increased by 50 percent.

Table:3.1.3 (I). Year –Wise Month –Wise (Intra – Seasonal) Price of Ginger (Dry) in Kozhikode (Kerala)

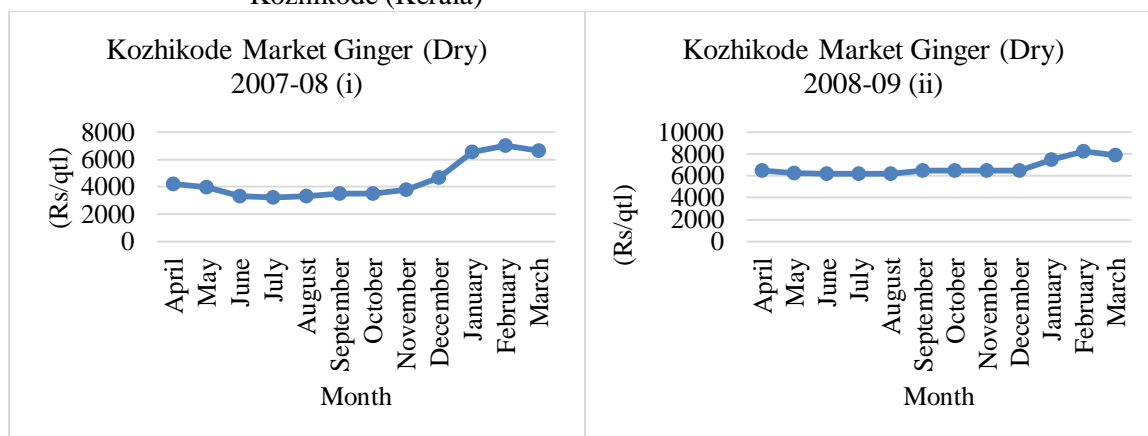
Price : Rs Per Quintal

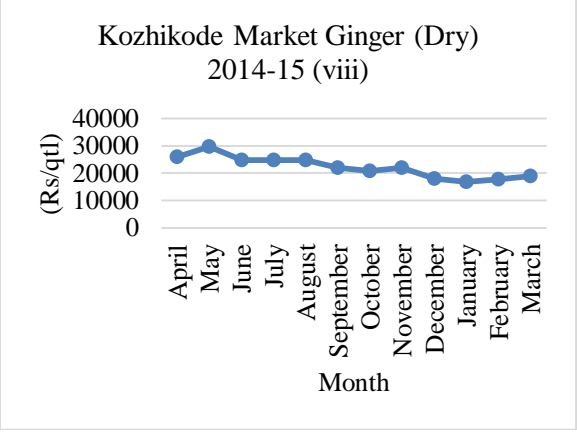
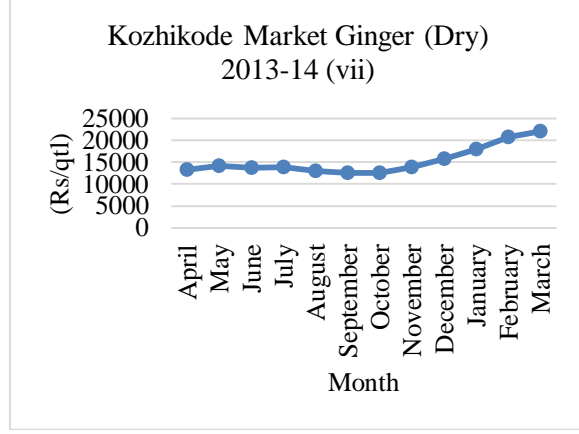
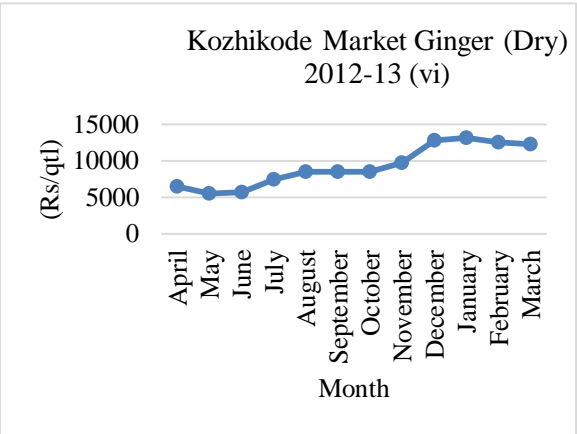
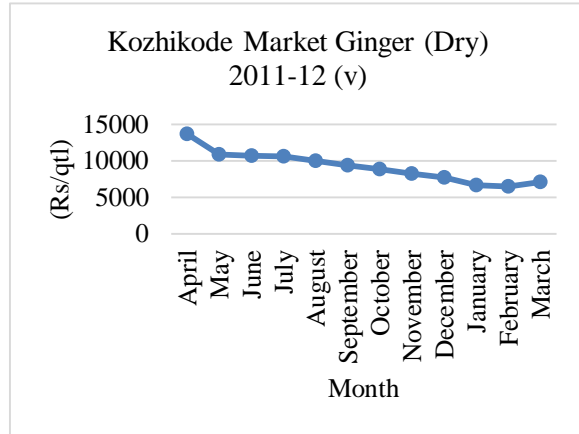
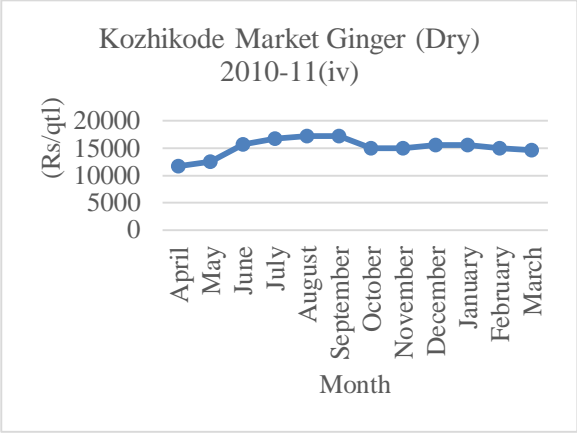
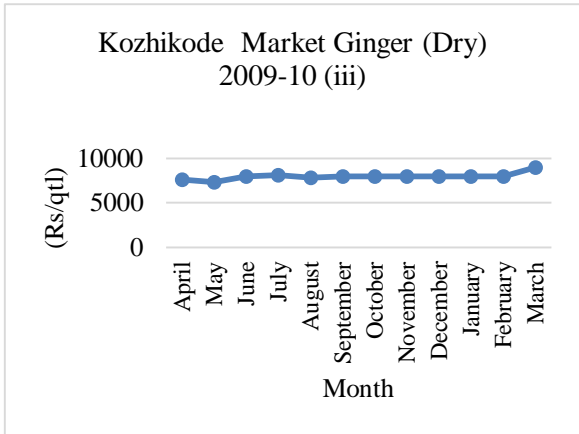
Month/ Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	%CV	Avrg
2007-08	4200	3950	3320	3200	3320	3500	3500	3800	4667	6550	7020	6625	31.94	4471
2008-09	6500	6260	6200	6200	6200	6500	6500	6500	6500	7460	8250	7875	10.47	6745
2009-10	7625	7360	8000	8120	7875	8000	8000	8000	8000	8000	8000	9000	4.74	7998
2010-11	11667	12500	15750	16800	17242	17242	15000	15000	15600	15600	15000	14600	11.20	15167
2011-12	13700	10875	10667	10600	10000	9400	8875	8250	7740	6625	6450	7100	23.10	9190
2012-13	6450	5475	5640	7425	8500	8500	8500	9750	12750	13150	12500	12300	30.55	9245
2013-14	13250	14100	13750	13875	13040	12500	12500	13800	15750	18000	20750	22000	21.18	15276
2014-15	25875	29600	24750	24750	24800	22000	20875	21875	18000	16900	17750	19000	17.50	22181
2015-16	19625	19100	19500	19800	19250	18833	17100	18125	18250	16800	16250	15875	7.58	18209
2016-17	13900	12875	13875	13700	12000	11100	11625	12000	12500	12875	12125	11666	7.48	12520
2017-18	10700	10000	9100	8525	8550	8325	8800	8750	8500	9250	9500	10340	8.55	9195
2018-19	11750	11750	11000	11000	12700	15500	15500	17625	18000	18666	21675	20400	24.61	15464
Gr Rate														11.94

Sources: <https://agmarknet.gov.in/>

*CV=Coefficient of Variation

Graph No:3.1.3 (I). Year –Wise Month –Wise(Intra – Seasonal) Price of Ginger (Dry) in Kozhikode (Kerala)





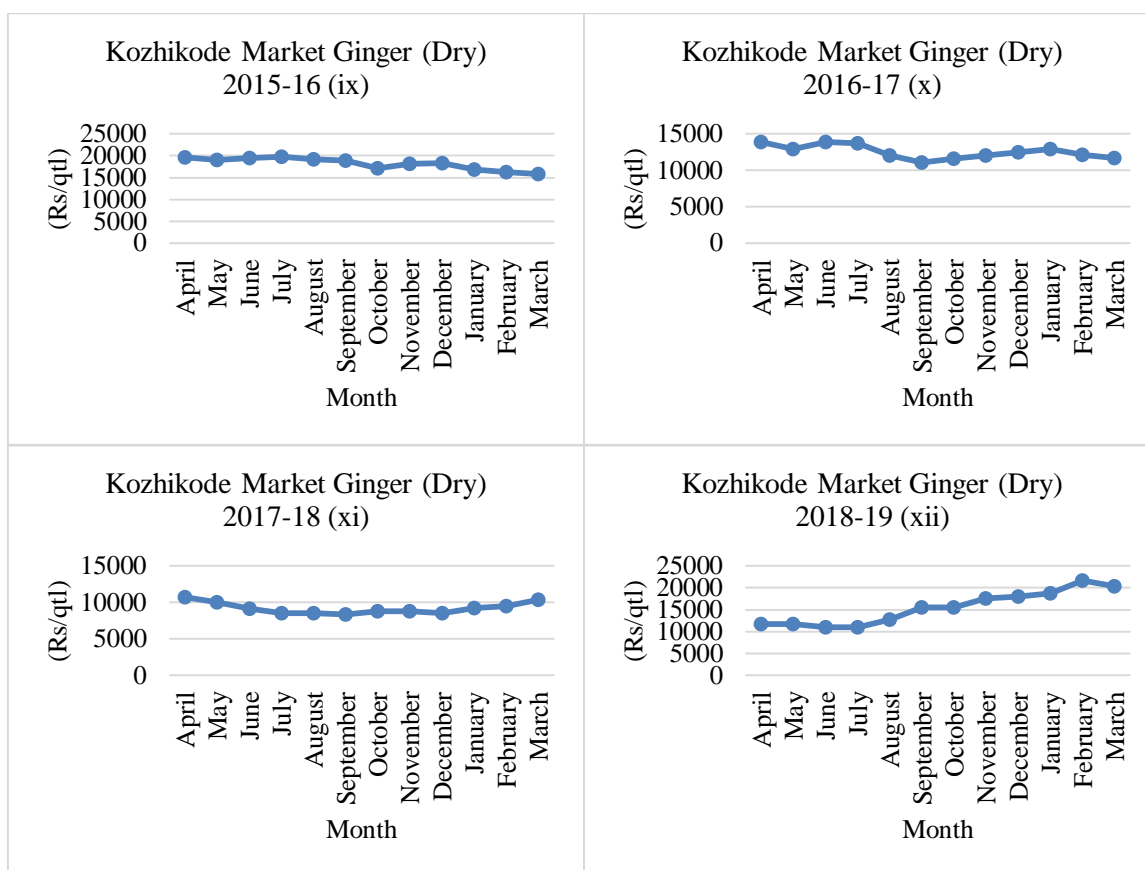


Table No.3.1.3 (J): Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Dry) in Cochin (Kerala)

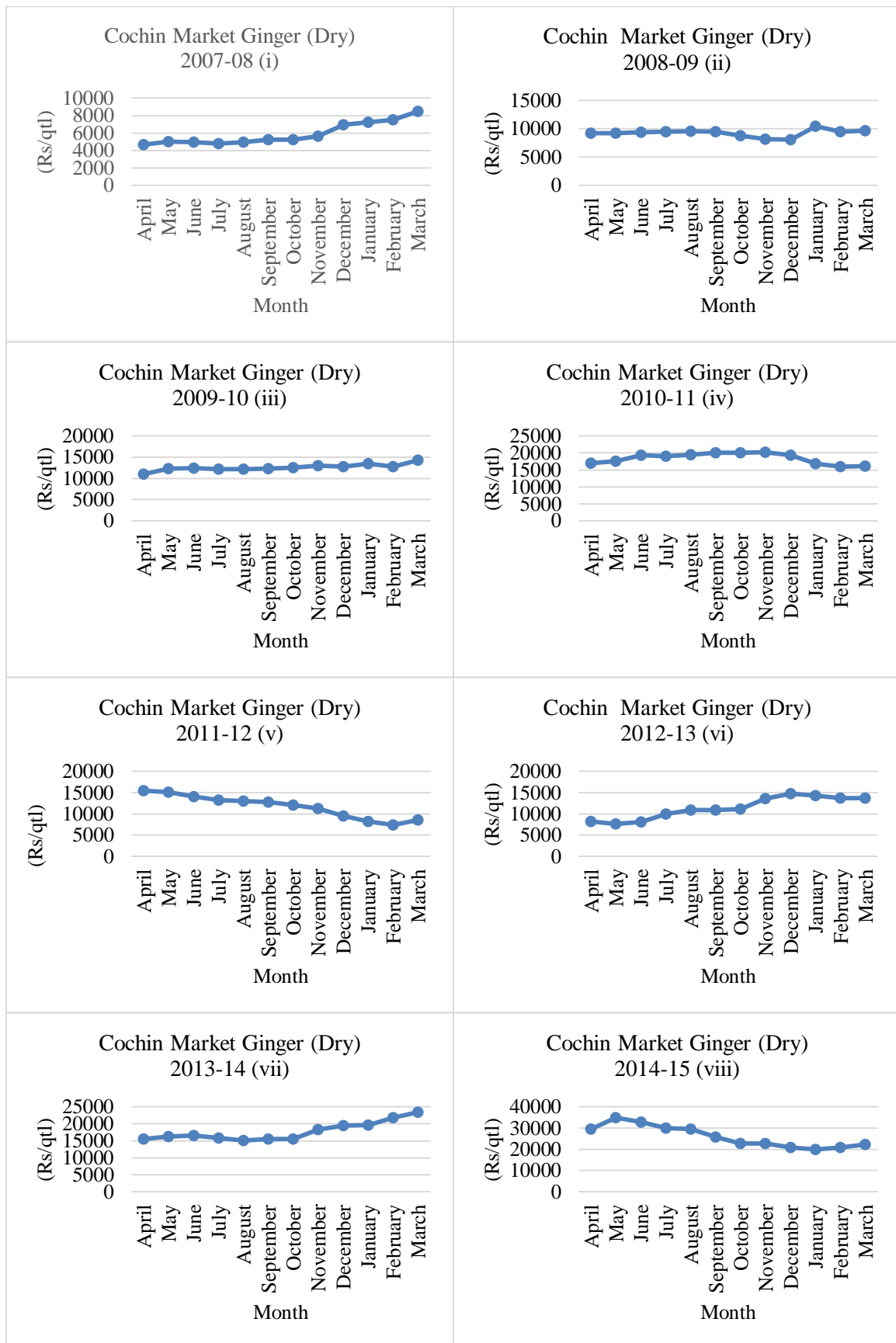
Price Rs Per Quintal

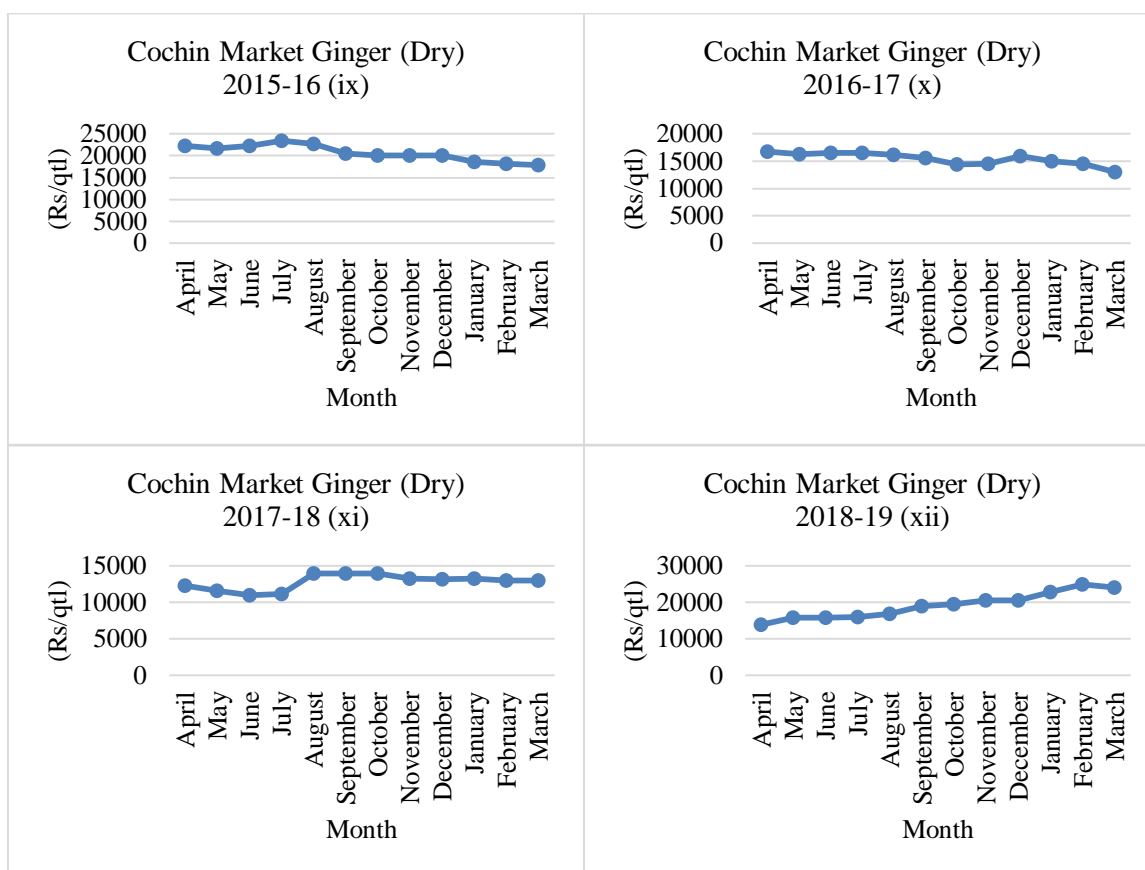
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	%CV	Avrg.
2007-08	4688	5000	4950	4771	4951	5218	5218	5665	6957	7250	7500	8500	22.08	5889
2008-09	9200	9200	9425	9500	9600	9475	8750	8188	8113	10450	9500	9625	6.98	9252
2009-10	10970	12350	12425	12200	12200	12250	12540	12950	12738	13460	12775	14340	6.39	12600
2010-11	16925	17625	19250	19000	19500	20000	20000	20250	19300	16800	15900	16075	8.77	18385
2011-12	15400	15050	14075	13260	13000	12720	12025	11300	9460	8250	7375	8500	23.31	11701
2012-13	8175	7575	8060	9950	10840	10900	11088	13605	14813	14313	13750	13750	22.90	11402
2013-14	15588	16300	16500	15875	15100	15500	15500	18340	19500	19600	21875	23375	15.61	17754
2014-15	29625	35000	32750	30000	29600	25875	22700	22750	20750	20000	20750	22250	19.92	26004
2015-16	22250	21600	22250	23400	22750	20500	20000	20000	20125	18600	18125	17875	8.94	20623
2016-17	16700	16250	16500	16500	16125	15600	14375	14500	15875	15000	14500	13000	7.38	15410
2017-18	12325	11625	11000	11125	14000	14000	14000	13250	13200	13250	13000	13000	8.36	12815
2018-19	13800	15750	15900	16000	16800	19000	19500	20500	20500	22875	25000	24000	18.75	19135
CAGR														11.31

Sources: <https://agmarknet.gov.in/>

*CV=Coefficient of Variation

Graph No 3.1.3 (J): Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Dry) in Cochin (Kerala)





The intra seasonal fluctuation in prices are also observed in Bara Bazar market of West Bengal and indicated in Table 3.1.3 (K).

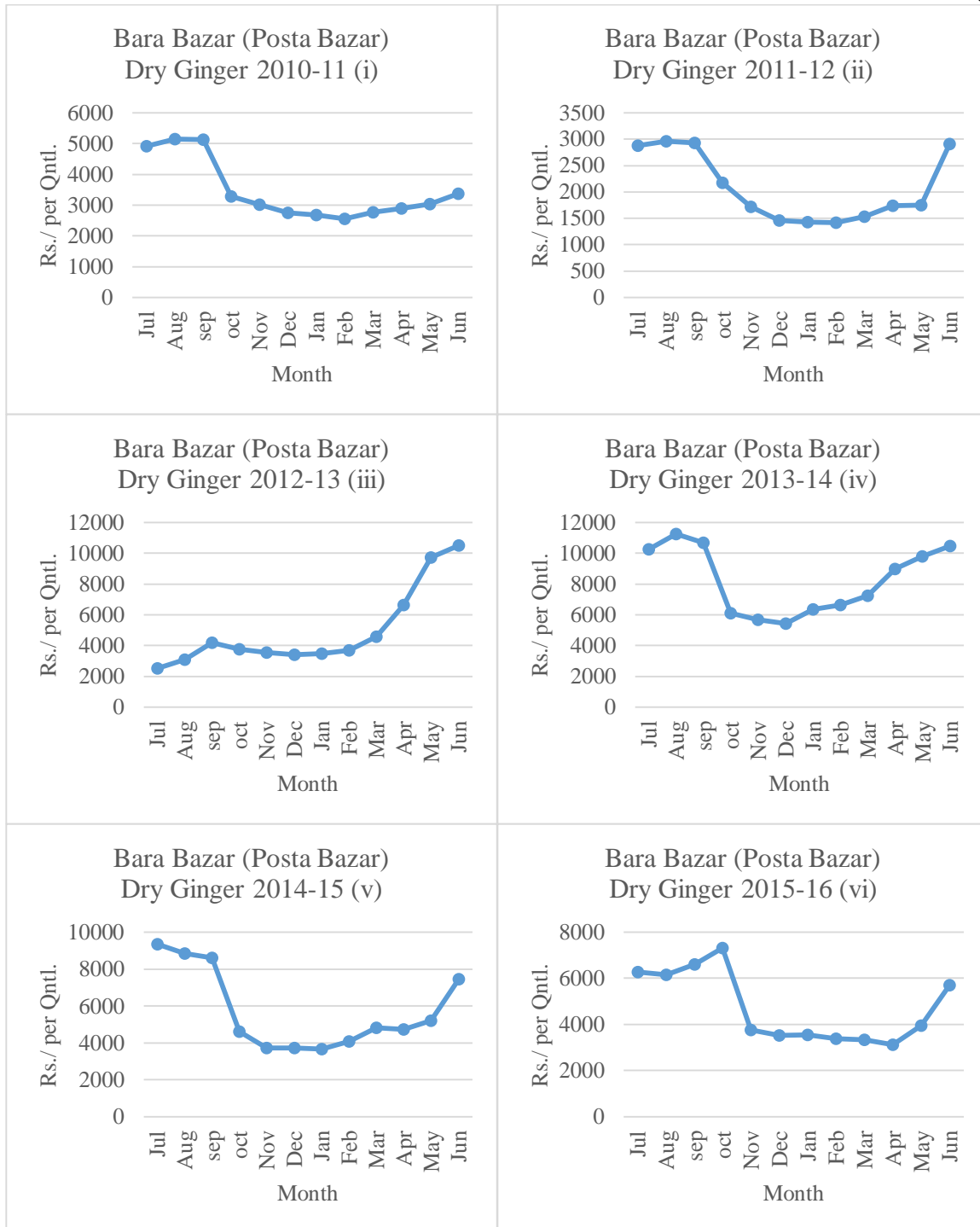
Table.3.1.3 (K): Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Dry) in Bara Bazar Market (West Bengal)

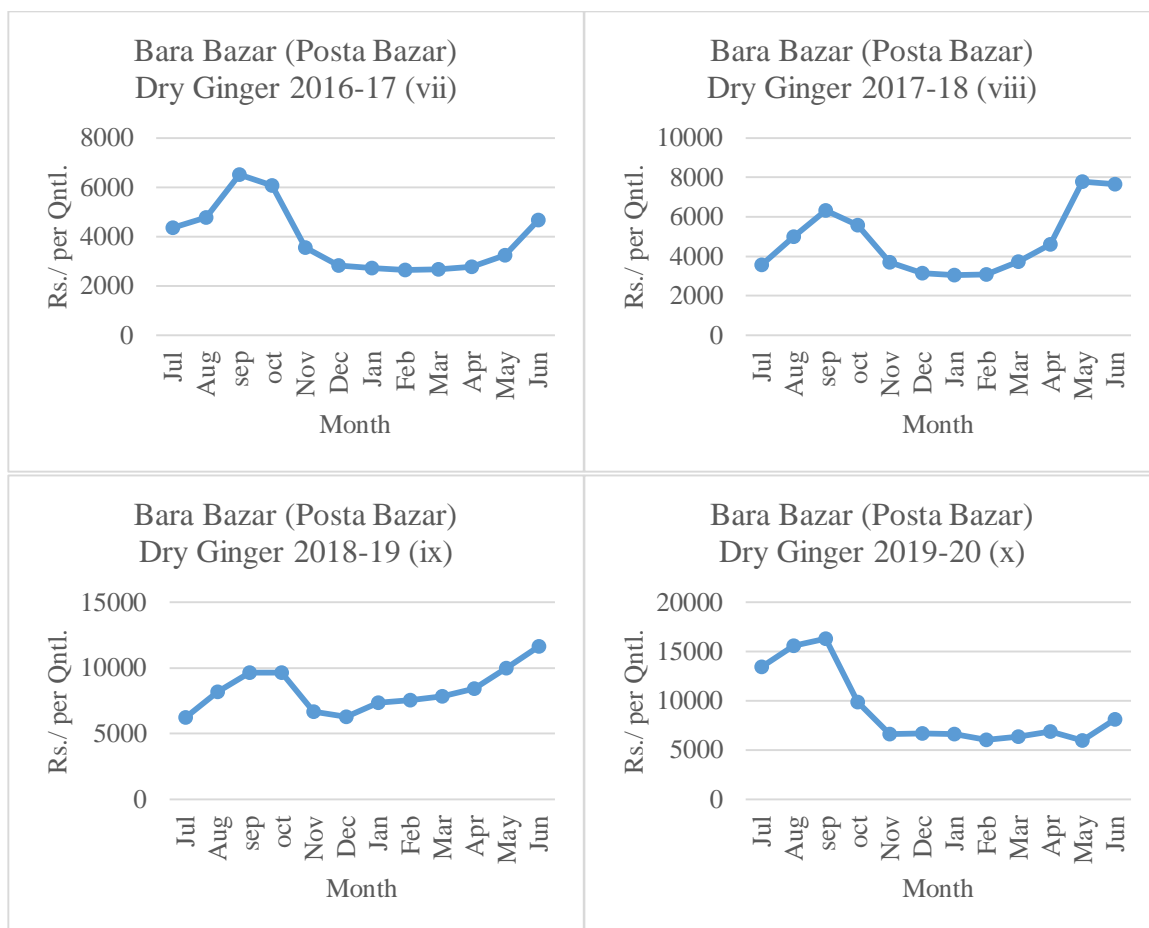
	Price Rs Per Quintal														
	Jul	Aug	sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	CV	Avrg	
2010-11	4910	5144	5134	3281	3025	2750	2680	2554	2765	2890	3029	3370	28.76	3461	
2011-12	2875	2962	2934	2178	1723	1457	1424	1413	1528	1736	1752	2909	31.70	2074	
2012-13	2534	3088	4188	3761	3536	3408	3496	3703	4568	6635	9721	10510	53.33	4929	
2013-14	10260	11240	10698	6111	5667	5438	6340	6653	7250	8975	9804	10470	26.68	8242	
2014-15	9343	8841	8609	4625	3719	3731	3667	4068	4832	4733	5200	7462	38.04	5736	
2015-16	6261	6163	6600	7315	3771	3515	3557	3392	3337	3127	3950	5710	32.68	4725	
2016-17	4365	4779	6524	6071	3558	2829	2714	2655	2664	2767	3255	4669	35.08	3904	
2018-19	6230	8164	9658	9653	6681	6269	7346	7531	7828	8397	9993	11652	20.12	8283	
2019-20	13408	15598	16293	9875	6642	6648	6636	6007	6379	6848	5971	8134	42.73	9037	
G.Rate														11.25	

Sources: <https://agmarknet.gov.in/>

Graph 3.1.3 (K): Year –Wise Month –Wise (Intra-Seasonal) Price of Ginger (Dry) in Bara Bazar Market (West Bengal)

Price Rs Per Quintal





3.1.4 Inter Seasonal Variations in Prices :

Besides prices fluctuating within a year, it is observed that there are fluctuations in prices from year to year. This can be observed from Table 3.1.4 and also from graphs 3.1.4 (A) to 3.1.4 (I).

Table 3.1.4 Coefficient of Variation in Prices of Ginger in Markets between Seasons

Market	Co-efficient of Variation (Percent)	Season
Hassan (Fresh Ginger) (Karnataka)	40.91	2002-03 to 2019-2019
Shimoga (Fresh Ginger) (Karnataka)	70.11	2002-03 to 2019-20
Kozikhode (Fresh Ginger) (Kerala)	53.28	2007-08 to 2018-19
Satara (Fresh Ginger) (Maharashtra)	42.85	2010-11 to 2019-20
Goreswar (Fresh Ginger) (Assam)	44.82	2006-07 to 2019-20
Lashkar , (Fresh Ginger) Madhya Pradesh	45.64	2010-11 to 2019-20
Haatpipliya (Fresh Ginger) Madhya Pradesh	44.87	2010-11 to 2019-20
Siliguri (Fresh Ginger) West Bengal	40.19	2014-15 to 2019-20
Kozikhode (Dry Ginger) Kerala	42.92	2007-08 to 2018-19
Cochin (Dry Ginger) Kerala	36.83	2007-08 to 2018-19
Bara Bazar (Dry Ginger) West Bengal	41.75	2010-11 to 2019-20

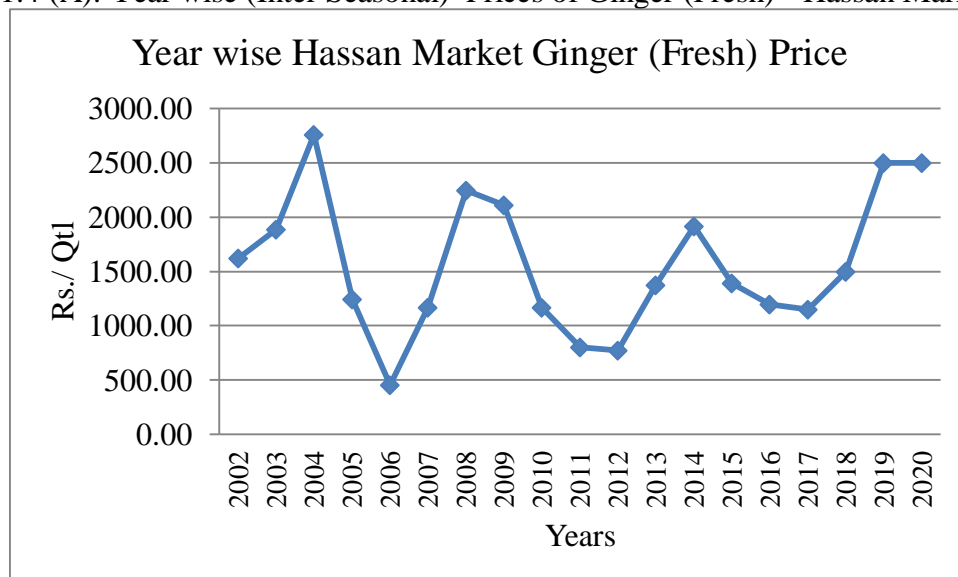
Source : calculated from data in Tables 3.1.3 (A to K).

It can be observed from Table 3.1.4 that the markets of ginger, both fresh and dry, have huge inter seasonal fluctuations in prices. The coefficient of variation of ginger prices in Shimoga market during the period 2002 to 2020 was as high as 70.11 percent indicating huge year to year fluctuations in prices. In Satara market also considerable inter seasonal fluctuations in prices was observed as the coefficient of variation in prices during the season 2010-11 to 2019-20 was 42.85 percent.

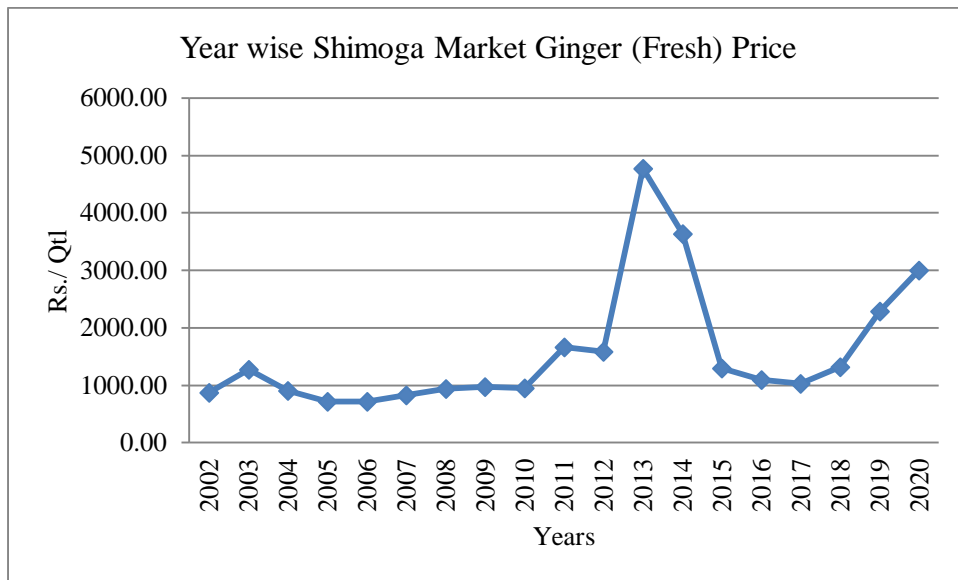
In case of dry ginger Kozikhode market showed a coefficient of variation in prices between 2007-08 to 2018-19 of 42.92 percent, while Cochin showed a coefficient of variation of 36.83 percent during the corresponding period. Sharp fluctuations in prices are often observed because if prices are ruling high, the farmers have a tendency to increase area under the crop which brings about increase in production. This increased production increases the arrivals in the markets and pushes down the prices. As a result, often, inter seasonal fluctuations in prices are observed.

The fluctuations are also indicated in Graphs 3.1.4 (A to K). In Graph 3.1.4 (L&M)), it can also be observed that prices vary in markets. This can be due to differences in varieties besides availability in supplies.

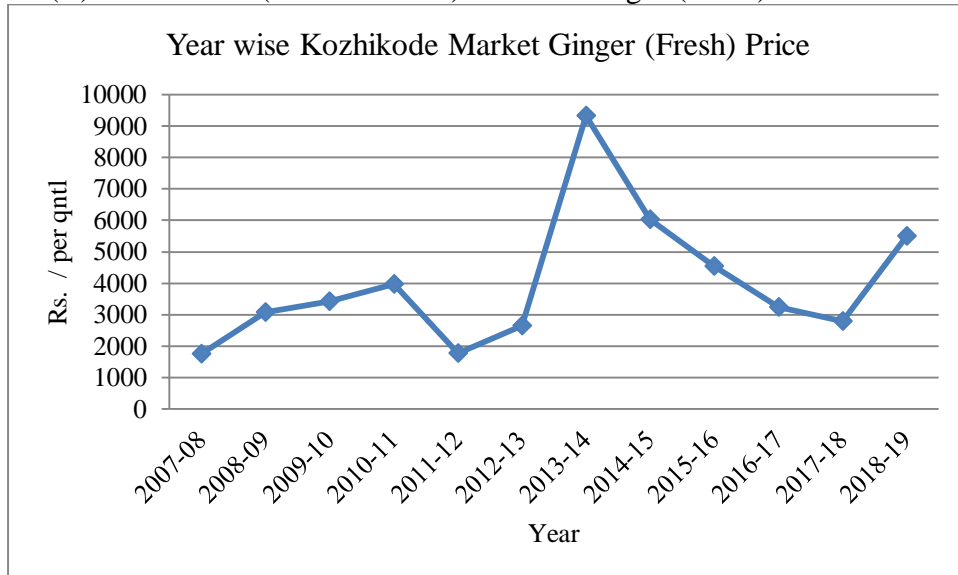
Graph 3.1.4 (A): Year wise (Inter Seasonal) Prices of Ginger (Fresh) - Hassan Market



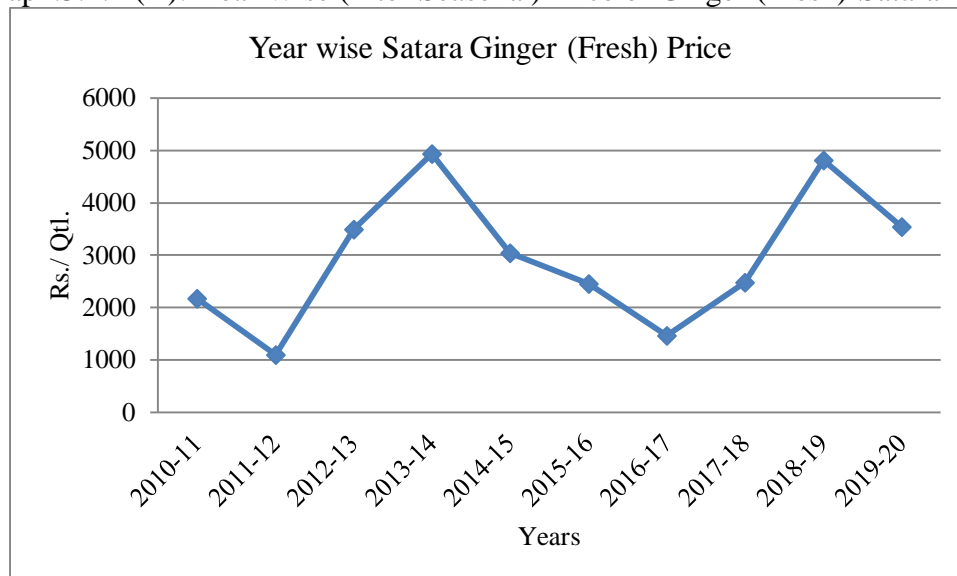
Graph 3.1.4 (B): Year wise (Inter Seasonal) Prices of Ginger (Fresh) - Shimoga Market



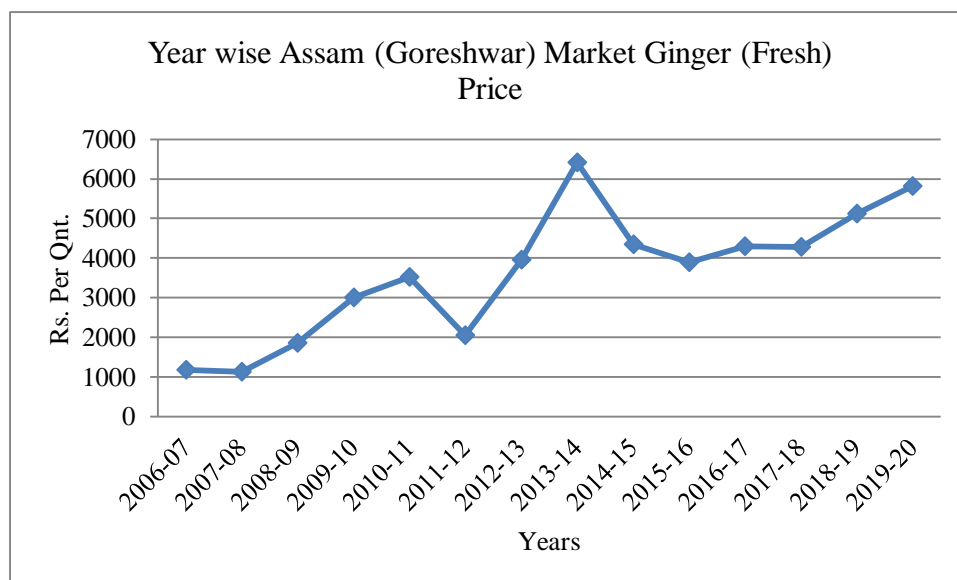
Graph 3.1.4 (C): Year Wise (Inter Seasonal) Price of Ginger (Fresh) -Kozikhode Market



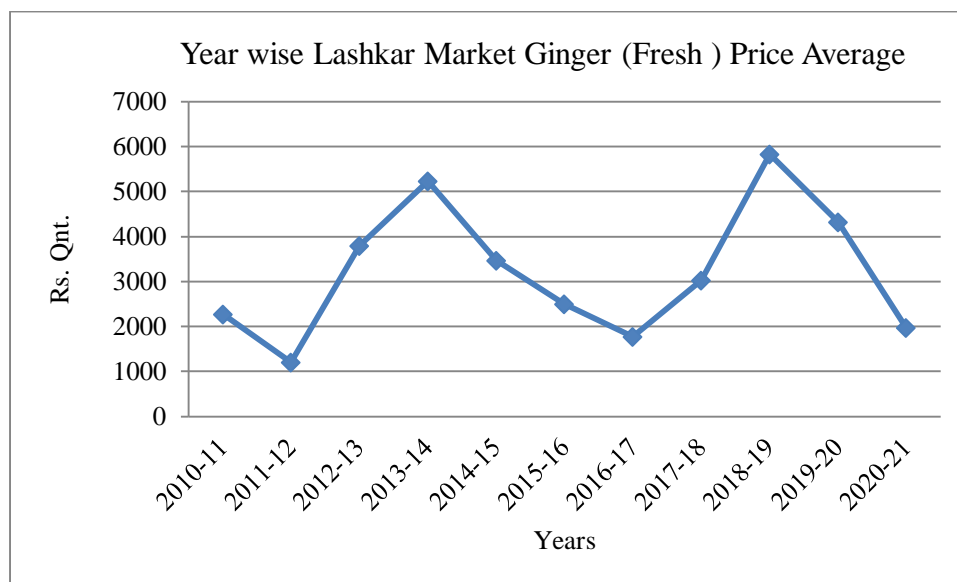
Graph.3.1.4 (D): Year Wise (Inter Seasonal) Price of Ginger (Fresh)-Satara Market



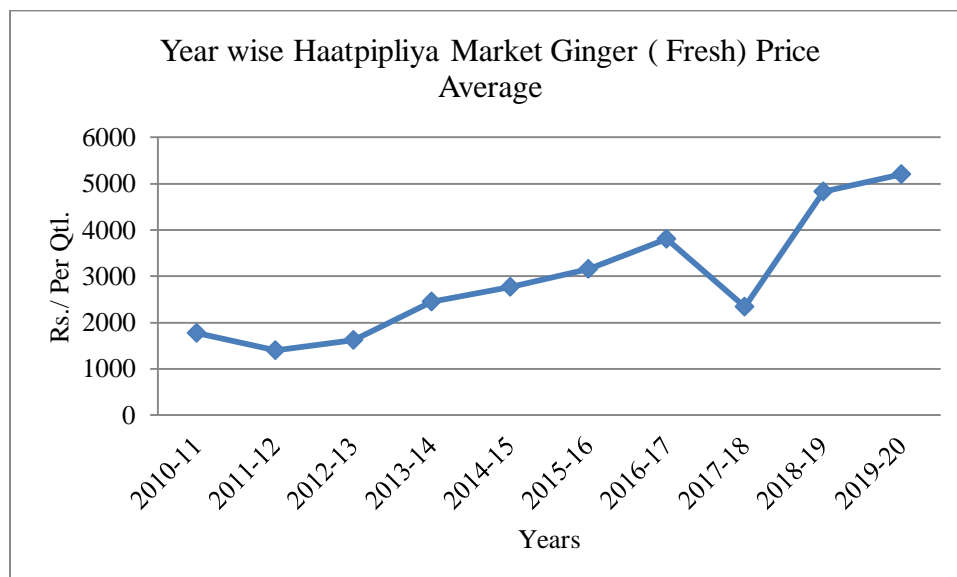
Graph.3.1.4 (E): Year Wise (Inter Seasonal) Price of Ginger (Fresh)Goreshwar Market Assam



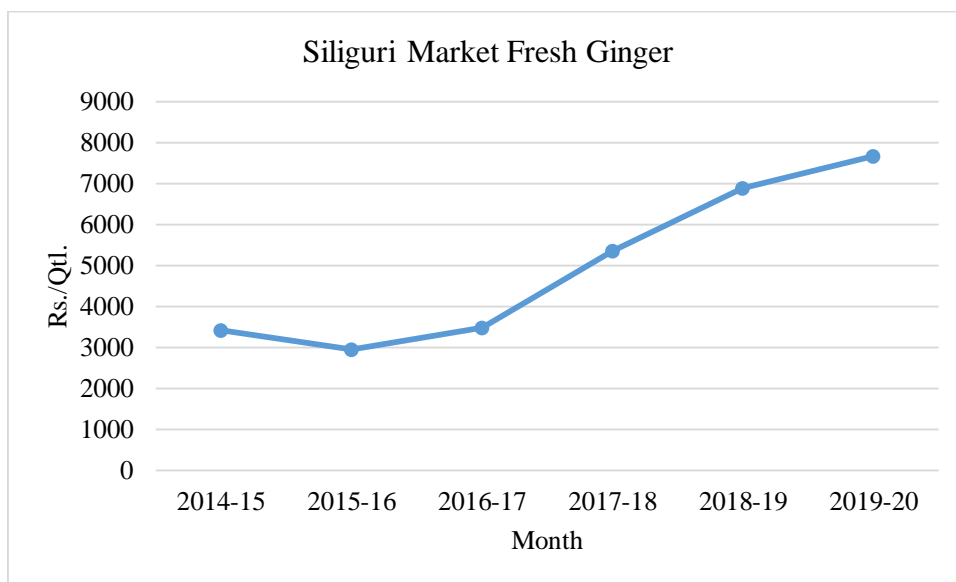
Graph.3.1.4 (F): Year Wise (Inter Seasonal) Price of Ginger (Fresh)- Lashkar Market Madhya Pradesh



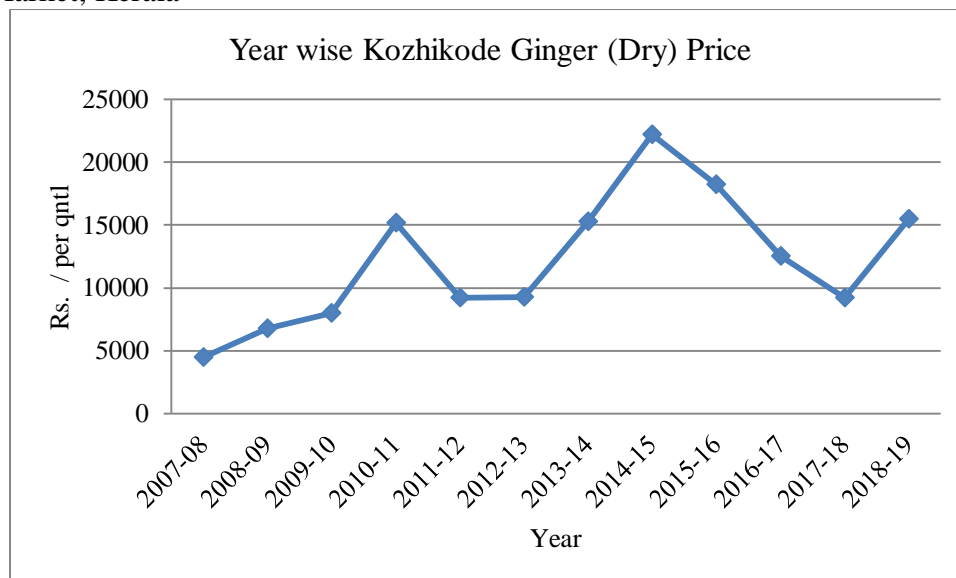
Graph 3.1.4 (G): Year Wise (Inter Seasonal) Price of Ginger (Fresh)-Haatpipliya Market, Madhya Pradesh



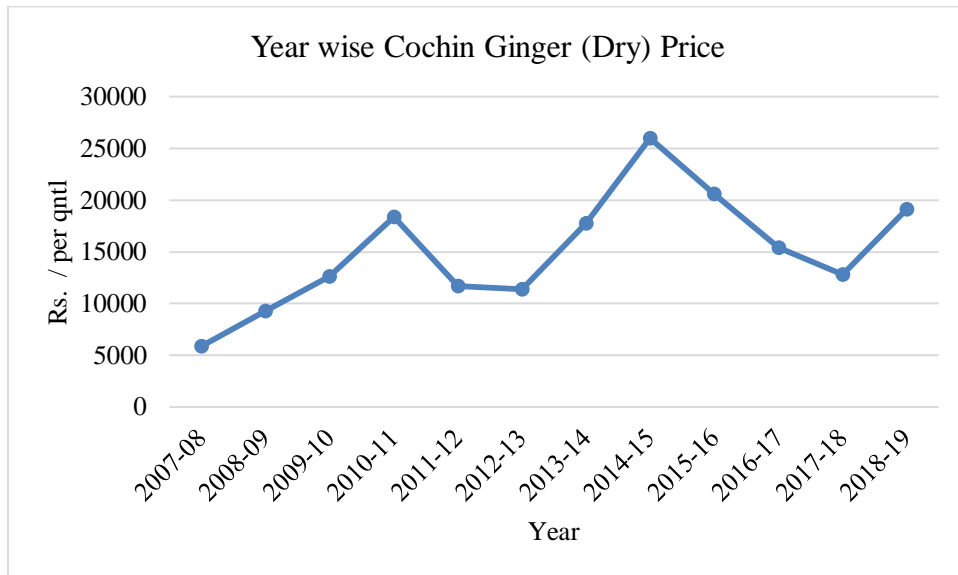
Graph 3.1.4 (H): Year Wise (Inter Seasonal) Price of Ginger (Fresh) - Siliguri Market (West Bengal)



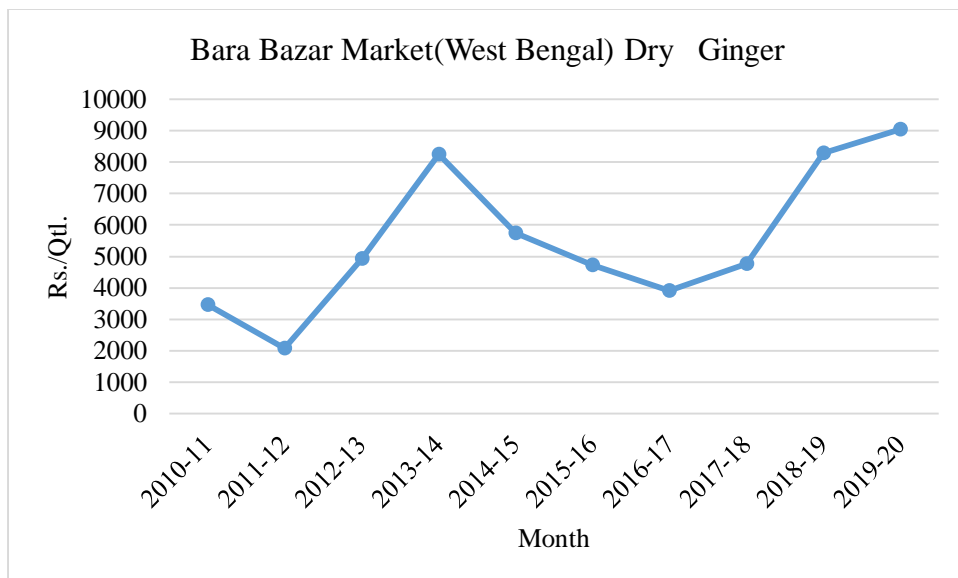
Graph 3.1.4 (I) : Year Wise (Inter Seasonal) Price of Ginger (Dry) -Kozikhode Market, Kerala



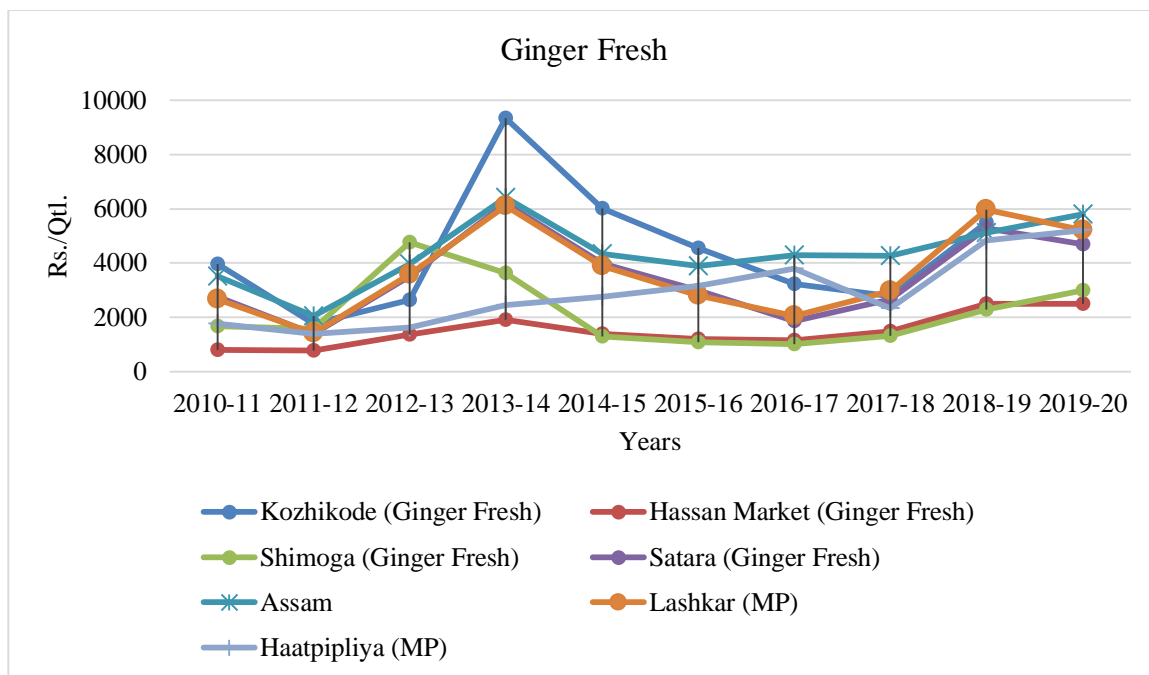
Graph 3.1.4 (J): Year Wise (Inter Seasonal) Price of Ginger (Dry)-Cochin Market, Kerala



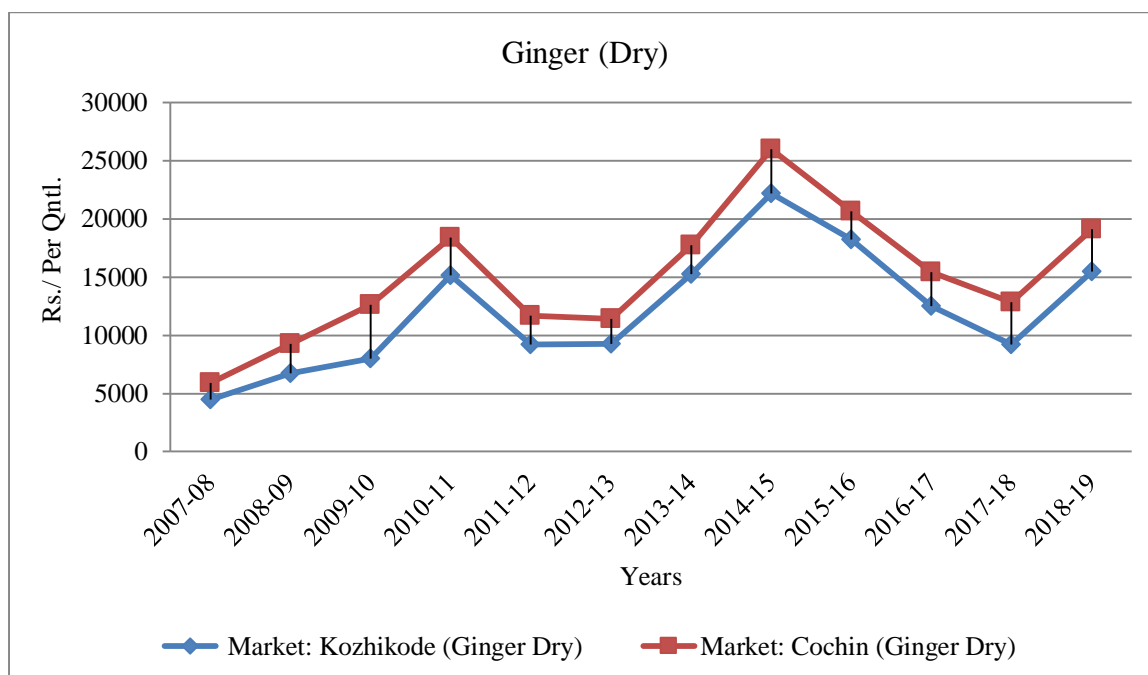
Graph 3.1.4 (K): Year Wise (Inter Seasonal) Price of Ginger (Dry) in Bara Bazar Market (West Bengal)



Graph 3.1.4 (L) Inter Seasonal Fluctuations in Prices of Ginger (Fresh) Across Markets



Graph 3.1.4 (M) Inter Seasonal Fluctuations in Prices of Ginger (Dry) Across Markets



3.2 Seasonal Variations in Domestic Prices of Turmeric:

The prices of turmeric, both inter seasonal and intra seasonal are subject to variation due to several factors. Besides, demand and supply, the curcumin content in turmeric plays a major role in determining the price, as there is an increasing demand for this product in view of it having medicinal properties. Also, price plays an important role in the sowing operations. If farmers receive a high price in a season, they tend to increase the area under turmeric. This increased area however, increases supply and farmers then experience crash in price which again makes them reduce area under the crop and switch over to some other crop. The price of turmeric in international markets also influences the domestic prices.

3.2.1 Index Number of Prices of Turmeric:

The index number of wholesale prices of turmeric is indicated in Table 3.2.1. It can be observed from Table 3.2.1 that in 2011-12, the WPI for turmeric was as low as 79.8 indicating a steep fall in prices. The fall in prices was due to increase in supply of the crop which pushed the prices down. Prices were ruling at very high levels in 2009-10 and 2010-11 and perhaps this served as an incentive for farmers to increase area under turmeric. Tamil Nadu is a major turmeric producing state and in Salem market the price which was ruling at Rs 6500 per quintal between April to July 2009 began to increase rapidly and touched Rs 14,000 per quintal in March 2010. This rising trend continued and peaked in January 2011 when the price touched Rs 18875 per quintal. Hence prices increased by 190 percent between July 2009 and January 2011. Erode market, in Tamil Nadu experienced a price rise of 223 percent during the corresponding period. It was felt that this drastic increase in price was due to speculation, as on line trading too was taking place in turmeric. As prices began to show a rising trend, the traders began to hoard the produce in the hope of higher prices. This reduced supply and further pushed up the prices of turmeric. The prices however did recover, but since 2015-16 the prices have moved in a narrow range. The high prices of turmeric led to increase in area under the crop in Tamil Nadu, which increased from 33366 hectares in 2009-10 to 51446 in 2010-11, i.e increase of 54 percent. As prices continued to rule high, the area further increased to 67246 hectares, i.e. increase of 31 percent. This increased area brought alongwith it increased output which increased by 33 percent between 2010-11 and 2011-12 in Tamil Nadu. A similar increase in area was observed in Andhra Pradesh in 2010-11 and the area which was 69160 hectares increased to 75 000 hectares in 2011-12, ie. An increase of 8 percent. Both the states of Tamil Nadu and Andhra Pradesh together contributed 54 percent

of area in turmeric in 2010-11 and 65 percent of area in 2011-12. Hence in 2011-12 the prices of turmeric began to decline which brought the index of wholesale prices of turmeric to 79.8 percent. There was some recovery in price index as states began to reduce area under turmeric. In Tamil Nadu the area declined to 26070 hectares in 2014-15, i.e a decline of 62 percent from 2011-12 and in case of Andhra Pradesh, the corresponding decline was 20 percent. This decline in area brought about a decline in production of turmeric in the country by about 29 percent between 2011-12 and 2014-15. Hence the wholesale price index in 2014-15 improved to 121.5. Since 2015-16, the index has hovered around 118 with no major fluctuations.

Table. 3.2.1: Index Number of Wholesale Prices (WPI) of Turmeric (Base 2010 - 11=100)

Year	WPI
2011-12	79.8
2012-13	103
2013-14	109.3
2014-15	121.5
2015-16	117.3
2016-17	119.7
2017-18	118.7

Source : statistica.com/statistics/883524/wholesale-price-index-of-turmeric-india/

3.2.2 Average Ruling Prices of Turmeric:

The prices of turmeric are subject to fluctuations both within a season and across seasons. In Table 3.2.2, the average price of turmeric in major trading centres is indicated for the period 2010-11 to 2018-19. The coefficient of variation ranged between 5.01 percent in 2017-18 to 21.16 percent in 2011-12. In 2017-18 and 2018-19, the co-efficient of variation was 5.01 percent and 5.59 percent respectively. In Graph 3.2.2 (A), the intra season fluctuations in prices can be observed.

It can also be observed from graph 3.2.2 (B), that there are sharp inter seasonal variations in prices and the coefficient of variation of prices between 2010-11 to 2018-19 was 18.71 percent. The prices indicated a growth rate of -3.44 percent in the period 2009-10 to 2018-19. The average price in 2010-11 which was Rs 8879 per quintal sharply declined to Rs 4730 per quintal in 2011-12. There was recovery in 2014-15 and 2015-16 when the average

price for the season was Rs 7363 per quintal and Rs 8487 per quintal respectively. However, the prices again showed a downward trend in 2016-17. In 2018-19, the prices hovered around Rs 6708 per quintal.

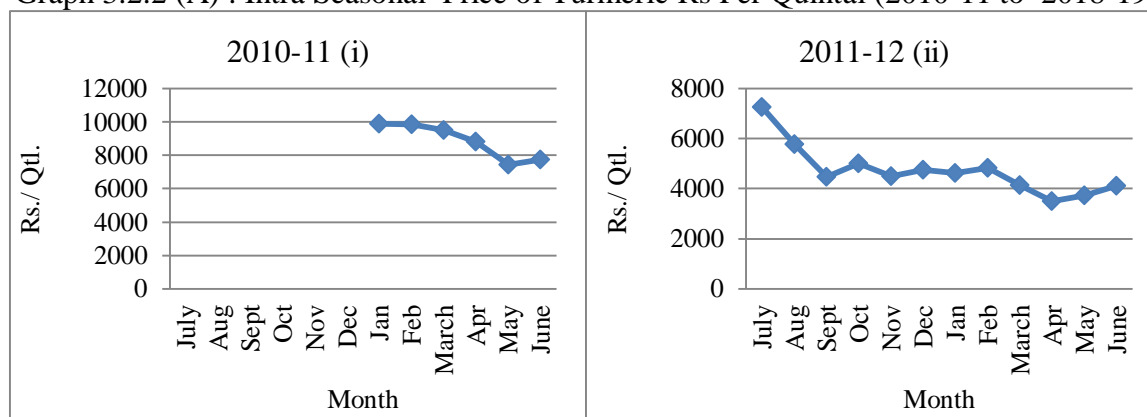
Table 3.2.2 : Average Price of Turmeric Across Major Trading Centres

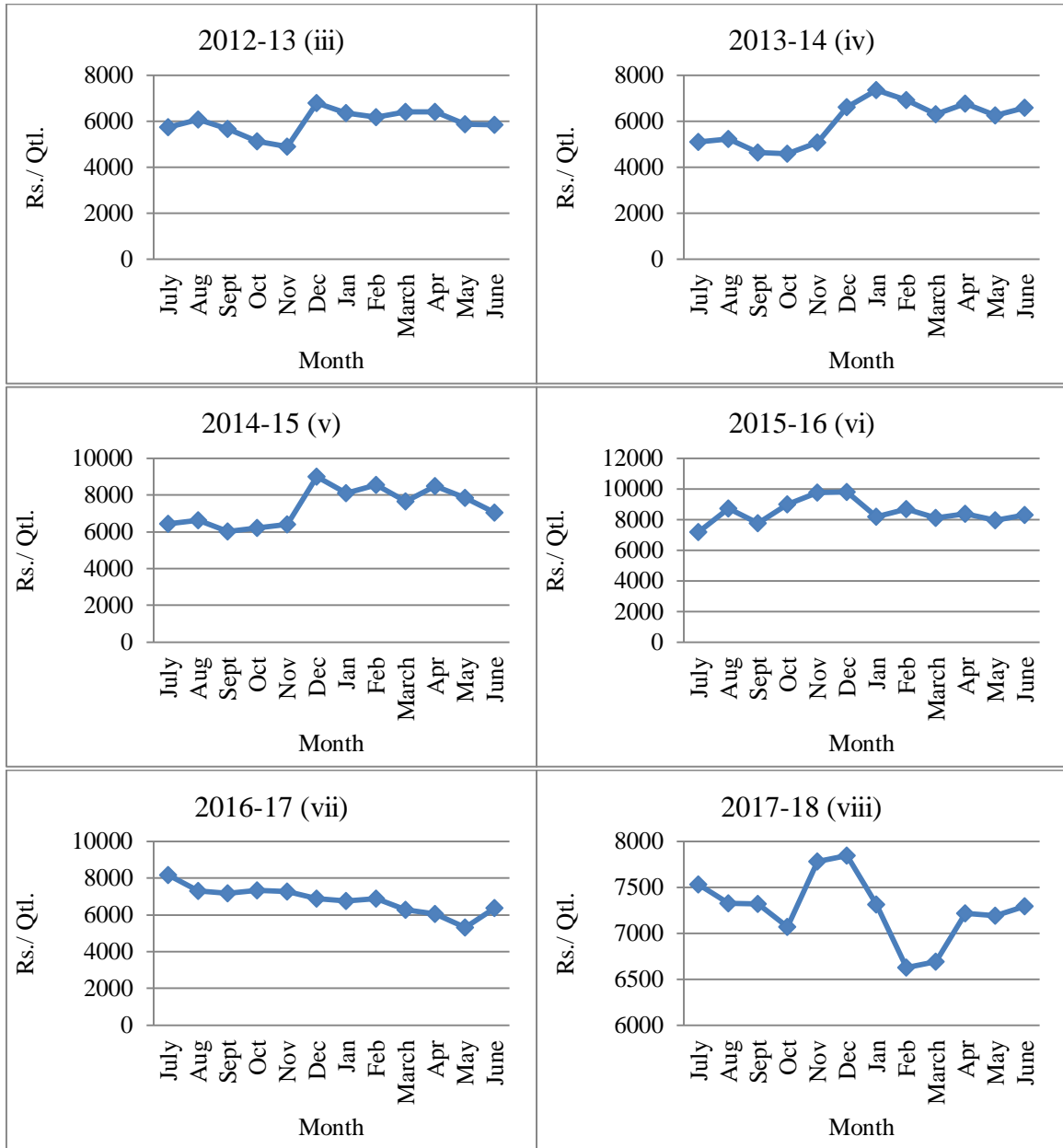
Price : Rs Per Quintal

Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	CV (%)	Avrg.
2010-11							9908	9868	9496	8830	7434	7736	12.15	8879
2011-12	7276	5780	4480	5010	4494	4766	4626	4836	4142	3508	3732	4110	21.16	4730
2012-13	5746	6080	5654	5128	4896	6798	6342	6174	6394	6414	5860	5848	9.19	5945
2013-14	5100	5232	4632	4580	5062	6616	7346	6904	6302	6754	6254	6574	16.19	5946
2014-15	6418	6616	6014	6212	6404	8990	8102	8544	7662	8486	7854	7048	14.06	7363
2015-16	7196	8732	7764	8984	9762	9780	8200	8688	8110	8368	7964	8292	8.98	8487
2016-17	8154	7300	7186	7332	7254	6874	6758	6876	6278	6058	5322	6378	10.76	6814
2017-18	7532	7322	7318	7070	7780	7842	7314	6628	6694	7214	7192	7290	5.01	7266
2018-19	7312	6868	6770	6796	6502	6740	6398	6238	6656	6438	7455	6320	5.59	6708
Growth Rate														-3.44

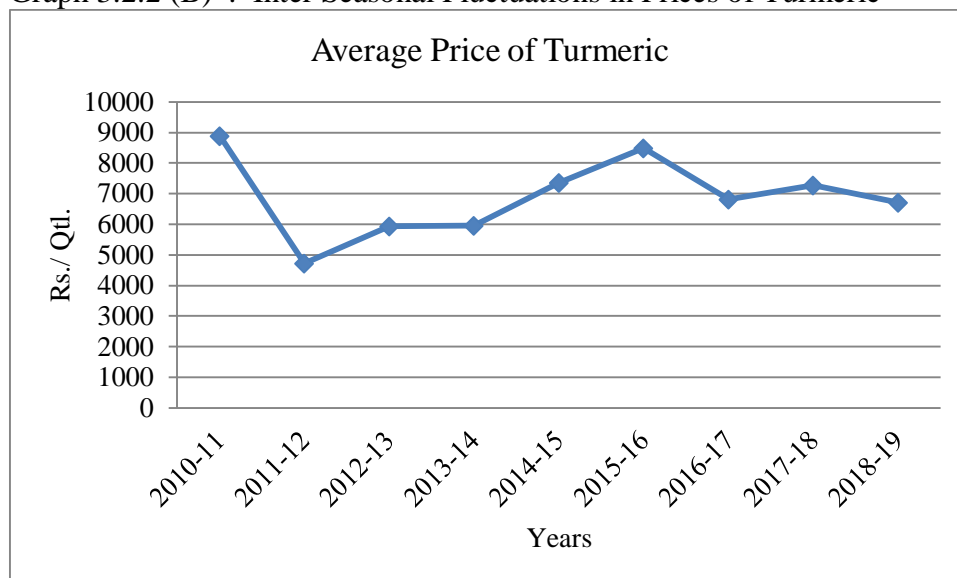
Source : vid.investmentguruindia.com>report>July>kedla

Graph 3.2.2 (A) : Intra Seasonal Price of Turmeric Rs Per Quintal (2010-11 to 2018-19)





Graph 3.2.2 (B) : Inter Seasonal Fluctuations in Prices of Turmeric



3.2.3 Intra Seasonal Fluctuations in Prices of Turmeric in Major Markets :

As observed in earlier sections, prices of turmeric are subject to intra seasonal fluctuations. Hence in this section, the intra seasonal fluctuations in certain markets of major turmeric growing states have been indicated. In Table 3.2.3 (A) and Graph 3.2.3 (A) the fluctuations in prices of turmeric in Salem market of Tamil Nadu can be observed for the period 2007-08 to 2019-20. In two years, 2009-10 and 2011-12, the coefficient of variation was observed to be relatively high and was 29.28 percent and 29.08 percent respectively. While the prices showed a huge rising trend in 2009-10, with prices ranging from Rs 6500 per quintal in April 2009 to Rs 14,000 per quintal in March 2010, in 2011-12, the prices showed a downslide. While the price of turmeric was Rs 15300 per quintal in April 2011, it fell sharply to Rs 6900 per quintal in March 2012. However, in the following years, within the years the fluctuation in price was by and large reducing. The growth rate in prices during the period 2007-08 to 2019-20 was 8.86 percent per annum.

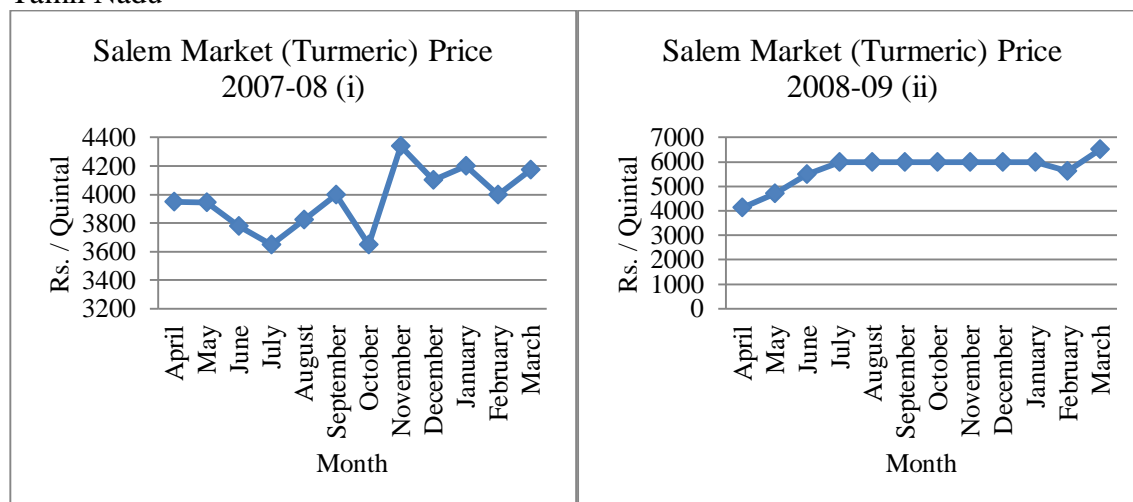
Table No.3.2.3 (A) Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in (Salem) Tamil Nadu

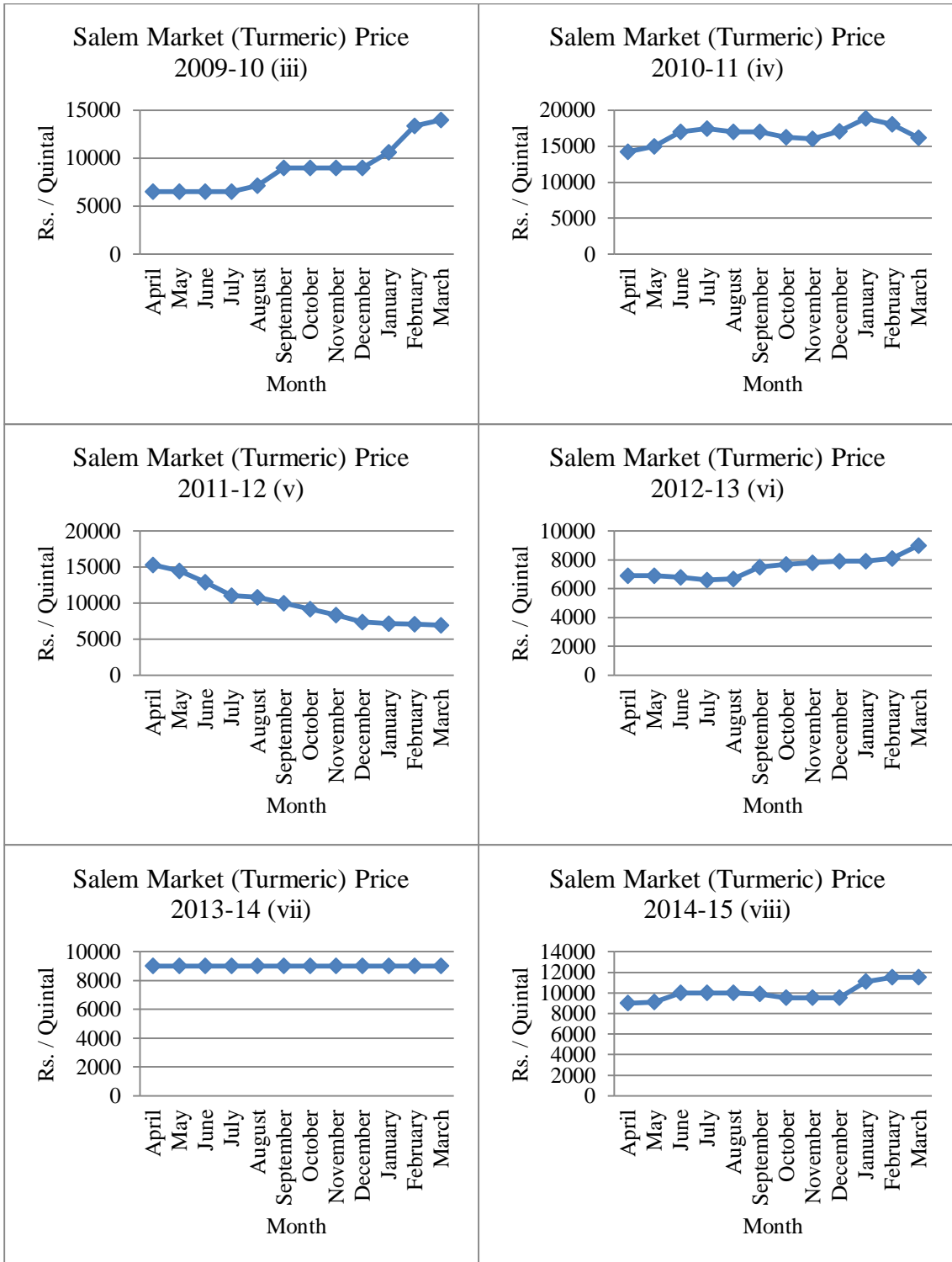
Price : Rs Per Quintal

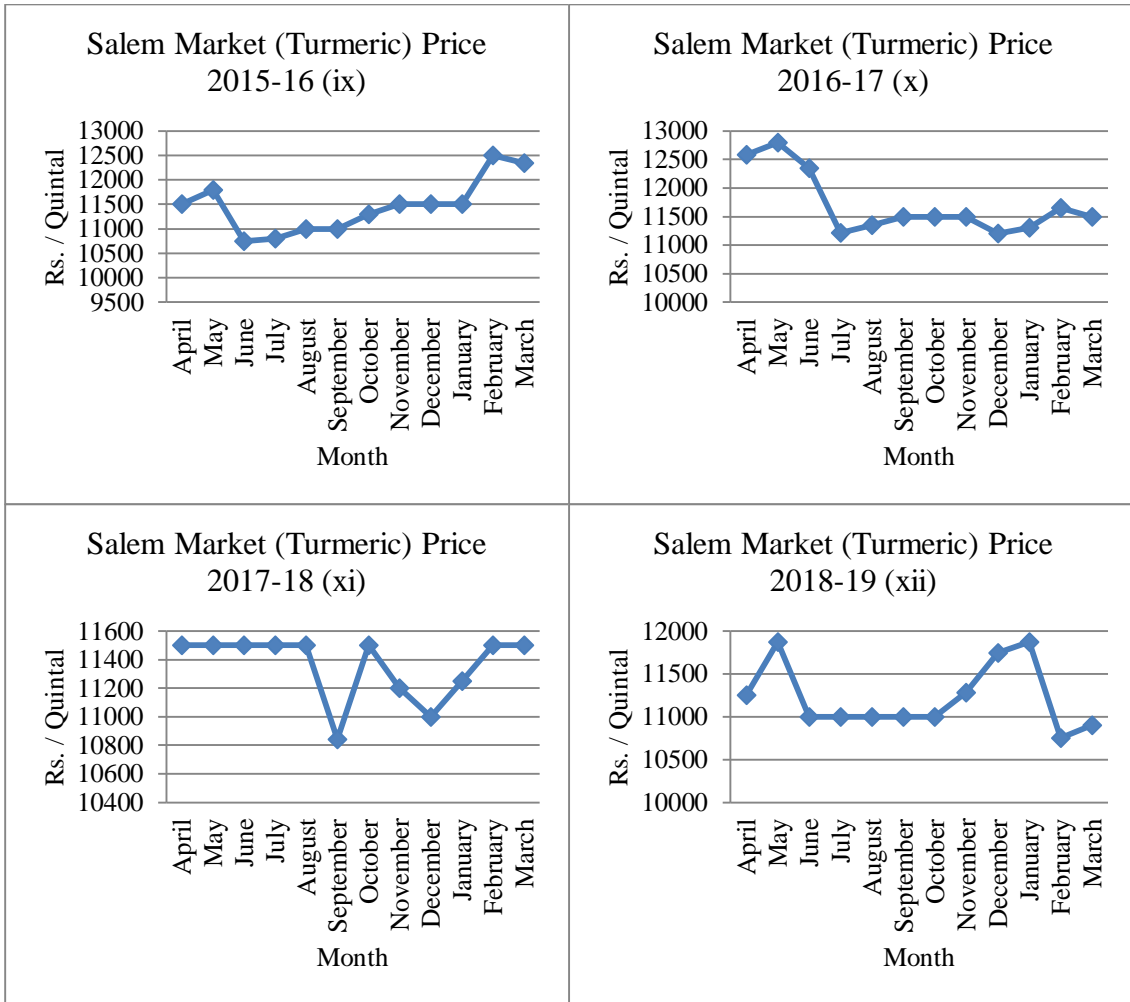
Years	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	CV (%)	Avrg.
2007-08	3950	3946	3780	3650	3822	4000	3650	4341	4100	4200	4000	4175	5.44	3968
2008-09	4125	4700	5500	6000	6000	6000	6000	6000	6000	6000	5625	6500	11.57	5704
2009-10	6500	6500	6500	6500	7126	9004	9004	9004	9004	10603	13375	14000	29.28	8927
2010-11	14200	15000	17000	17433	17000	17000	16240	16000	17066	18875	18075	16200	7.60	16674
2011-12	15300	14450	12900	11020	10800	10000	9200	8375	7400	7175	7100	6900	29.08	10052
2012-13	6900	6900	6780	6600	6660	7500	7700	7780	7900	7900	8100	9000	9.71	7477
2013-14	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	0.00	9000
2014-15	9000	9100	10000	10000	10000	9875	9500	9500	9500	11100	11500	11500	8.62	10048
2015-16	11500	11800	10750	10800	11000	11000	11300	11500	11500	11500	12500	12350	4.84	11458
2016-17	12580	12800	12350	11220	11350	11500	11500	11500	11200	11300	11650	11500	4.70	11704
2017-18	11500	11500	11500	11500	11500	10840	11500	11200	11000	11250	11500	11500	2.04	11358
2018-19	11250	11875	11000	11000	11000	11000	11000	11280	11750	11875	10750	10900	3.51	11223
2019-20	10500	10800	10875	11625	11500	11250	10375						4.40	10989
G.Rate														8.86

Sources: <https://agmarknet.gov.in/>

Graph No.3.2.3 (A) Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in (Salem) Tamil Nadu







In Table 3.2.3 (B), the intra seasonal fluctuation in price of turmeric in Erode, Tamil Nadu for from 2007-08 to 2019-20 is indicated. As in case of Salem market, in Erode market also, the coefficient of variation was highest in 2009-10 and 2011-12 and was of the order of 33.7 percent and 32.6 percent respectively. While prices increased by 139 percent in 2009-10 season, the converse picture happened in 2011-12 when prices declined by 58 percent. The growth rate in prices during 2007-08 to 2019-20 was 10.68 percent per annum. The fluctuations were relatively less in the following years and can be observed from Graph 3.2.3 (B).

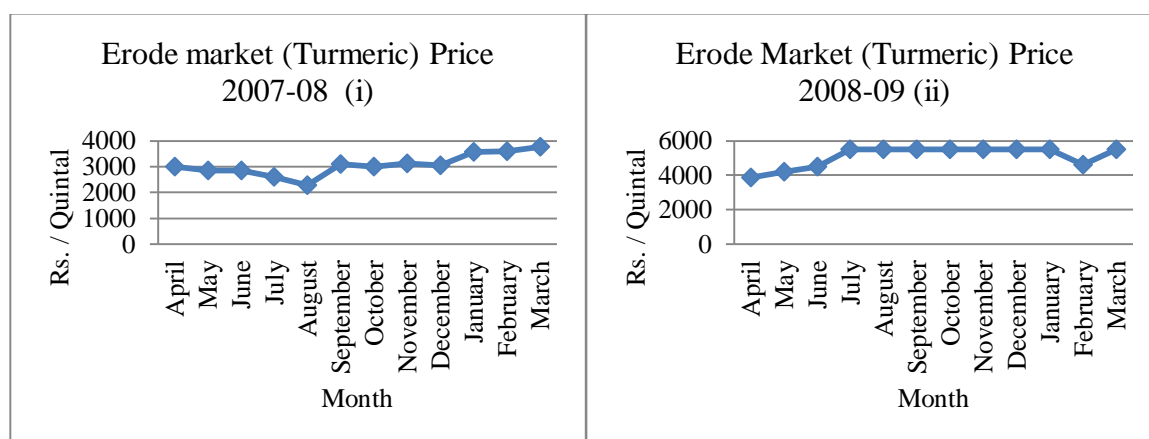
Table No.3.2.3 (B): Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in (Erode) Tamil Nadu

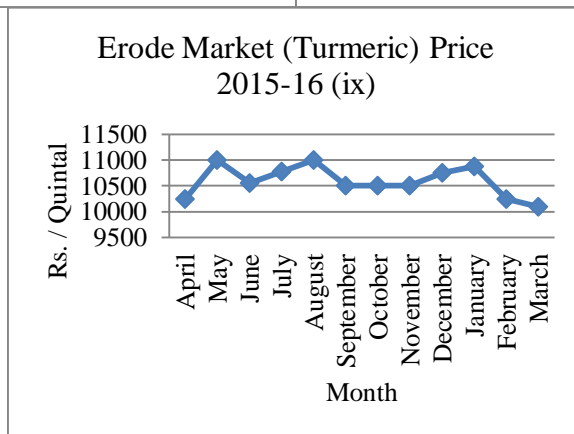
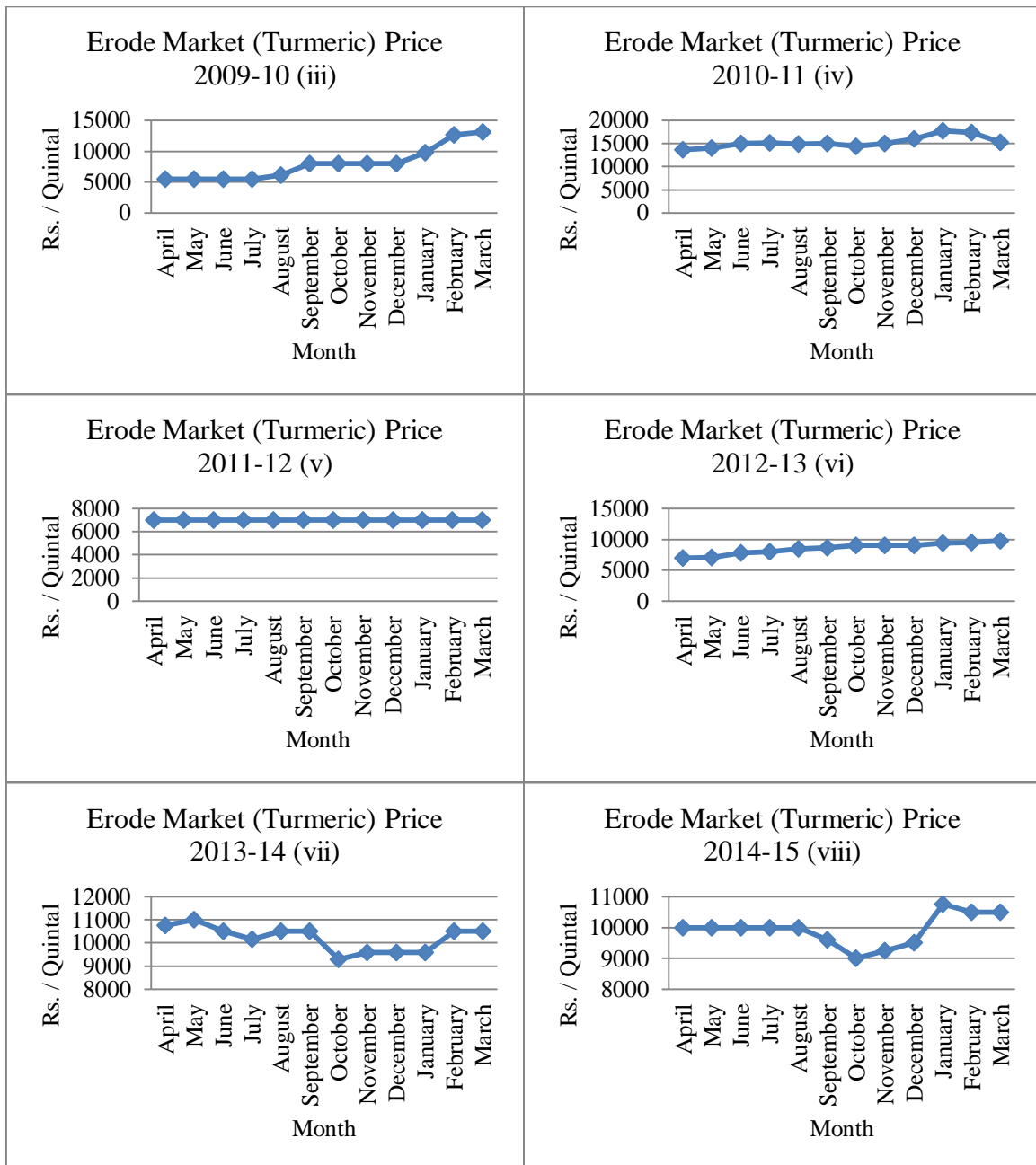
Price : Rs Per Quintal

Years	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	CV (%)	Avrg.
2007-08	3000	2849	2840	2600	2281	3099	3000	3120	3050	3575	3600	3775	13.86	3066
2008-09	3850	4200	4500	5500	5500	5500	5500	5500	5500	5500	4625	5500	12.18	5098
2009-10	5500	5500	5500	5500	6126	8002	8002	8002	8002	9802	12625	13125	33.70	7974
2010-11	13600	14000	14996	15200	14950	15000	14380	15000	16000	17800	17400	15275	8.12	15300
2011-12	13760	12850	11950	9440	8850	8100	7700	7700	6167	5775	5800	5800	32.69	8658
2012-13	5800	5800	5800	5800	5840	6450	6575	6500	6500	6500	6525	7000	6.73	6258
2013-14	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	0.00	7000
2014-15	7000	7080	7800	8000	8500	8625	9000	9000	9000	9400	9500	9750	10.64	8555
2015-16	10750	11000	10500	10160	10500	10500	9280	9600	9600	9600	10500	10500	5.38	10208
2016-17	10700	11500	11000	10480	10500	10000	10000	10000	9400	9525	9900	10000	5.93	10250
2017-18	10000	10000	10000	10000	10000	9600	9000	9250	9500	10750	10500	10500	5.23	9925
2018-19	10250	11000	10550	10775	11000	10500	10500	10500	10750	10875	10250	10100	2.81	10588
2019-20	10000	10000	9875	10500	10500	11500	10125						5.42	10357
Growth Rate														10.68

Sources: <https://agmarknet.gov.in/>

Graph 3.2.3 (B) Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in (Erode) Tamil Nadu





In Table 3.2.3 (C), the intra seasonal price of turmeric in Gundlepete in Karnataka is indicated. The table shows that the highest intra seasonal fluctuation in prices was in 2011, when prices declined from January 2011 to December 2011 by 73 percent and the coefficient of variation in prices during this period was 41.78 percent. In other years the coefficient of variation ranged from 10.43 percent to 24.59 percent with the exception of 2020 where the coefficient of variation was 3.33 percent. During the eleven year period, from 2010 to 2020, the rate of growth of prices in Gundlepete market was -7.96 percent. This reveals that prices of turmeric are declining over the years and if this fall in prices is accompanied by rising cost of production, the profitability of the crop is likely to get eroded.

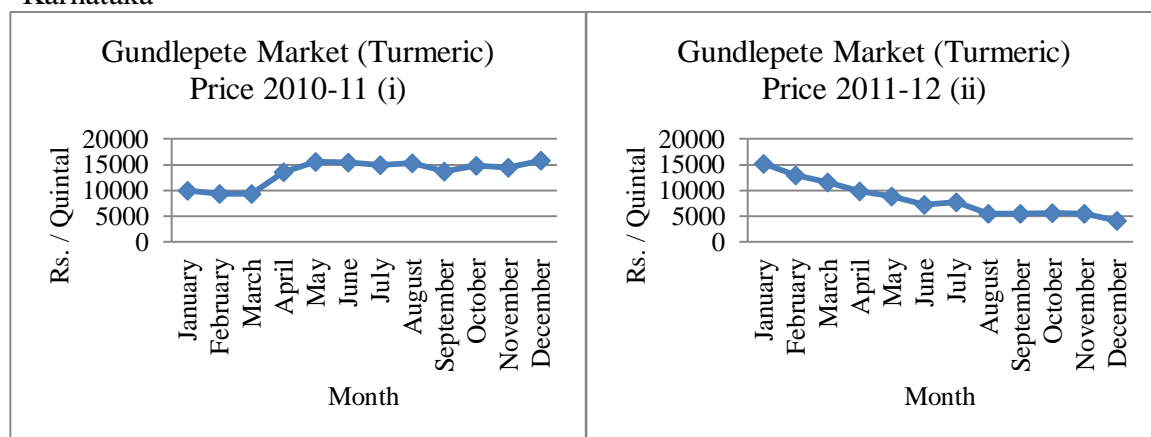
Table 3.2.3 (C): Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in Gundlepete, Karnataka

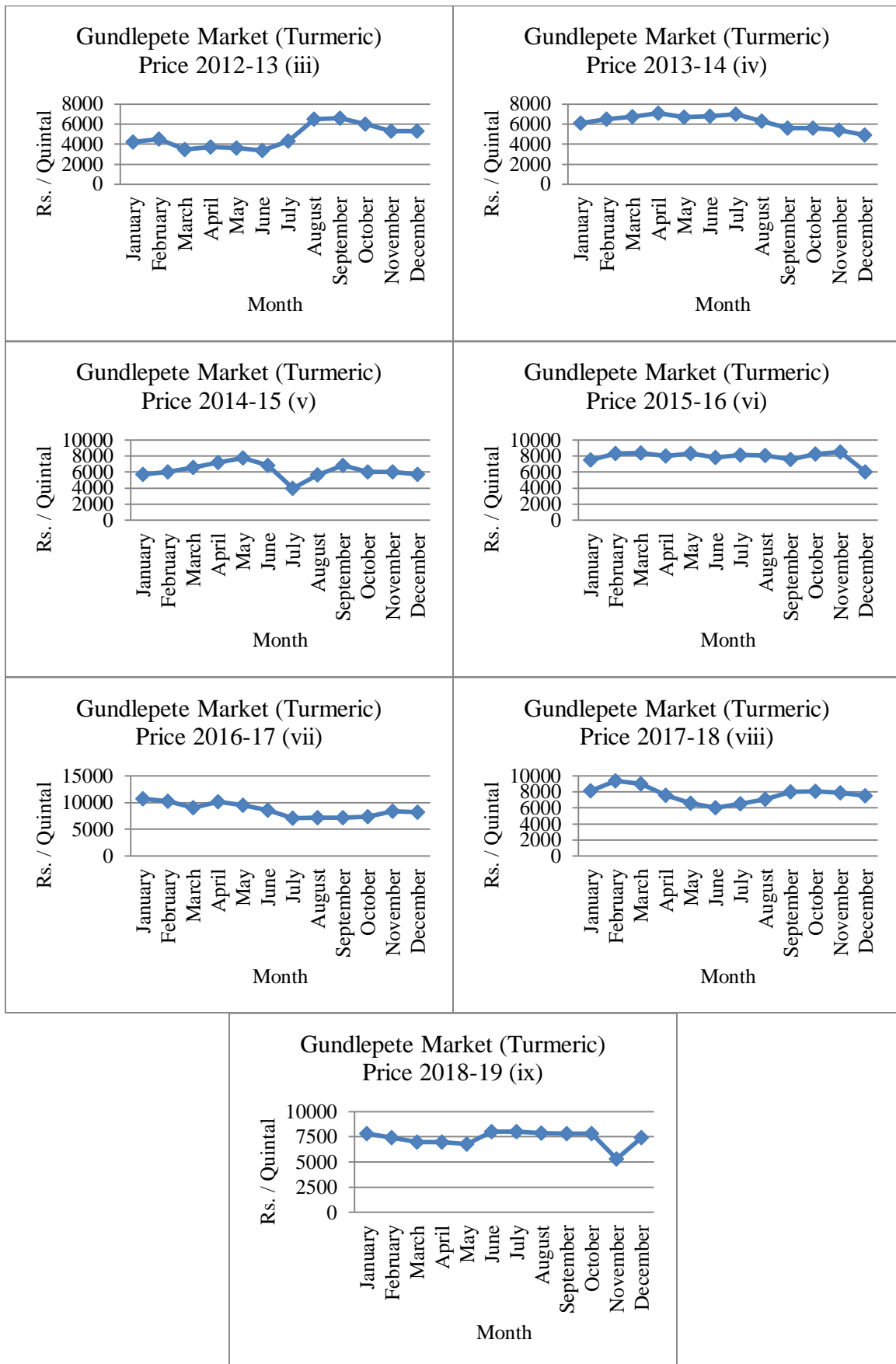
Price : Rs Per Quintal

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	CV (%)	Avg.
2010	10000	9333	9333	13556	15500	15400	14955	15300	13650	14850	14500	15770	18.39	13512
2011	15200	13000	11600	9800	8800	7300	7800	5500	5500	5600	5500	4120	41.78	8310
2012	4200	4500	3500	3700	3600	3400	4300	6500	6580	6000	5290	5290	24.59	4738
2013	6100	6500	6750	7100	6700	6798	7000	6320	5590	5600	5400	4900	11.38	6230
2014	5725	6000	6600	7200	7750	6800	4000	5675	6800	6000	6050	5700	15.37	6192
2015	7500	8300	8350	8000	8300	7800	8100	8060	7600	8267	8500	6000	8.51	7898
2016	10675	10200	9000	10100	9500	8600	7050	7200	7200	7350	8420	8200	14.90	8625
2017	8100	9400	9000	7600	6553	6000	6500	7100	8000	8050	7900	7500	13.09	7642
2018	7800	7400	7000	7000	6800	8000	8000	7850	7800	7800	5300	7400	10.43	7346
2019	6800	5252	6000	6000	6000	6700	7210	6400	6000	6000	6575	6000	8.26	6245
2020	5700	5950	6200	6000	5800	5700							3.33	5892
G.Rate														-7.96

Sources: <https://agmarknet.gov.in/>

Graph.3.2.3 (C): Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in Gundlepete, Karnataka





In Table 3.2.3 (D), the intra seasonal fluctuation in prices of turmeric in Nizambad is indicated. It may be noted that Telengana was formed only in 2014 and was earlier a part of

Andhra Pradesh. Telengana has the largest share in area and production of turmeric contributing about one-third to the production in the country. Nizambad is a major trading centre for turmeric but it can be observed that prices over the years have shown a negative growth rate which is -7.86 percent per annum during the period 2009-10 to 2018-19. Farmers often bring their turmeric to Nizambad market with high moisture content. However, the crop should be suitably dried at the time of sale or else it will be sold at a discount. Generally, traders prefer to purchase crop which has moisture content of less than 12 percent, but farmers often bring the produce which is wet and hence they are unable to reap a good price.

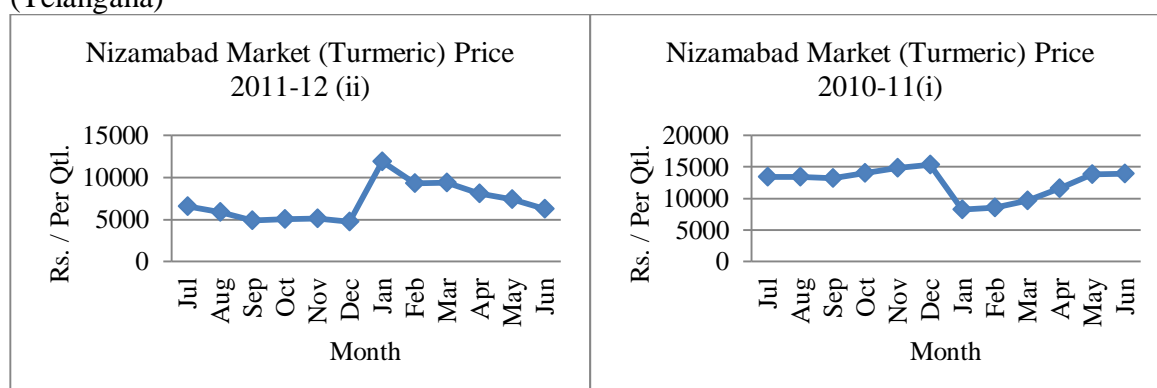
The prices fluctuated maximum in 2011-2012 and the coefficient of variation was 32.45 percent. The price which was Rs 6539 per quintal in July 2011 reached Rs 11873 per quintal in January 2012, i.e. increase of 82 percent.

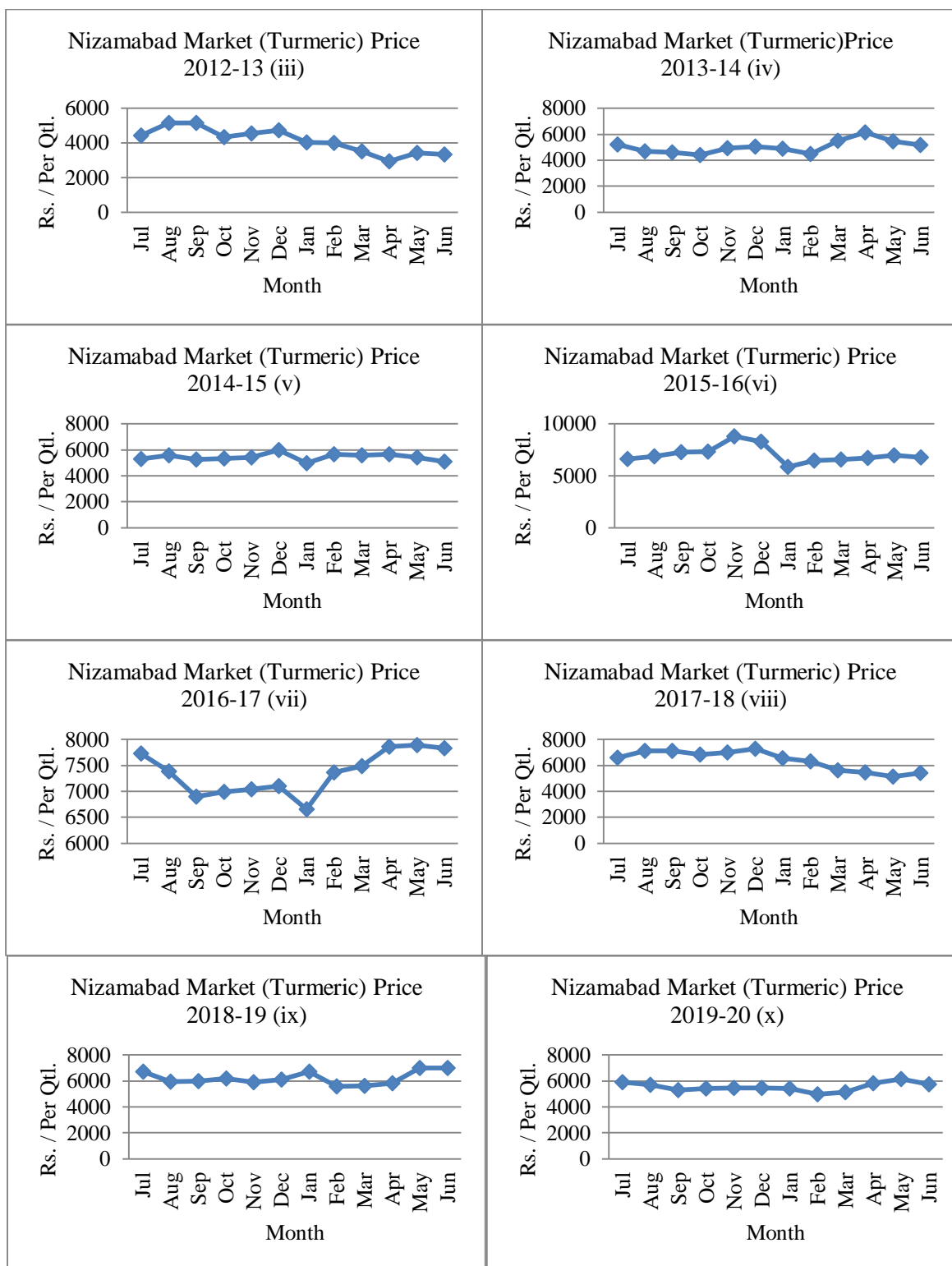
Table 3.2.3 (D) Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in Nizamabad (Telangana)

Years	Price: Rs Per Quintal												CV (%)	Avrg.
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun		
2010-11	13427	13410	13196	14038	14825	15284	8273	8532	9630	11596	13755	13888	20.60	11694
2011-12	6539	5863	4882	5066	5101	4761	11873	9323	9354	8091	7408	6220	32.45	6890
2012-13	4435	5152	5148	4329	4564	4725	4030	4014	3511	2950	3422	3338	17.54	4099
2013-14	5209	4696	4590	4403	4915	5063	4903	4499	5500	6146	5459	5194	9.80	5074
2014-15	5315	5574	5263	5356	5407	5992	4972	5681	5589	5667	5417	5096	5.11	5442
2015-16	6598	6877	7264	7343	8774	8285	5851	6491	6566	6721	6951	6762	11.32	7070
2016-17	7727	7385	6897	6989	7045	7097	6657	7369	7490	7863	7887	7833	5.69	7340
2017-18	6584	7138	7125	6827	7012	7294	6564	6314	5610	5475	5152	5432	12.03	6365
2018-19	6718	5952	5976	6201	5902	6113	6728	5570	5618	5828	7002	6994	8.15	6297
2019-20	5900	5708	5316	5399	5475	5469	5421	4961	5132	5829	6161	5756	6.07	5600
Growth Rate														-7.86

Sources: <https://agmarknet.gov.in/>

Graph 3.2.3 (D).: Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in Nizamabad (Telangana)





In Table 3.2.3 (E), the intra seasonal prices of turmeric in Warangal market in Telengana are indicated from 2012-13 to 2018-19. The prices which were ruling at relatively low levels in 2012-13 and 2013-14, picked up in 2014-15 and 2015-16. The price in Warangal market which was Rs 5059 per quintal in July 2013, increased gradually to Rs 7846

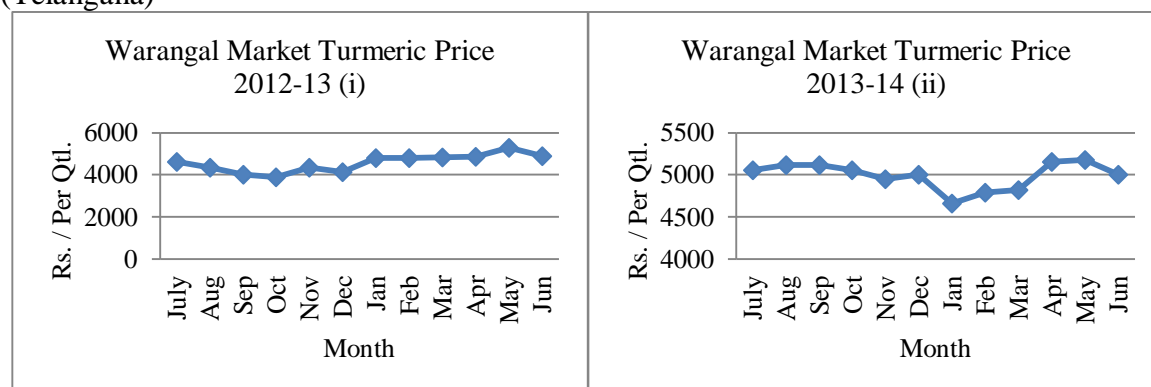
per quintal in June 2016, i.e an increase of 55 percent. The low prices led to fall in acreage under the crop in the state, by 11 percent from 2013-14 to 2014-15. The fall in area reduced production and firmed up prices. The coefficient of variation indicating intra seasonal fluctuations in prices, was lowest in 2013-14 and of the order of 3.2 percent. This figure was highest in 2016-17 and was 10.84 percent. The price which was ruling at Rs 6128 per quintal in July 2016 gradually declined to Rs 5063 per quintal in June 2017, i.e a fall of 17.4 percent. Weak demand for the crop and low quality of output has played a role in the declining prices.

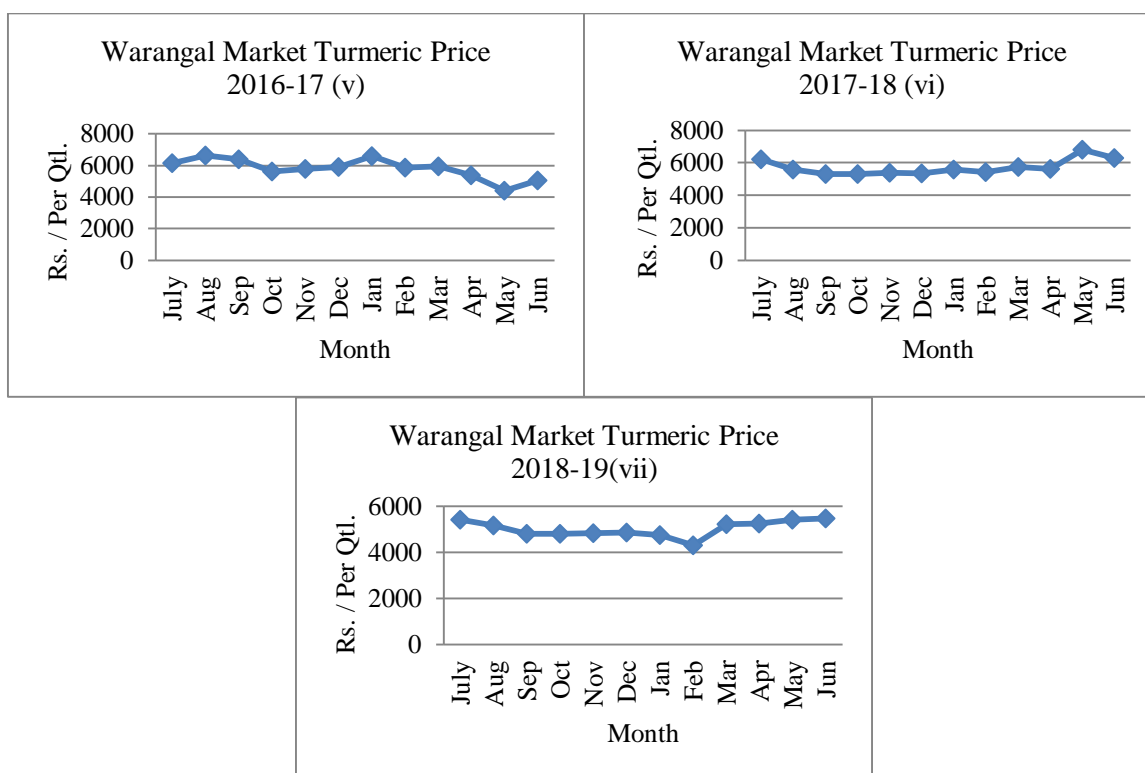
Table 3.2 3 (E) : Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in Warangal (Telangana)

Month	Price per Quintal												CV (%)	Avrg.
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun		
2012-13	4612	4350	4014	3899	4350	4133	4797	4798	4835	4872	5279	4905	9.59	4370
2013-14	5059	5119	5116	5054	4953	5004	4660	4791	4819	5153	5174	5000	3.20	5001
2014-15	6611	6923	7582	7647	7704	8219	6073	6374	6675	7091	6972	6726	8.89	7045
2015-16	7958	7507	6769	6861	6724	6753	8450	8004	8473	8030	7963	7846	8.83	7545
2016-17	6128	6631	6390	5631	5800	5915	6609	5881	5933	5362	4421	5063	10.84	5903
2017-18	6195	5572	5316	5315	5401	5358	5579	5411	5748	5610	6821	6304	8.18	5822
2018-19	5420	5159	4797	4798	4835	4872	4760	4300	5219	5258	5418	5472	6.85	5168
Growth Rate														2.83

Sources: <https://agmarknet.gov.in/>

Graph 3.2.3 (E) : Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in Warangal (Telangana)





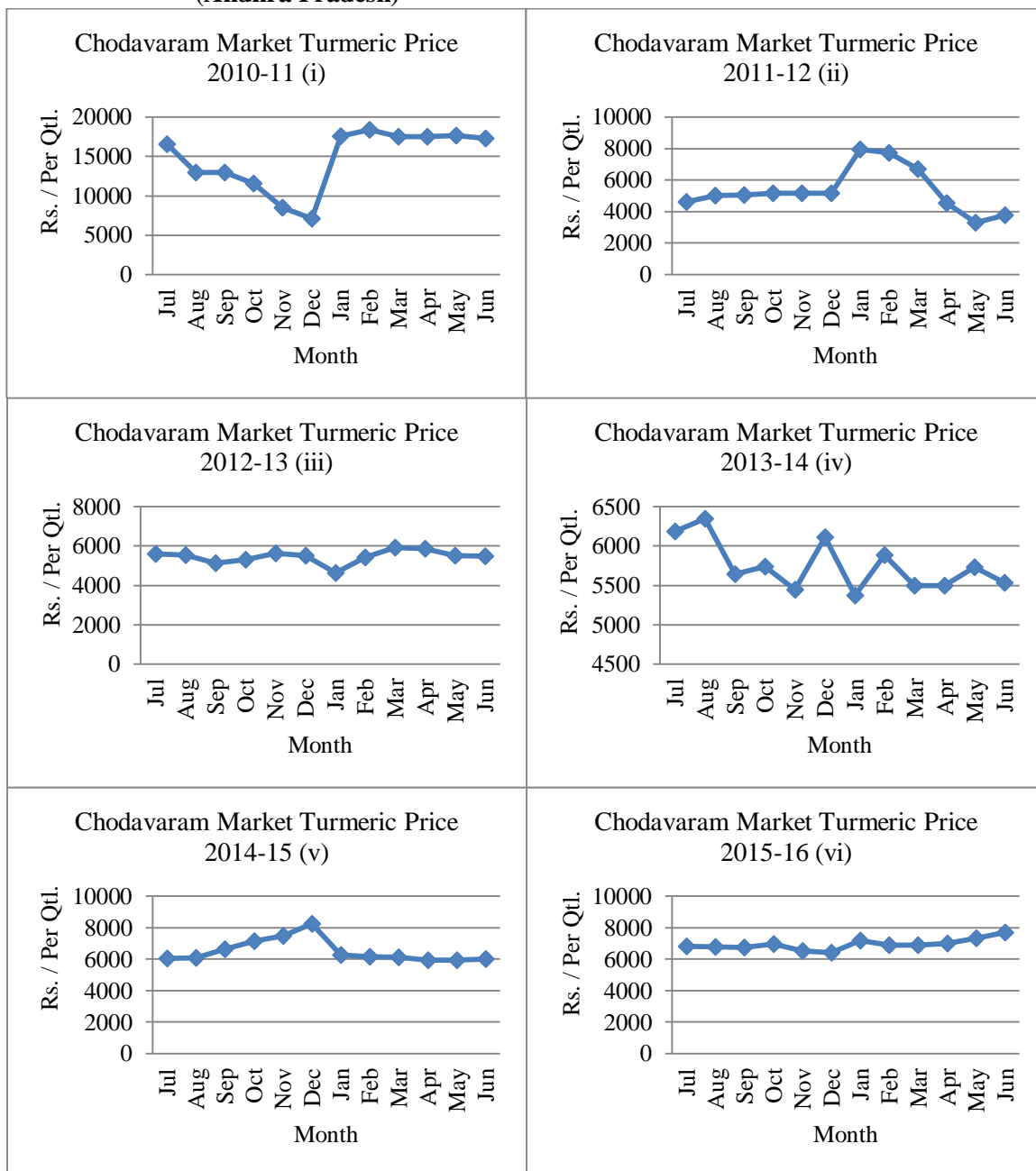
In Table 3.2.3 (F), the intra seasonal prices of turmeric in Chodavaram market of Andhra Pradesh are indicated. The prices showed huge fluctuations in 2010-11 and 2011-12 with coefficient of variation being 28.4 percent and 26.4 percent respectively. In July 2010, the price of turmeric was Rs 16545 per quintal but showed severe fluctuations throughout the year. In 2011-12, the fluctuations in prices continued, ranging from as high as Rs 7976 per quintal in January 2012 to as low as Rs 3788 per quintal in June 2012, i.e a fall of 52.5 per cent. Over the period 2010-11 to 2016-17, the growth rate in prices was -9.20 per cent per annum. Lack of demand and poor quality of produce was often cited by traders as the cause of low prices. The intra seasonal fluctuations in prices are also presented in Graph 3.2.3 (F).

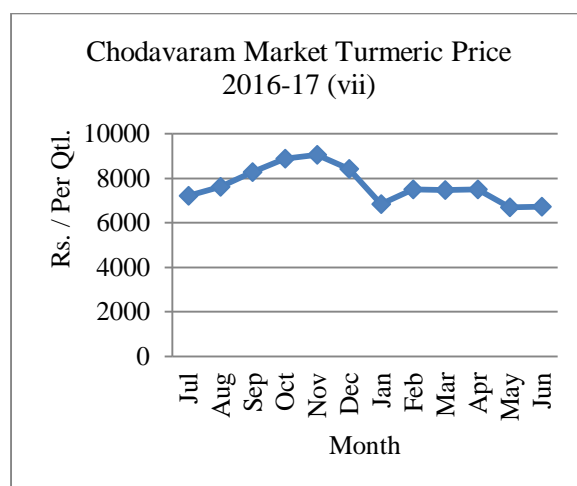
Table 3.2.3 (F) : Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in Chodavaram (Andhra Pradesh)

Years	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	CV (%)	Avrg
2010-11	16545	13000	13000	11581	8533	7123	17574	18405	17500	17517	17646	17296	28.40	13739
2011-12	4630	5007	5072	5153	5187	5163	7976	7748	6693	4541	3286	3788	26.44	5424
2012-13	5616	5533	5127	5300	5621	5526	4644	5435	5927	5871	5530	5484	6.17	5476
2013-14	6188	6352	5643	5740	5448	6112	5375	5888	5500	5500	5733	5533	5.55	5746
2014-15	6065	6077	6627	7138	7463	8258	6286	6175	6138	5930	5953	6000	11.29	6518
2015-16	6810	6800	6730	6971	6510	6411	7203	6897	6887	6998	7329	7716	5.10	6935
2016-17	7218	7622	8275	8886	9064	8435	6853	7490	7484	7500	6712	6740	10.46	7699
Growth Rate														-9.20

Sources: <https://agmarknet.gov.in/>

Graph 3.2.3 (F): Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in Chodavaram (Andhra Pradesh)





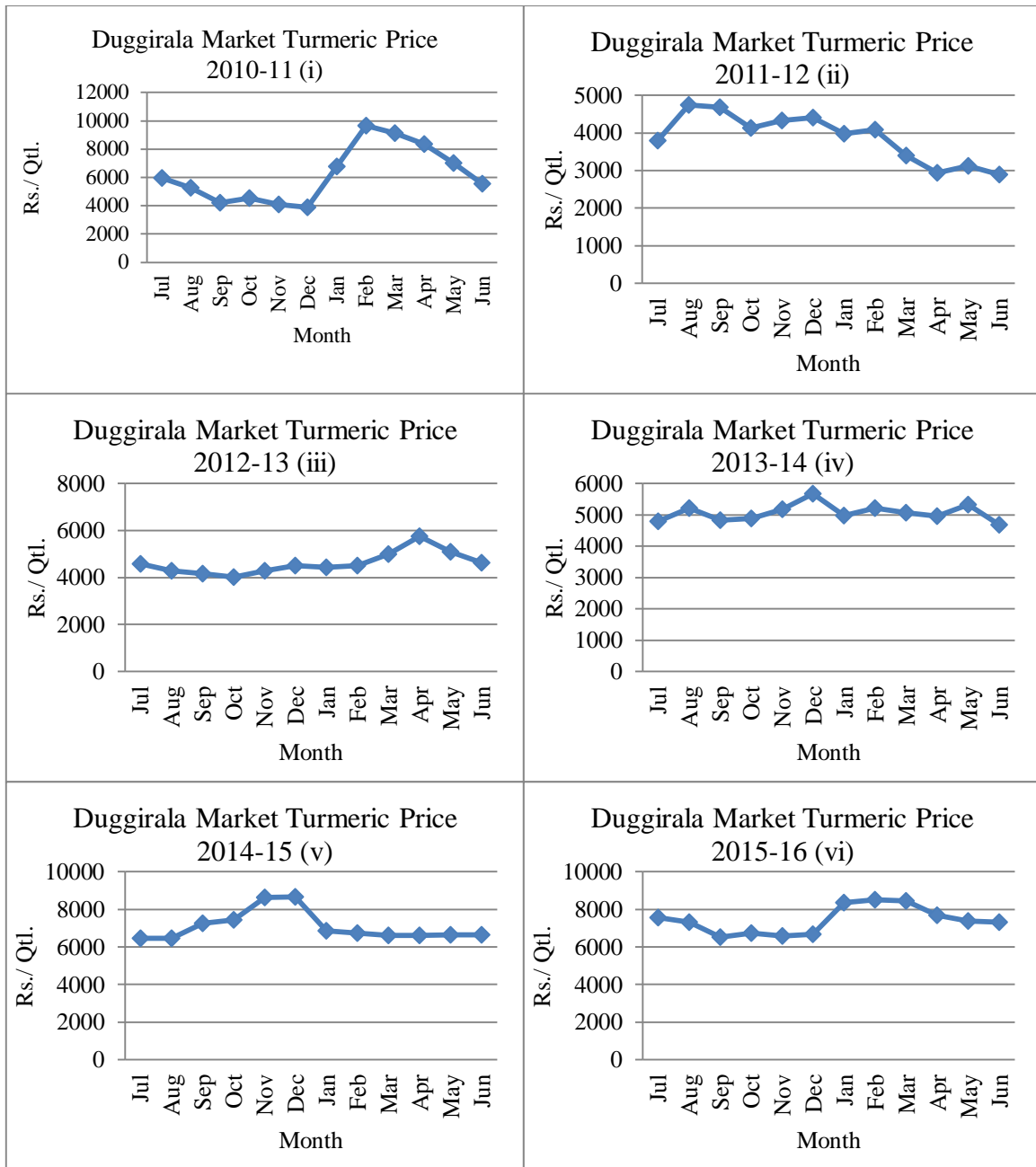
In Table 3.2.3 (G), the intra seasonal fluctuations in prices in Duggirala market of Andhra Pradesh are indicated. The highest variation in prices was observed in 2010-11 and the coefficient in variation in prices was 35.35 per cent. The price of turmeric which was as low as Rs 3876 per quintal in December 2010, suddenly showed a rapid rise and was Rs 9660 per quintal in 2011, i.e an increase of 149 percent. In other years also there were fluctuations in prices but relatively less and the coefficient of variation ranged between 5.34 percent in 2013-14 to 16.74 percent in 2011-12. The prices during the period 2010-11 to 2017-18 indicated a negative growth rate of the order of -0.23 percent. This reveals that turmeric prices are declining over the years. With increasing cost of production, this does not augur well for the turmeric economy.

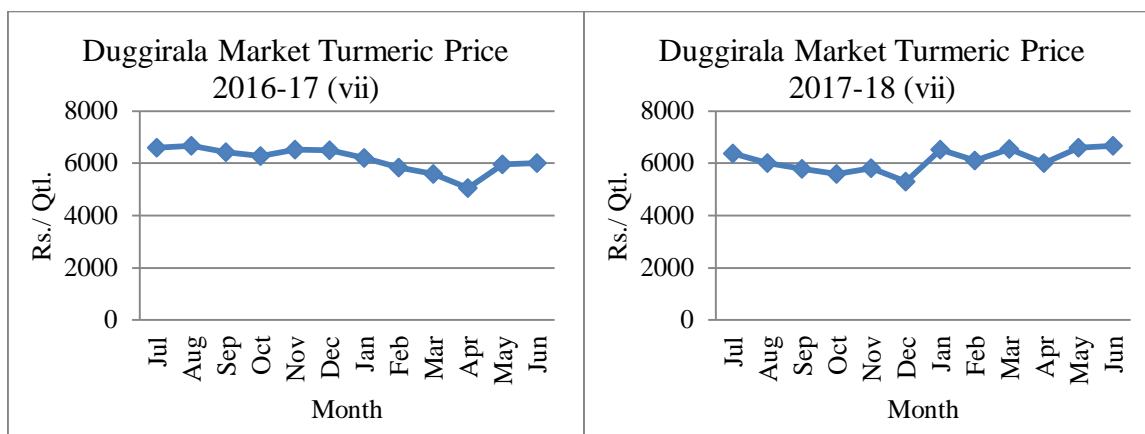
Table 3.2.3 (G) : Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in Duggirala (Andhra Pradesh)

Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	CV (%)	Avrg.
2010-11	5949	5252	4191	4542	4092	3876	6768	9660	9133	8363	6994	5545	35.35	6197
2011-12	3799	4744	4680	4128	4337	4403	3979	4087	3407	2934	3127	2902	16.74	3876
2012-13	4575	4280	4160	4017	4279	4516	4434	4500	4989	5766	5097	4638	10.44	4608
2013-14	4797	5220	4839	4886	5176	5670	4982	5224	5079	4955	5325	4694	5.34	5073
2014-15	6468	6465	7259	7448	8636	8671	6847	6738	6611	6616	6641	6656	11.14	7080
2015-16	7558	7320	6516	6740	6578	6689	8353	8505	8439	7673	7382	7330	9.72	7420
2016-17	6580	6676	6431	6280	6529	6506	6203	5839	5589	5061	5944	5996	7.75	6145
2017-18	6380	6012	5776	5580	5802	5285	6525	6091	6550	5996	6580	6676	7.28	6100
G Rate														-0.23

Sources: <https://agmarknet.gov.in/>

Graph No.3.2.3 (G): Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in Duggirala (Andhra Pradesh)





Sangli district in Maharashtra is well known for turmeric and the market is recognized as a turmeric hub in the state. Infact, it is considered to be one of the oldest, largest and most important trading centre for turmeric in Asia. In 2009, the Agricultural Produce Market Committee located in Sangli celebrated 100 years of turmeric trading. The turmeric in Sangli also obtained a geographical indication tag in 2018 for its special characteristics. The saffron colour of the turmeric is rich and attractive and size is thick and bold with mustardy aroma. The weather in Sangli is hot and dry and very suitable for the cultivation of turmeric. Further, the region has a very unique way of storing the produce which is done in underground air tight storage system which not only enhances its colour and the curcumin content but also increases the shelf life as this produce can be stored upto two years.

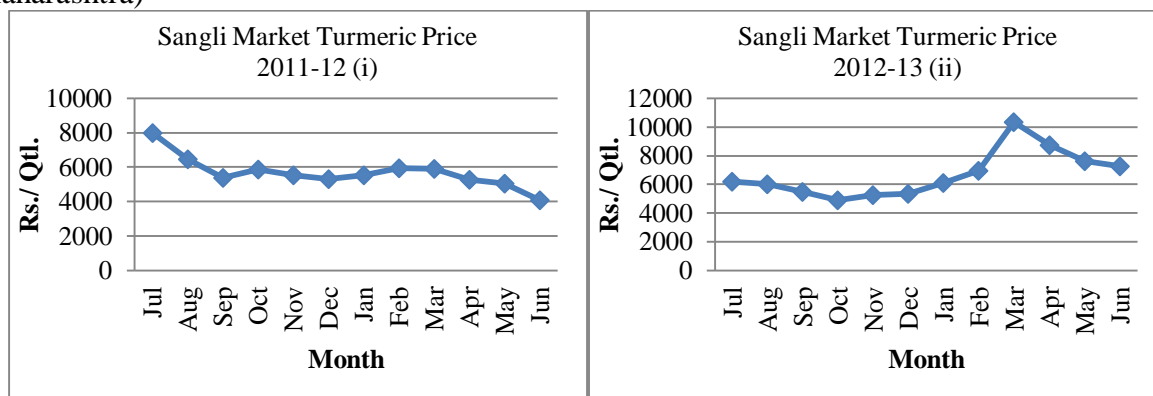
Sangli is a key turmeric trading centre and huge trading of turmeric takes place in Sangli. From Table 3.2.3 (H), it can be observed that Sangli which is a big market for turmeric experienced a decline in prices over the period 2010-11 to 2019-20 as the growth rate in prices during this period was -6.98 percent per annum. As in other markets, the 2010-11 season witnessed a huge increase in prices which began to decline towards the end of the season and then witnessed a sharp fall by the end of the 2011-12 season. The price which was as high as Rs 16739 per quintal in January 2010-11 declined to Rs 8691 per quintal in June 2011, i.e a fall of 48 percent. The coefficient of variation in prices in 2010-11 was 15.93 percent. In 2011-12, the prices declined by 49 percent. The coefficient of variation in prices within the season ranged between 8.11 percent in 2016-17 to 24.11 percent in 2012-13.

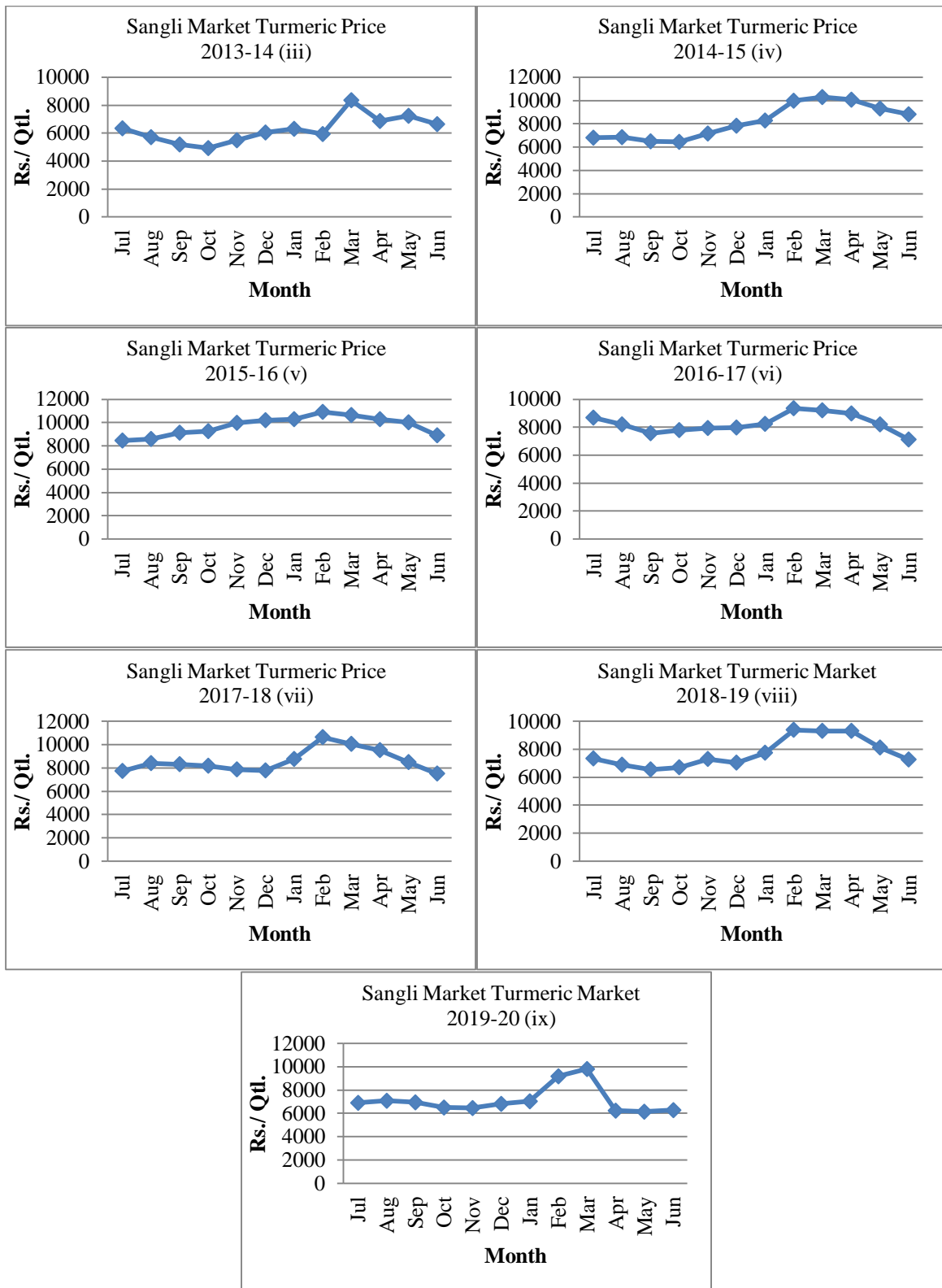
Table 3.2.3 (H) : Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in Sangli (Maharashtra)

Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	CV (%)	Avg.
2010-11	15130	14325	13533	14602	14500	15356	16739	14311	13773	12156	10806	8691	15.93	13660
2011-12	8008	6479	5376	5860	5550	5317	5544	5958	5923	5278	5050	4091	16.35	5703
2012-13	6182	5999	5459	4906	5238	5328	6112	6959	10345	8756	7613	7269	24.15	6680
2013-14	6351	5725	5207	4938	5505	6041	6314	5953	8367	6878	7234	6642	15.06	6263
2014-15	6829	6859	6483	6455	7175	7827	8283	10002	10315	10083	9312	8815	17.91	8203
2015-16	8453	8593	9121	9265	9967	10170	10277	10922	10636	10293	10022	8899	8.44	9718
2016-17	8665	8211	7565	7800	7944	7990	8234	9368	9200	8980	8198	7127	8.11	8273
2017-18	7710	8416	8312	8167	7858	7780	8741	10607	10054	9507	8469	7517	11.36	8595
2018-19	7314	6896	6551	6707	7288	7050	7738	9366	9288	9288	8116	7241	13.43	7737
2019-20	6912	7094	6971	6502	6476	6802	7038	9188	9793	6250	6148	6271	16.30	7120
Growth Rate														-6.98

Sources: <https://agmarknet.gov.in/>

Graph 3.2.3 (H) : Year –Wise Month –Wise (Intra-Seasonal) Price of Turmeric in Sangli (Maharashtra)





3.2.4 Inter Seasonal Fluctuations in Prices of Turmeric:

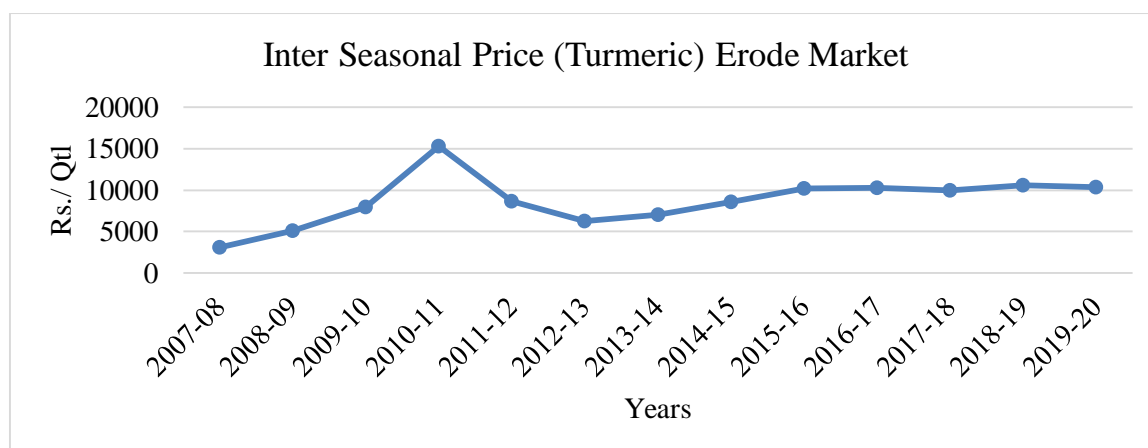
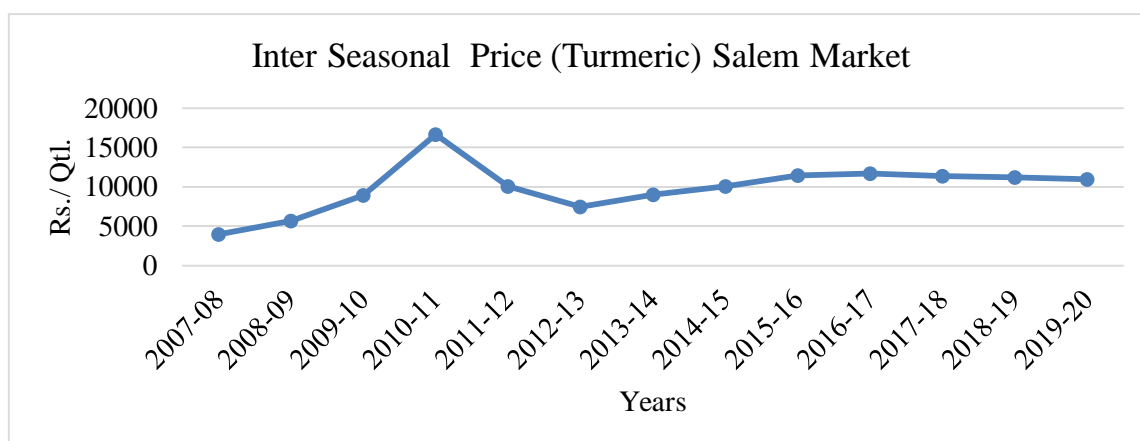
There are sharp inter seasonal variations in prices of turmeric. The same is indicated in Table 3.2.4. The coefficient of variation of in Salem and Erode market is 31.58 percent and 34.78 percent respectively. The highest inter seasonal fluctuation in prices was observed in Chodavaram market in

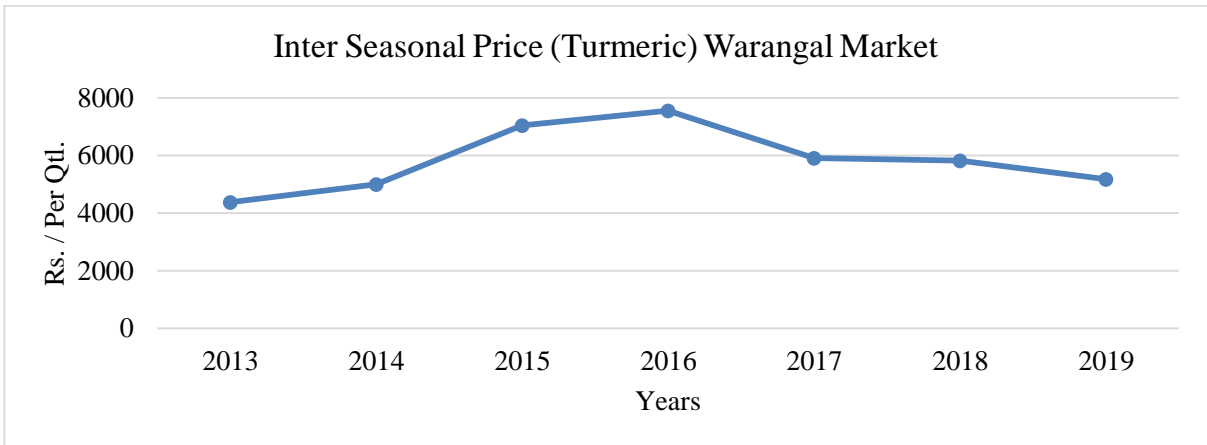
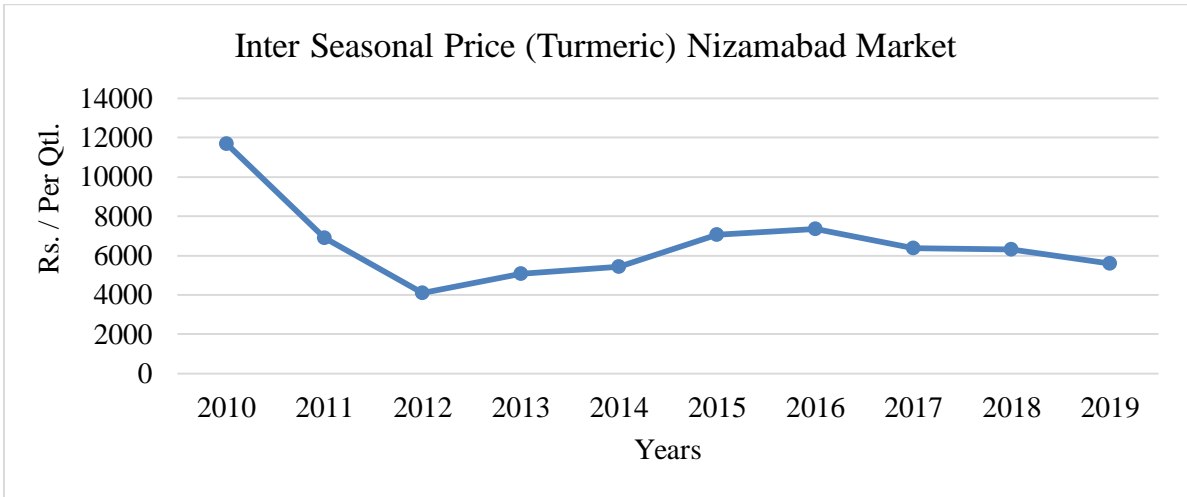
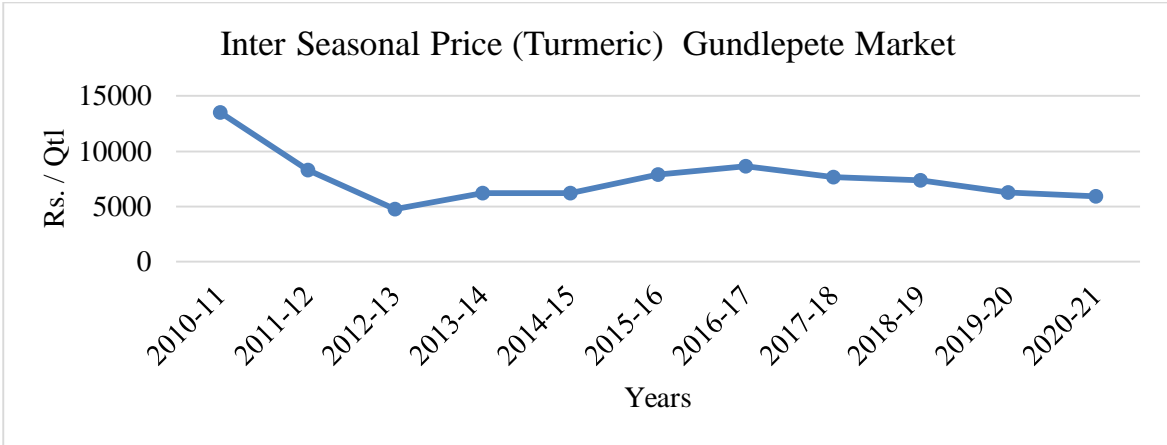
Andhra Pradesh where the coefficient of variation was 39.83 percent. Farmers often decide the area to be sown under turmeric based on the price of the previous year and this causes excess production in certain years while there is lower production in some years. The production has its impact on prices which fluctuate from year to year.

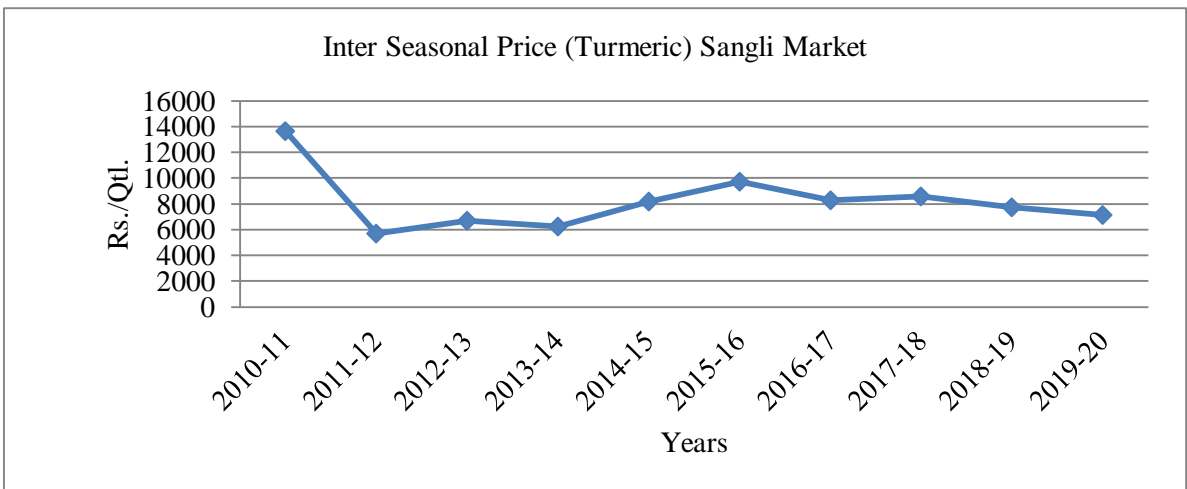
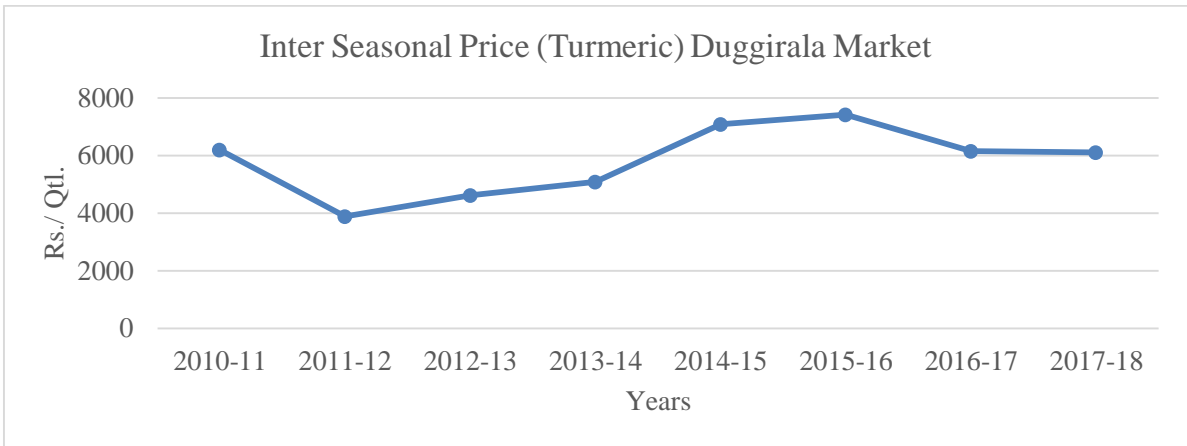
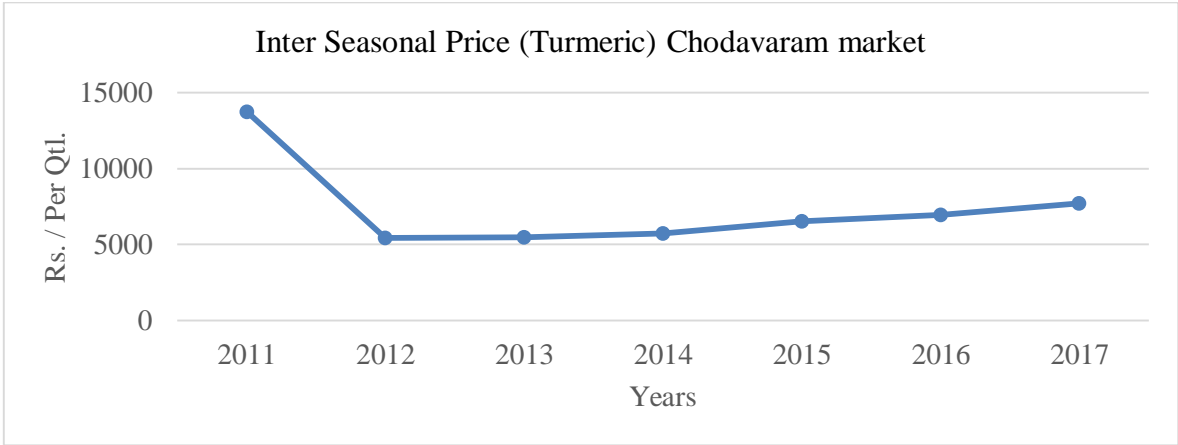
Table 3.2.4: Coefficient of Variation in Prices of Turmeric in Major Markets:

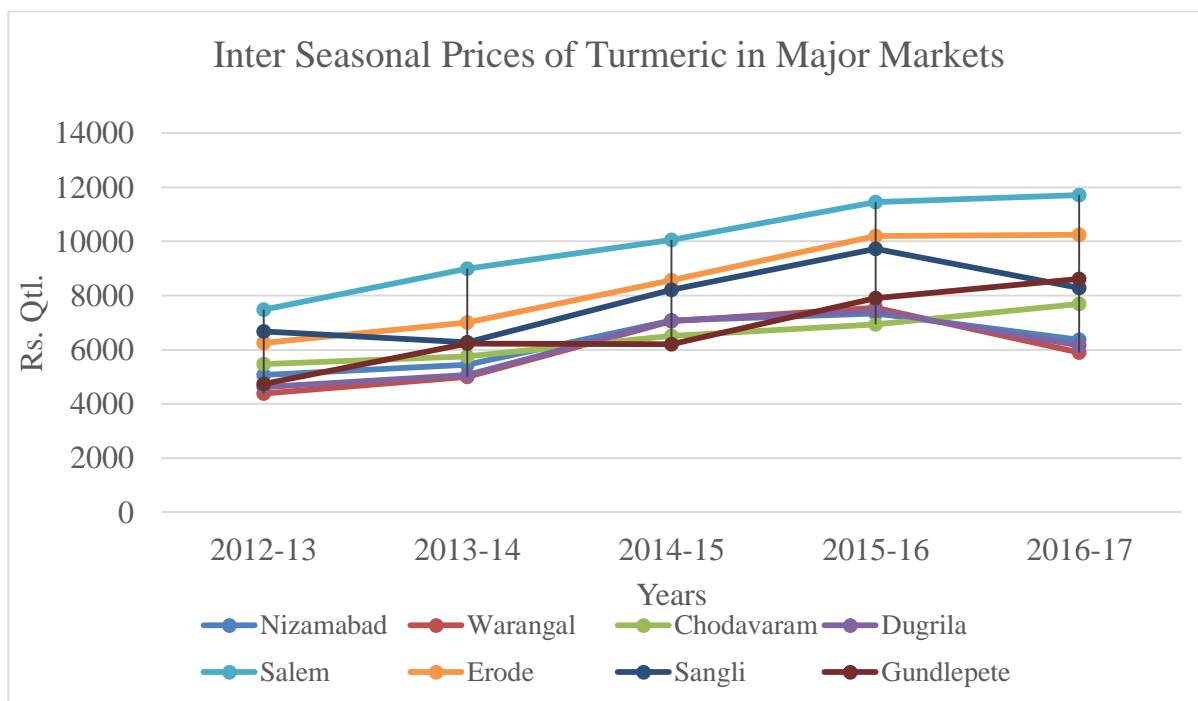
Market	Coefficient of Variation	Period
Salem (Chennai)	31.58	2007-08 to 2019-20
Erode (Chennai)	34.78	2007-08 to 2019-20
Gundulpete (Karnataka)	30.75	2010-11 to 2019-20
Nizambad (Telangana)	31.14	2010-11 to 2018-19
Warangal (Telangana)	19.38	2012-13 to 2018-19
Chodavaram (Andhra Pradesh)	39.83	2010-11 to 2016-17
Duggirala (Andhra Pradesh)	20.84	2010-11 to 2017-18
Sangli (Maharashtra)	27.57	2000-11 to 2019-20

Graph 3.2.4 : Inter Seasonal Variations in Prices of Turmeric in Major Markets :









Overall it can be concluded that turmeric prices are subject to considerable inter seasonal and intra seasonal fluctuations in prices. The main factors influencing prices are the area sown under turmeric, the demand in both domestic and international markets and also production and prices in global markets. Further, in different states the varieties of turmeric cultivated are different and prices vary according to the variety. The finger and bulb of the turmeric fetch different price. The price largely depends upon the quality of the produce and if the moisture content is high, then the produce is sold at a price that is lower than ruling market price. Hence prices of turmeric are influenced by several factors.

However, an important point to be noted is that the data reveal that often farmers decide upon the area to be allocated for turmeric on the basis of the prices prevailing in the previous year. An increase in prices in a particular season, leads to more area devoted to the crop in the following season, leading to excess production and crash in prices. This phenomenon gives rise to frequent sharp inter seasonal fluctuations in prices. In case of turmeric, there is a futures market which provides facility for hedging against price risk. The price prevailing in the futures market reveals the assessment of anticipated future demand and supply of the commodity. Futures market serves as a barometer of the future trend in prices and therefore helps to avoid major fall in price during peak season and sharp rise in lean season, thereby imparting stability in price throughout the season. However, with respect to turmeric, farmers do not seem to take advantage of futures markets, perhaps due to several constraints. A major constraint is the minimum trading quantity threshold which is 5 tonnes

for turmeric. Farmers are mainly small and marginal and do not have big lots of standardized produce to offer. Due to quality differences in produce there are aggregation problems, if farmers want to participate as a group. Farmers also lack knowledge on market operations on futures trading and are not able to maintain daily mark to margin. There are also infrastructure bottlenecks and trading platforms may be distantly located. Due to these limitations, the farmers are reluctant to participate in futures markets. Possibly, only when futures market becomes more vibrant, will there be some stability in the turmeric economy.

3.3 Returns to farmers :

Ginger and turmeric are spice crops which have huge potential to enhance the income of farmers. However, this is possible only if the farmers are able to get remunerative price for their produce and at the same time increase their yield. The price varies depending upon demand and supply and also the variety of the crop as well as the quality in terms of characteristics such as good appearance, low fibre, volatile oils, pungency and aroma in ginger, curcumin content in turmeric, international prices, etc. As an example, the cost of cultivation of ginger and turmeric is indicated in Appendix 3.1 and 3.2 respectively.

As far as ginger is concerned, a major part of the produce is sold and consumed as fresh. The cost of cultivation varies across states as labor costs differ in each state. For example, labor costs are very high in Kerala and Tamil Nadu, while they are lower in Marathwada area of Maharashtra where turmeric cultivation is gaining importance. However, after discussing with farmers and other stakeholders, it was noted that the cost of cultivation of fresh ginger was about Rs 2.5 lakh per hectare. If the yield of fresh ginger is considered to be 10.72 tonnes per hectare, then the farmers can just cover their costs if the price of fresh ginger is Rs 23320 per tonne. Higher prices, increase in yield and lower cost of production will enable the farmers to earn maximum profits.

Turmeric is normally sold as dry and the conversion from fresh turmeric immediately after harvesting to dry is normally done by the farmers. The cost of cultivation is approximately Rs 2.5 lakh per hectare and if the average yield of dry turmeric is considered to be 3.82 tonnes per hectare then at a price of Rs 65445 per tonne, the farmers will be able to just cover their costs. The data reveal that often prices are ranging at this level and in certain years have even fallen below cost of production. This is a disincentive for farmers to cultivate turmeric and there has often been a demand from farmers to introduce support prices for turmeric. However considering that turmeric is an important spice crop with useful

properties, there should be technological upgradation to produce highyielding varieties which also have high curcumin content. Markets should be broadened and diversified so as to give maximum returns on this crop.

Appendix 3.1 : Cost of Cultivation for Organic Ginger in Sikkim (Rs/hectare)

Items	Unit	2015-16	2016- 17	2017-18	2018-19	2019-20
A. Pre sowing						
Land preparation	Rs	10500	11250	12000	12500	12750
Seed treatment (Organic treatment)	12.5 Lab	2500	2813	3125	3750	4063
Seed/Bulb cost	1800-2200 kg	130000	142500	150000	175000	181625
B. Cultivation						
Ratalu cost for inter crops (Bamboo sticks and ropes)	6.25 unit	6250	7500	8750	10000	11125
Composting	7.5-10 tonnes	25000	30000	35000	37500	39250
Land tilling	5 Hrs	3750	3750	4000	4500	5125
Mulching	25 lab	5000	5625	6250	7500	8125
Weeding	87.5 lab	17500	19688	21875	26250	28438
Harvesting	37.5 lab	7500	8438	9375	11250	12188
IPM (Organic)	Rs	25000	26250	27500	28750	30125
C. Post Harvest						
Cleaning/sorting/grading	50 lab	10000	11250	12500	15000	16250
Packing	225-250 bags	10000	11250	12500	12500	13750
Transport & selling	Rs.	7500	10000	12500	15000	17875
D. Others						
Crop Insurance	Rs.	3750	2500	2500	2500	2500
Miscellaneous	Rs.	1500	2000	2500	3000	3750
TOTAL (Cost of Cultivation)	Rs./Ha	265750	294813	320375	365000	387063
Yields (Total)	Tonnes/ha	10.00	10.63	11.25	12.50	13.45
Average farm-gate price	Rs./Kg	18.60	24.80	31.40	37.60	48.00
Cost of Production	Rs./Kg	22.08	23.51	24.03	24.80	24.13
Earning from Ginger	Rs./ha	186000	263500	353250	470000	645600
Earning From Intercrop	Rs./ha	45000	45000	50000	55000	62500
Total Revenue	Rs./ha	231000	308500	403250	525000	708100
Net Revenue	Rs./ha	-34750	13688	82875	160000	321038
Benefit Cost Ratio	BCR	0.87	1.05	1.26	1.44	1.83

Source : Field Work, AERC Shantiniketan, Viswabharati

Appendix 3.2 Cost of Cultivation for Organic Turmeric in Sikkim (Rs/acre)

Items	Unit	2015-16	2016-17	2017-18	2018-19	2019-20
A. Pre sowing						
Land preparation	Rs	10500	11250	12000	12500	12750
Seed treatment (Organic treatment)	10 Lab	2000	2250	2500	3000	3250
Seed/Bulb cost	1700-1800 kg	70000	80000	87500	100000	110625
B. Cultivation						
Composting	7.5-10 tonnes	25000	30000	37500	40000	40500
Mulching	20 lab	4000	4500	5000	6000	6500
Weeding	75 lab	15000	16875	18750	22500	24375
Harvesting	35 lab	7000	7875	8750	10500	11375
IPM (Organic)	Rs	10000	12500	15000	16250	17625
C. Post Harvest						
Cleaning/sorting/grading	45 lab	9000	10125	11250	13500	14625
Packing	175-225 bags	7500	8750	10000	11250	11425
Transport & selling	Rs	5000	7500	10000	12500	13625
D. Others						
Crop Insurance	Rs	3750	2500	2500	2500	2500
Miscellaneous	Rs.	1250	1500	2500	3000	3125
TOTAL (Cost of Cultivation)						
	Rs./Ha	170000	195625	223250	253500	272300
Yields (Total)	Tonnes/ha	8.00	8.75	9.38	10.00	10.31
Average farm-gate price	Rs./Kg	17.40	22.00	25.60	29.40	35.00
Cost of Production						
	Rs./Kg	21.25	22.36	23.81	25.35	26.40
Total Revenue						
	Rs./ha	139200	192500	240000	294000	360938
Net Revenue						
	Rs./ha	-30800	-3125	16750	40500	88638
Benefit Cost Ratio						
	BCR	0.82	0.98	1.08	1.16	1.33

Source : Field work ,AERC Shantiniketan, Viswabharati

Exports of ginger and turmeric and their Products

Backdrop:

India produces about 8.4 million tonnes (2017-18) of different types of spices. The diverse agro-climatic conditions, which exist in different parts of the country, from tropical to temperate, make it conducive to cultivate a wide variety of spices. It is not only this large volume and diverse range, which makes the country well known in the spice economy, both domestic and international, but also the usefulness of their value added products. The value added products mainly belong to the food, pharmaceutical, nutraceutical and certain other sectors. Spices have a rich aroma and taste, and therefore in great demand in the food industry. They also have huge medicinal properties which is increasing their demand in the pharmaceutical sector. Trade in spices is one of the oldest forms of commerce and exports of spices have an important role to play in order to promote the agricultural sector. Out of 109 varieties of spices listed by the International Organization for Standardization, around 75 varieties are produced in India and also exported.

Besides exporting fresh spices, value added commodities from spices also have begun to assume importance and this has greatly strengthened the value chain. Value added commodities are normally low volume and high value and hence these products have considerable export potential.

In the recent past, organic products are also becoming popular and the demand is increasing, not only in the domestic market but also in the developed world. The pattern of food consumption is undergoing a change with importance being placed on health and nutrition. Organic cultivation is not new in India and in order to consume food that is free from chemical contaminants, this method of cultivation is again being promoted. Accordingly, organic cultivation of spices is also being undertaken especially in the North-Eastern Region of the country.

In view of the above, an attempt is made in this chapter to study trade in ginger and turmeric and their value added products.

4.1 Trade in ginger and ginger products:

India is the largest producer of ginger in the world, but the domestic consumption is so high, which restricts it from being the largest exporter. Other countries like China, Thailand, Nigeria, etc cultivate ginger, but since domestic consumption is limited, they are in a position to have larger share than India in international markets.

In this section, an in depth analysis of trade in ginger and ginger products is carried out, to observe the magnitude of India's share in exports of ginger and value added products. Also the major countries to which the products are exported is observed.

4.1.1 Exports of Ginger and Ginger Products:

The exports of ginger and ginger products can be observed for the last five years in Table 4.1.1. With respect to fresh ginger, it can be observed that there was a sudden increase in quantity exported in 2019-20 with a corresponding increase in unit price. While 10140.44 tonnes were exported in 2015-16 and mild fluctuations in exports of fresh ginger over the next three years, there was a huge increase to 38,774.03 tonnes in 2019-20, i.e increase by 3.82 times. This increase has been attributed to increase in demand for ginger due its medicinal properties in preventing infection due to corona. It is well known that COVID-19 was declared as a pandemic on 31st December 2019 and spread to about 216 countries across the world. Consumption of ginger was considered to be one measure to build physical immunity and perhaps this increased the demand for ginger in 2019-20. The unit price at which ginger was exported increased from Rs 30.13 per kg to Rs 54.61 per kg. Out of the total ginger exported in 2019-20, 75.82 percent was fresh ginger and the share in value was 38.55 percent.

With respect to dry ginger (bleached and unbleached), there was a decline in quantity exported as the growth rate during 2015-16 to 2019-20 was -4.27 percent per annum. However, the growth rate in unit price was 8.94 percent, mainly due to increase in price from Rs 167.60 per kg in 2015-16, to Rs 236.08 per kg in 2019-20, i.e increase by 41 percent. However, during the period 2015-16 to 2018-19 the prices showed a declining trend and was as low as Rs 121.93 in 2017-18. The prices picked up and in 2019-20 the export price of dry ginger increased by 46 percent over 2017-18 levels.

In case of ginger powder, the share in value of total exports which was 14.76 percent in 2015-16, declined to 11.86 percent in 2019-20. Further, there has been decline in unit price during this period as the growth rate in unit price was -2.41 percent per annum.

Ginger oil and oleoresins are high value products but have low share in the total quantity of exports. However, while the quantity of exports of ginger oil showed a growth rate of 7.97 percent during 2015-16 to 2019-20, the growth rate in unit price showed a decline and was -1.39 percent during the corresponding period. A similar picture arose with respect to ginger oleoresin where the growth rate in quantity of exports was 7.14 percent, but that of unit price was -1.97 percent during 2015-16 to 2019-20. This reveals that the country is not able to capitalize on high value, low volume products.

The total value of exports of ginger and value added products which was Rs 359.83 crores in 2015-16, actually declined to Rs 305.88 in 2018-19. However, there was a sudden jump to Rs 549.28 crores in 2019-20, mainly triggered by increase in exports of fresh ginger and the value increased from Rs 43.99 crores to Rs 211.74 crores.

Table 4.1.1: Exports of Ginger and Ginger Products

Years	Quantity (tonnes)	Value (Rs in Crore)	Unit price (Rs/kg)	Percent	
				Quantity	Value
Fresh Ginger					
2015-16	10140.44	30.55	30.13	39.41	8.49
2016-17	9738.37	25.70	26.39	28.85	7.18
2017-18	16354.74	41.28	25.24	48.82	12.59
2018-19	12461.97	43.99	35.30	54.37	14.38
2019-20	38774.03	211.74	54.61	75.82	38.55
Growth Rate	39.84		16.03		
Dry unbleached					
2015-16	4034.58	80.39	199.26	15.68	22.34
2016-17	5024.03	74.15	147.60	14.89	20.70
2017-18	5383.42	66.39	123.32	16.07	20.25
2018-19	1958.28	32.85	167.73	8.54	10.74
2019-20	4017.34	95.24	237.06	7.86	17.34
Growth Rate	-0.11		4.44		
Dry Bleached					
2015-16	2522.91	34.30	135.94	9.80	9.53
2016-17	2568.19	37.79	147.15	7.61	10.55
2017-18	1955.32	23.57	120.54	5.84	7.19
2018-19	1889.49	29.42	155.71	8.24	9.62
2019-20	1488.96	35.00	235.09	2.91	6.37
Growth Rate	-12.35		14.68		
Bleached and Unbleached					
2015-16	6557.49	114.69	167.60	25.48	31.87
2016-17	7592.22	111.94	147.38	22.50	31.25
2017-18	7338.74	89.96	121.93	21.91	27.44
2018-19	3847.77	62.27	161.72	16.79	20.36
2019-20	5506.30	130.24	236.08	10.77	23.71
CAGR	-4.27	3.23	8.94		

Years	Quantity (tonnes)	Value (Rs in Crore)	Unit price (Rs/kg)	Percent	
				Quantity	Value
Ginger Powder					
2015-16	2333.04	53.10	227.61	9.07	14.76
2016-17	3053.13	59.22	193.97	9.05	16.53
2017-18	3203.35	58.54	182.73	9.56	17.86
2018-19	3573.03	68.12	190.64	15.59	22.27
2019-20	3154.70	65.14	206.48	6.17	11.86
CAGR	7.83	5.24	-2.41		
Ginger Oil					
2015-16	24.72	19.74	7983.62	0.10	5.49
2016-17	27.75	24.20	8719.50	0.08	6.76
2017-18	38.27	24.34	6360.54	0.11	7.43
2018-19	61.21	34.93	5706.29	0.27	11.42
2019-20	33.59	25.35	7547.93	0.07	4.62
Growth Rate	7.97		-1.39		
Ginger Oleoresin					
2015-16	187.75	46.54	2478.71	0.73	12.93
2016-17	234.31	52.76	2251.85	0.69	14.73
2017-18	264.85	53.22	2009.48	0.79	16.23
2018-19	253.88	53.68	2114.42	1.11	17.55
2019-20	247.37	56.63	2289.17	0.48	10.31
Growth Rate	7.14		-1.97		
Other Ginger Neither crushed nor ground					
2015-16	6000.78	80.29	133.80	23.32	22.31
2016-17	12618.19	71.15	56.39	37.39	19.87
2017-18	5740.18	46.44	80.89	17.13	14.17
2018-19	2131.04	27.75	130.22	9.30	9.07
2019-20	2469.26	37.48	151.81	4.83	6.82
Growth Rate	-19.91		3.21		
Other Ginger Crushed or Ground					
2015-16	487.09	14.92	306.36	1.89	4.15
2016-17	485.54	13.18	271.50	1.44	3.68
2017-18	561.08	14.04	250.27	1.67	4.28
2018-19	592.12	15.14	255.76	2.58	4.95
2019-20	951.61	22.70	238.56	1.86	4.13
Growth Rate	18.23		-6.06		
Total Ginger and Ginger Products					
Years	Quantity (tonnes)	Value (Rs in Crore)	Unit price (Rs/kg)	Quantity	Value
2015-16	25731.31	359.83	139.84	100.00	100.00
2016-17	33749.51	358.15	106.12	100.00	100.00
2017-18	33501.21	327.81	97.85	100.00	100.00
2018-19	22921.02	305.88	133.45	100.00	100.00
2019-20	51136.86	549.28	107.41	100.00	100.00
Growth Rate	18.73		-6.38		

Source: Directorate of Arecanut & Spices Development (DSAD), Ministry of Agriculture and Farmers' Welfare, Calicut (unpublished data)

4.1.2 Export of ginger from India: A Trend Analysis

The exports of ginger and ginger from India since last 13 years, i.e since 2007-08 is indicated in Table 4.1.2. However, the picture relating to average price of ginger fresh plus dry does not give a comparable picture over the years as the quantities of fresh and dry ginger vary over the years. Dry ginger has a much higher price per kg as compared to fresh ginger and hence in any year, if the quantity of dry ginger exported is higher, then the average price will also be higher.

Table 4.1.2: Export of Ginger and Ginger Products

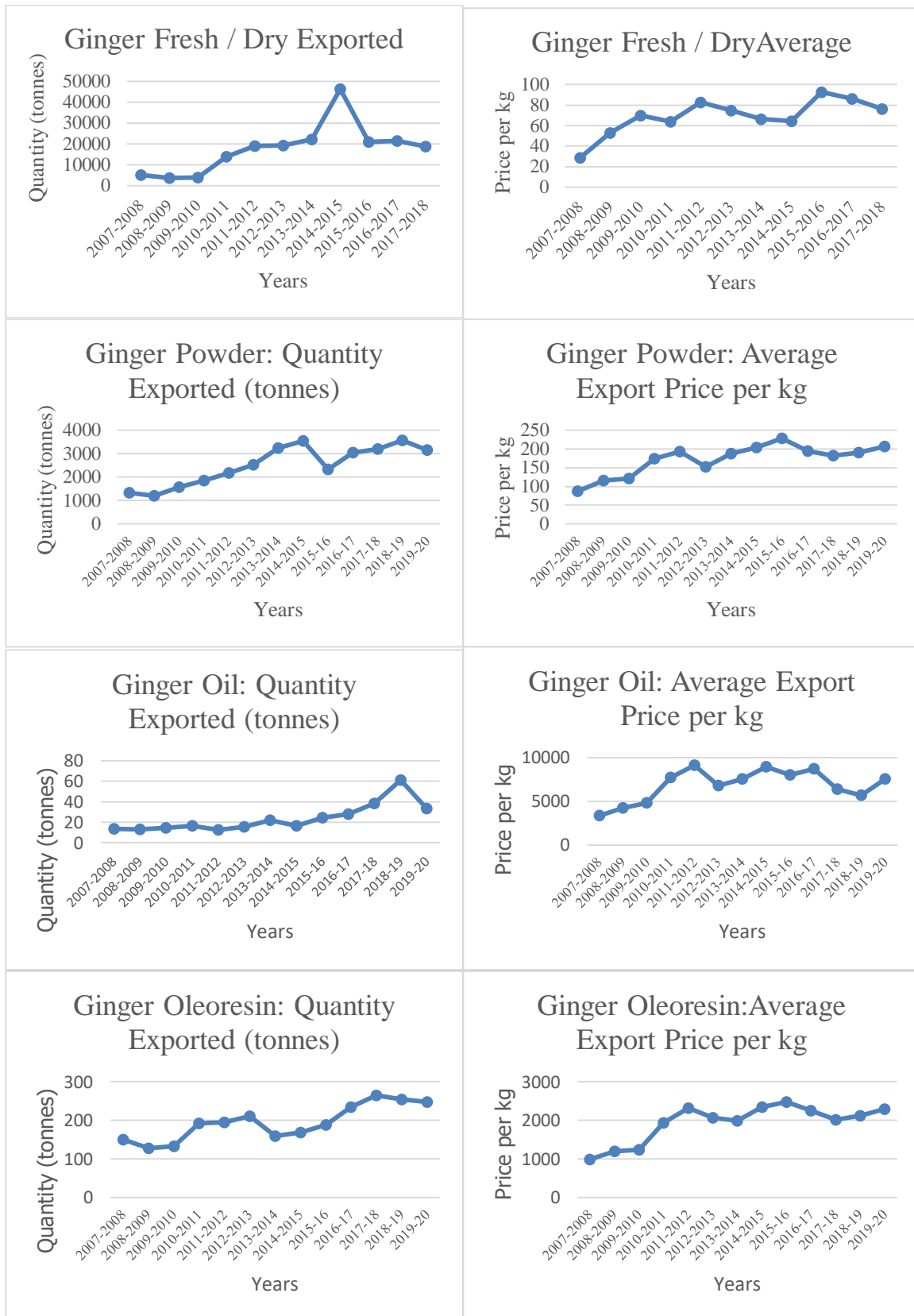
	GINGER FRESH/DRY Export	
	Quantity (tons)	Average Price per kg
2007-2008	5200.27	28.76
2008-2009	3727.53	52.91
2009-2010	3883.37	69.83
2010-2011	13819.46	63.77
2011-2012	18956.05	82.93
2012-2013	19160.49	74.67
2013-2014	22116.15	66.57
2014-2015	46404.05	64.57
2015-16	16697.93	86.98
2016-17	17330.59	79.42
2017-18	23693.48	55.39
2018-19	16309.74	65.15
2019-20	44280.33	77.23
Growth Rate	19.54	8.58
	GINGER POWDER	
	Quantity (tons)	Average Price per kg
2007-2008	1319.60	86.91
2008-2009	1201.62	115.27
2009-2010	1575.23	120.69
2010-2011	1850.33	173.52
2011-2012	2170.23	192.68
2012-2013	2527.63	152.53
2013-2014	3236.16	187.05
2014-2015	3549.89	203.93
2015-16	2333.04	227.61
2016-17	3053.13	193.97
2017-18	3203.35	182.73
2018-19	3573.03	190.64
2019-20	3154.70	206.48
Growth Rate	9.27	7.71
	GINGER OIL	GINGER OIL
	Quantity (tons)	Average Price per kg
2007-2008	13.69	3370.20
2008-2009	13.22	4245.01
2009-2010	14.55	4829.28
2010-2011	16.40	7700.12
2011-2012	12.41	9097.34

2012-2013	15.62	6769.78
2013-2014	21.86	7537.42
2014-2015	16.57	8937.18
2015-16	24.72	7983.62
2016-17	27.75	8719.50
2017-18	38.27	6360.54
2018-19	61.21	5706.29
2019-20	33.59	7547.93
Growth Rate	10.83	6.56
	GINGER OLEORESIN	GINGER OLEORESIN
	Quantity (tons)	Average Price per kg
2007-2008	149.59	989.60
2008-2009	127.90	1201.73
2009-2010	133.49	1236.44
2010-2011	192.84	1941.30
2011-2012	194.34	2317.75
2012-2013	210.29	2072.83
2013-2014	159.35	1982.89
2014-2015	168.18	2346.16
2015-16	187.75	2478.71
2016-17	234.31	2251.85
2017-18	264.85	2009.48
2018-19	253.88	2114.42
2019-20	247.37	2289.17
Growth Rate	5.88	7.34

Source: Directorate of Arecanut & Spices Development (DSAD), Ministry of Agriculture and Farmers' Welfare, Calicut (unpublished data)

With respect to ginger powder, it can be observed that the quantity exported for the period 2007-08, has shown a growth rate of 9.27 percent per annum and the average price also showed a growth rate of 7.71 percent during the corresponding period. In case of ginger oil also there has been an increase in quantity exported over the entire year period showing a growth rate of 10.83 percent with the average export price indicating a growth rate of 6.56 percent. The export of ginger oil which fluctuated from 12.41 tonnes to 38.27 tonnes in the period 2007-08 to 2017-18, showed a sudden increase to 61.21 tonnes in 2018-19, and again a decline to 33.59 tonnes in 2019-20. The growth rate in unit price during the entire period was 6.56 percent per annum. The export of ginger oleoresin showed a gradual increase from 149.59 tonnes in 2007-08 to 247.37 tonnes in 2019-20 thus showing an overall growth rate of 5.88 percent and unit price showing a growth rate of 7.3 percent during the corresponding period.

4.1.2 The quantity exported and unit price can be also observed from Graphs 1 (A&B) to Graphs 4 (A&B).



4.1.3 Country Wise Exports of Ginger (Fresh and Dry):

The share of total ginger in terms of fresh and dry can be observed in Table 4.1.3. It can be observed that in six years the share of fresh ginger is higher than that of dry ginger in exports. However, the growth rate in the quantity of fresh ginger exported during the period 2007-08 to 2017-18, has declined by -4.42 percent while that of dry ginger increased to 6.37 percent during the corresponding period.

Table 4.1.3 (A) Share (Percent) of Fresh and Dry Ginger Exported

Ginger Fresh & Dry	Quantity % Share		
	Fresh	Dry	TOTAL
2007-2008	70.12	29.88	100
2008-2009	59.22	40.78	100
2009-2010	57.86	42.14	100
2010-2011	71.36	28.64	100
2011-2012	34.73	65.27	100
2012-2013	34.51	65.49	100
2013-2014	41.71	58.29	100
2014-2015	40.3	59.7	100
2015-2016	64.03	35.97	100
2016-2017	53.01	46.99	100
2017-2018	44.6	55.4	100
Growth Rate	-4.42	6.37	

Source: Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

In Table 4.1.3 (B), it can be observed that the major country to which India exports fresh ginger is to Bangla Desh and the share on an average over the period 2007-08 to 2017-18 is 54.68 percent. Fresh ginger can be easily exported from India to Bangla Desh, because of its close proximity to North-East states of India which are important ginger growing regions. Exports to Nepal and Pakistan also take place for the same reason, but the quantities exported to these two countries is far less than that exported to Bangla Desh. While Bangla Desh is the main destination of exports of fresh ginger, there are exports to other countries also though in smaller quantities such as, Saudi Arabia, UAE, Spain, Morocco, Egypt and Yemen. Infact in certain years, fresh ginger is also exported to far of destinations such as USA.

Table 4.1.3 (B) Share (Percent) of Fresh Ginger Exported to Bangla Desh:

Bangladesh		
Ginger Fresh	Fresh	Average Export Price
2007-2008	67.72	8.64
2008-2009	59.22	12.79
2009-2010	57.49	19.17
2010-2011	59.85	20.94
2011-2012	34.73	18.46
2012-2013	34.51	26.66
2013-2014	41.71	31.71
2014-2015	40.3	21.25
2015-2016	53.7	27.26
2016-2017	53.01	27.62
2017-2018	44.6	21.15
Growth Rate		9.37

Source: Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

In Table 4.1.3 (C), the country-wise exports of dry ginger is indicated. It can be observed that dry ginger is mainly exported to Spain, Morocco, Saudi Arabia, USA and UAE. The average price at which dry ginger is exported shows a growth rate of 5.28 percent. However, it is important to note that the price at which dry ginger was exported in 2015-15, was Rs 198.45 per kg and declined to Rs 122.26 per kg in 2017-18.

Table 4.1.3 (C) : Country wise Exports of Dry Ginger :

	Per kg Average Export Price	Quantity (Percent Share) of Dry Ginger Exported					Total
		Spain	Morocco	Saudi Arabia	U.S.A	U.A.E	
2007-08	73.11	4.88	3.75	4.75	3.44	0.1	16.92
2008-09	113.35	8.17	6.43	10.75	1.13	0.06	26.54
2009-10	136.28	8.55	5.05	10.44	1.98	0.4	26.42
2010-11	173.01	1.5	4.76	5.21	4.02	2.66	18.15
2011-12	135.34	3.72	5.47	8.21	7.31	10.68	35.39
2012-13	102.97	10.26	5.38	3.77	8.41	2.77	30.59
2013-14	166.29	7.39	1.84	2.89	2.68	2.5	17.3
2014-15	187.11	4.05	0.67	2.75	0.96	3.27	11.7
2015-16	198.45	10.98	3.72	5.01	4.36	1.26	25.33
2016-17	149.99	12.48	7.43	4.13	3	2.38	29.42
2017-18	122.26	4.29	21.4	3.48	3.5	4.42	37.09
Growth Rate	5.28						

Source : Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

4.1.4 Country-Wise Exports of Ginger Powder:

In Table 4.1.4 the country wise export of ginger powder is indicated. It can be observed that USA and UK are major countries to which ginger powder is exported. Infact many western countries import ginger powder from India. The average price at which ginger powder is

exported however showed a decline from Rs 237.33 per kg in 2015-16 to Rs 192.66 per kg in 2017-18.

Table 4.1.4 Country -Wise Exports of Ginger Powder

	Average Price Per kg.	Quantity percent Share								
		U.S.A	U.K	Austr Alia	Nether Lands	South Africa	Germany	Canada	Total	Others
2007-08	86.91	10.79	24.37	8.93	6.46	0.23	8.29	6.65	65.72	34.28
2008-09	115.27	14.74	29.91	7.78	10.67	0.6	5.17	2.43	71.3	28.7
2009-10	120.69	18.28	26.26	9.99	5.28	0.04	3.08	2.48	65.41	34.59
2010-11	173.52	23.32	22.98	3.62	6.91	6.34	2.91	1.67	67.75	32.25
2011-12	192.68	18.86	16.14	5.24	6.44	8.88	4.38	2.27	62.21	37.79
2012-13	152.53	21.31	17.7	7.73	5.67	12.61	1.51	3.85	70.38	29.62
2013-14	187.05	18.78	15.81	5.58	4.67	5.07	4.7	3.71	58.32	41.68
2014-15	203.93	17.97	11.61	5.2	3.41	6.94	7.62	1.58	54.33	45.67
2015-16	237.33	29.09	16.32	6.62	7.23	7.08	2.44	2.41	71.19	28.81
2016-17	204.95	18.24	13.73	7.02	6.2	5.76	9.78	3.04	63.77	36.23
2017-18	192.66	31.58	15.7	6.65	6.12	4.74	2.55	4.32	71.66	28.34
Growth Rate	11.34									

Source : Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

4.1.5 Country-Wise Exports of Ginger Oil:

The country wise exports of ginger oil is indicated in Table 4.1.5. The major countries to which exports of ginger oil take place are, U.K, USA and South Africa. However, ginger oil is exported to several other countries such as Netherlands, France and Germany. The average price at which ginger oil is exported has shown huge fluctuations over the years. The price which was as high as Rs 9220.69 per kg in 2015-16, declined to Rs 6957.26 per kg, in 2017-18, i.e a sharp fall of about 25 percent. Ginger oil is a low volume but high value product and a fall in price is a revenue loss for the country.

Table 4.1.5: Country -Wise Exports of Ginger oil

	Average Price Per kg.	Quantity (Percent Share)										
		U.K	U.S.A	South Africa	Nether Lands	Indo nesia	Germany	France	Japan	Austr alia	Total	Others
2007-08	3370.2	17.46	17.97	5.26	11.54	0	15.41	1.53	8.18	2.99	80.34	19.66
2008-09	4245.01	12.93	20.12	8.09	17.7	0	8.77	0.76	6.2	1.51	76.08	23.92
2009-10	4829.28	11.07	26.32	11.82	12.44	0	13.47	8.93	1.92	2.82	88.79	11.21
2010-11	7700.12	24.45	19.51	10.85	21.16	1.22	2.44	2.26	2.32	6.77	90.98	9.02
2011-12	9097.34	15.39	20.95	9.91	9.91	6.45	8.78	3.71	6.37	6.85	88.32	11.68
2012-13	6769.78	14.6	8.77	20.93	5.31	10.69	9.73	3.91	8	1.79	83.73	16.27
2013-14	7537.42	15.19	16.19	11.99	6.54	10.93	8.28	7.32	7.41	1.65	85.5	14.5
2014-15	8937.18	17.74	14.06	13.28	6.46	2.41	4.1	5.61	11.65	2.9	78.21	21.79
2015-16	9220.69	20.69	10.04	23.9	4.6	1.16	4.88	10.54	1.39	1.16	78.36	21.64
2016-17	6219.89	11.32	7.47	6.47	6.74	33.95	4.52	7.7	3.62	1.55	83.34	16.66
2017-18	6957.26	21.3	12.48	10.09	10.32	0.8	10.14	9.55	2.69	2.16	79.53	20.47
Growth Rate	7.52	2.01	-3.58	6.73	-1.11	-5.85	-4.10	20.10	-10.53	-3.20	-0.10	0.40

Source: Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

4.1.6 Country-Wise Exports of Ginger Oleoresins:

The country wise exports of ginger oleoresins is indicated in Table 4.1.6. The main countries to which ginger oleoresin are exported is USA, UK, and South Africa. However other countries which have a lower share to which oleoresin is exported are Australia, Germany and South Korea. However, there was a fall in average export price of oleoresin from Rs 2346.16 per kg in 2014-15 to Rs 1446.89 per kg in 2015-16, i.e a fall by 38 percent. The price at which the oleoresin is exported fluctuates over the years, although there is a growth rate of 7.74 percent over the period 2007-08 to 2017-18.

Table 4.1.6: Country-Wise Exports of Ginger Oleoresin

	Average Price Per kg.	Quantity (Percent Share)									
		U.S.A	U.K	South Africa	Australia	Germany	Korea (South)	Nether lands	France	Total	Others
2007-08	989.6	20.55	15.24	11.05	11.53	6.19	3.89	7.95	0.88	77.28	22.72
2008-09	1201.73	20.91	11.07	13.46	10.99	7.81	5.22	2.67	0.61	72.74	27.26
2009-10	1236.44	18.5	13.63	12.89	12.56	6.42	4.26	4.17	2.93	75.36	24.64
2010-11	1941.3	23.33	22.93	10.93	9.58	3.93	3.74	3.09	2.19	79.72	20.28
2011-12	2317.75	20.35	18.24	12.88	10.67	6.23	5.5	3.03	2.6	79.5	20.5
2012-13	2072.83	27.63	25.77	14.51	1.75	5.77	4.45	2.52	1.7	84.1	15.9
2013-14	1982.89	18.49	22.54	12.9	7.29	5.12	4.32	2.44	2.37	75.47	24.53
2014-15	2346.16	20.71	14.63	15.58	7.44	3.45	6.22	3.18	2.92	74.13	25.87
2015-16	1446.89	10.06	8.03	7.66	5.33	2.51	5.1	1.73	1.53	41.95	58.05
2016-17	2275.48	22.8	17.85	12.07	9.57	5.16	5.61	3.31	2.91	79.28	20.72
2017-18	2085.27	18.54	17.9	14.79	7.05	6.5	6.08	3.11	4.97	78.94	21.06
Growth Rate	7.74	-1.02	1.62	2.96	-4.80	0.49	4.57	-8.96	18.90	0.21	-0.76

Source: Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

4.1.7 World Trade in Fresh Ginger:

Large number countries are involved in export of ginger and it was estimated that in 2018 the amount of fresh ginger exported worldwide was 564,000 tonnes and the value of this trade was \$872.3 million. In Table 4.1.7 (A) the quantity of exports of major countries is indicated.

Table 4.1.7 (A) World Export Trade in Non Crushed Non Ground (Fresh) Ginger by Major Countries (2018)

Country	Quantity Exported (tonnes)	Percentage share
China	390,000	69.14
Thailand	54,000	9.57
Peru	21,000	3.72
India	21,000	3.72
Brazil	15,000	2.66
Netherland	13,000	2.3
Others	50,000	8.89
World	564,000	100

Source: worldstopexports.com/ginger-exporters

It can be observed from Table 4.1.7 (A) that China is a leading exporter of ginger with a share of 69.14 percent in world exports. While Thailand ranks second, its share is far lower at 9.57 percent. The share of India is 3.72 percent and although the country ranks 3rd, along with Peru, it has a very small share in world exports of ginger. Perhaps the reason why India is not able to export ginger is because there is a huge domestic demand. Although India is the largest producer of ginger, it is also the largest consumer and most of the production goes in meeting the domestic requirements as ginger forms an important ingredient in the food habits of an Indian consumer. Other countries however, are not major consumers of ginger and hence have surplus to export.

In Table 4.1.7 (B), the country wise value of exports is indicated. It is clear that in the world export trade of ginger, China is the leader having a share of 61.7 percent in 2019. The production of ginger is mainly mechanized and hence the country is able to produce more and export more as compared to other countries which produce ginger on a small scale through labour intensive methods. The global market prices of ginger are strongly influenced by China which is the largest producer of both fresh and dried ginger.

Table 4.1.7 (B): World Export Trade in Non Crushed Non Ground Ginger and Percentage share

Country	Value of Exports (million, USD\$)			
	Value of exports (Million \$) 2018	Value of Exports (Million \$) 2019	% share in 2018	% share in 2019
China	442.3	541.2	57.17	61.7
Netherlands	111.1	118.8	14.36	13.54
Thailand	85.4	54.8	11.03	6.25
Peru	41.1	40.2	5.31	4.58
Nigeria	21.98	37	2.84	4.22
India	20.1	32.2	2.6	3.67
Brazil	16	22.2	2.07	2.53
Spain	5.7	8.4	0.74	0.95
Germany	6.7	6.2	0.87	0.71
Taiwan	4.5	6	0.58	0.68
Italy	3.9	3.8	0.50	0.43
United States	3.1	3.4	0.40	0.39
Nepal	3.3	3.3	0.43	0.34
Others	8.5	0.1	1.10	0.01
Total	773.68	877.5	100	100

Source: www.worldstopexports.com>ginger-exporters

Netherlands ranks second with a share of 13.54 percent. India ranks 6th with a relatively small share of 3.67 percent, in the world exports of ginger, although it is competitive. The average price at which exports took place in the global market were \$1336 per tonne or Rs 91.77 per kg. The average price at which ginger was exported country wise in 2018 can be observed from Table 4.1.7 (C). It can be observed that India is in a position to export at a lower price, but the country does not have marketable surplus to increase the scale of exports.

Table 4.1.7 (C) Average Export Price of Non Crushed Non Ground Ginger, 2018 (Major Countries)

Country	Price Per Kg USD (\$)	Price INR (Rs)
Brazil	1.06	73.14
China	1.13	77.97
Thailand	1.03	71.27
Peru	1.96	135.24
India	0.96	66.24

Source: calculated by author from above tables

4.1.8 World Trade in Export of Crushed and Ground Ginger:

Besides, Non Crushed Non Ground ginger, there is considerable export by countries of Crushed and Ground ginger. The same can be observed from Table 4.1.8.

Table 4.1.8 World Trade in Exports of Crushed Ground Ginger (Million USD) and Percentage share

Country	Export of crushed/ground ginger Million USD (\$) 2018	Export of crushed/ground ginger Million USD (\$) 2019	Percentage share 2018	Percentage share 2019
China	28.8	30.5	38.38	37.12
India	11.4	12	15.2	14.63
Germany	8.8	9.3	11.73	11.33
Netherlands	5	6.1	6.7	7.44
U.K	2.9	2.2	3.86	2.68
USA	2.4	2.1	3.20	2.56
Vietnam	2.3	2.5	3.07	3.05
France	1.9	2	2.53	2.44
Spain	1.6	2.3	2.13	2.80
Australia	0.8	0.95	1.07	1.16
Belgium	0.78	0.89	1.04	1.08
South Africa	0.64	0.82	0.85	1.00
Pakistan	0.63	1.4	0.84	1.71
Indonesia	0.60	1.1	0.80	1.34
Other	6.48	7.88	8.18	9.66
Total	75.03	82.04	100	100

Source: connect2india.com/global/export-ginger-from-India

It can be observed from Table 4.1.8 that again China leads in the export of crushed or ground ginger and had a share of 37 percent in the world exports in 2019. India ranks second, but its share is much lower at 14.63 percent in the corresponding period. The crushed and ground ginger from India that is exported is mainly the varieties cultivated in Kerala. However, India cannot be competitive as labor costs are very high in Kerala, Chinese and Nigerian ginger is available in the international markets at lower rates. Discussion with manufacturers of ginger oil and oleoresins also revealed that they import dry ginger and crushed ginger largely from Nigeria as the price is much lower. Also, the ginger from Nigeria is renowned for its pungency and oleoresin extraction is higher

4.1.9 Import of Ginger by India:

It can be reiterated that India is the largest producer of ginger in the world, having a share of 35.21 percent in world production, followed by China which has a share of 19.2 percent. Nigeria ranks third, with a share of 11.52 percent. Thus, though India is far ahead of other countries in production of ginger, there is regular import of this product into India. The main reasons why India imports ginger is because domestic consumption is so high that it cannot meet the requirements of the produce not only for kitchen purposes, but also for further conversion into value added products. Secondly, the prices in the international market are very competitive and hence exporters often import dry ginger, process it into products such as essential oils and oleoresins and again export the value added product. The ginger which is converted from fresh to dry is mostly varieties of Kerala such as *Cochin* ginger because of its flavour, low fibre content and high oil content. However, the cost of producing this variety of ginger began to increase in view of high labor and so did the cost of conversion into dry ginger. The prices received by farmers fluctuated over the years. However, in 2010-11, while the price of fresh ginger in Kozhikode market of Kerala was Rs 39.67 per kg, it sharply declined to Rs 17.72 per kg in 2011-12. The price of *Cochin* dry ginger which was R 183.85 per kg accordingly declined to Rs 117 per kg, i.e a fall of 36 percent in price. This sharp fall in price, served as a disincentive for farmers to cultivate this popular variety, and gradually in Kerala the area under ginger began to decline. The prices of dry ginger in international markets were very competitive and the oil extraction units found it cheaper to import from countries where prices were far lower than domestic prices. Hence processors mainly of essential oils and oleoresins switched their purchases to cheap imports and this further served as a disincentive for Kerala to produce ginger.

Major exporting countries have increased area under ginger, which has also increased their production. In 2010, the area under ginger in Nigeria was 52300 hectares which increased to 71847 hectares. In case of China the corresponding figure was increase in area from 36198 to 47929 and while Nepal saw an increase in area of 27 percent during the same period, Indonesia saw an increase in area of 68 percent. The world area under ginger increased from 2.64 lakh hectares in 2010 to 3.73 lakh hectares in 2018, i.e increase of 41 percent. Most countries have increased their area and production with a view to export, as their domestic requirements are limited and also India is a neighbouring country so the transport of ginger, especially fresh ginger requires less time.

Table 4.1.9: Import of Ginger and Ginger Products by India:

	Quantity (tonnes)	Value (Rs in crores)	Unit price (Rs/kg)	Quantity Percent Share	Value Percent Share
Ginger Fresh					
2015-16	20388.43	19.94	9.78	67.45	17.31
2016-17	29579.91	41.05	13.88	80.42	42.68
2017-18	27792.86	39.33	14.15	80.83	38.55
2018-19	19428.36	26.80	13.79	51.54	15.23
2019-20	8734.61	16.67	19.08	46.15	13.53
Growth Rate	-19.10	-4.38	18.18		
Dry Ginger					
2015-16	3826.26	41.23	122.05	12.66	35.79
2016-17	2955.12	29.80	100.85	8.03	30.98
2017-18	5108.67	46.72	91.46	14.86	45.79
2018-19	9030.90	70.60	116.86	23.96	40.12
2019-20	5422.25	50.66	92.1	28.65	41.12
Growth Rate	9.11	5.28	-6.80		
Other Ginger					
2015-16	5877.18	49.59	84.39	19.44	43.05
2016-17	4232.21	24.12	57.01	11.51	25.08
2017-18	1388.49	12.75	91.89	4.04	12.50
2018-19	8903.34	70.08	78.72	23.62	39.82
2019-20	4248.88	37.61	88.52	22.45	30.52
Growth Rate	-7.79	-6.68	1.20		
Ginger Powder					
2015-16	24.64	1.41	575.65	0.08	1.23
2016-17	4.02	0.08	204.73	0.01	0.09
2017-18	89.44	1.84	205.64	0.26	1.80
2018-19	16.15	0.45	278.20	0.04	0.26
2019-20	78.55	1.27	162.27	0.41	1.03

	Quantity (tonnes)	Value (Rs in crores)	Unit price (Rs/kg)	Quantity Percent Share	Value Percent Share
Growth Rate	33.62	-2.64	-27.13		
Other Ginger, crushed or ground					
2015-16	110.42	2.54	229.81	0.37	2.20
2016-17	5.40	0.23	434.44	0.01	0.24
2017-18	1.51	0.23	1537.09	0.00	0.23
2018-19	295.63	2.50	84.66	0.78	1.42
2019-20	389.47	4.04	103.82	2.06	3.28
Growth	37.04	12.35	-18.02		
Ginger Oil					
2015-16	0.52	0.21	4030.77	0.00	0.18
2016-17	1.05	0.52	4977.14	0.00	0.54
2017-18	0.95	0.63	6606.32	0.00	0.62
2018-19	2.48	1.43	5767.34	0.01	0.81
2019-20	8.50	3.70	4358.00	0.04	3.01
Growth Rate	101.07	105.04	1.97		
Ginger Oleoresin					
2015-16	0.74	0.28	3754.05	0.00	0.24
2016-17	2.81	0.36	1285.05	0.01	0.38
2017-18	1.95	0.53	2715.90	0.01	0.52
2018-19	20.07	4.11	2049.28	0.05	2.34
2019-20	46.08	9.24	2007.34	0.24	7.51
Growth Rate	180.91	140.21	-14.49		
Grand Total					
2015-16	30228.19	115.21	38.12	100	100
2016-17	36780.52	96.18	26.15	100	100
2017-18	34383.87	102.05	29.68	100	100
2018-19	37696.93	175.98	46.68	100	100
2019-20	18928.34	123.21	65.09	100	100
Growth Rate	-11.04	1.69	14.31		

Source: Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

In 2016-17 the share of imports of value of fresh ginger in total ginger imports was 42.68 percent while quantity imported had a share of 80.42 percent. This indicated that imports were mainly of fresh ginger. The imports of fresh ginger were mainly from the neighbouring country of Nepal. In 2019-20, the quantity of fresh ginger imported was 46.15 percent of total ginger and ginger products imported. However, the main item that was imported was dry ginger. The share of value of dry ginger imported ranged from 30.98 percent in 2016-17 to 45.79 percent in 2017-18. In quantity terms, the share ranged from 8.03 percent in 2016-17 to

28.65 percent in 2019-20. The important point to note is that the price at which ginger is being imported is showing a negative growth rate which is -6.80 per cent which clearly indicates that the international price of dry ginger is declining. The imported price of dry ginger which was Rs 122.05 per kg depicted a declining trend and was Rs 92.1 per kg in 2019-20. In contrast, the domestic varieties of dry ginger, such as Cochin dry ginger which were used for oil extraction had ruling market prices ranging from Rs 130 per kg in 2017-18 to Rs 250 per kg in 2018-19. Hence domestic varieties of dry ginger such as *Cochin* variety ranged from 42 percent to 114 percent higher than international prices. This explains the increasing imports of dry ginger from 3826.26 tonnes in 2015-16 to 9030.90 tonnes in 2018-19 and the growth rate in quantity of dry ginger imported was 9.11 percent per annum, during the period 2015-16 to 2019-20.

The imports of ginger oil which was negligible between 2015-16 to 2017-18, increased from 2.48 tonnes in 2017-18 to 8.50 tonnes in 2019-20, i.e. 3.43 times increase. The increase in price was perhaps due to fall in price by 25 percent from 2018-19 to 2019-20. A similar trend was observed with respect to imports of ginger oleoresins which were negligible from 2015-16 to 2017-18. However, the quantity of ginger oleoresin imported increased from 1.95 tonnes in 2017-18 to 20.07 tonnes in 2018-19 and further to 40.08 tonnes in 2019-20. The price at which ginger oleoresins were imported showed a negative growth rate which was -14.49 percent per annum during 2015-16 to 2019-20.

Overall, the value of imports of ginger and ginger products imported has varied between Rs 96.18 crores in 2016-17 to Rs 175.98 crores in 2018-19. Although India is a major producer of ginger, the domestic requirements are large and imports are required to fill the gap. More importantly, it is the producers of value added products such as essential oils and oleoresins, who import dry ginger as rates in the international market are competitive.

4.1.10 Country Wise Imports of Ginger:

The country wise import of fresh and dry ginger is indicated in Table 4.1.10. It can be observed that fresh ginger is mainly imported from Nepal and this constitutes a major share in total imports in quantity terms of ginger and ginger products ranging from 56.91 percent in 2019-20 to 91.85 percent in 2016-17. The price at which the country is importing fresh ginger from Nepal ranges from Rs 13.91 per kg in 2015-16 to Rs 28.93 per kg in 2019-20. In fact from 2016-17 to 2018-19, there was hardly any variation in imported price of fresh ginger from Nepal which ranged between Rs 16.32 per kg to Rs 19.58 per kg in 2018-19.

Dry ginger was mainly imported from Nigeria and the share of dry ginger in total quantity of ginger and ginger products imported from Nigeria in 2019-20 was as high as 40.98 percent with a unit price of Rs 88.16 per kg. The price at which dry ginger is imported from Nigeria indicates a negative growth rate of -15.06 percent per annum during the period 2015-16 to 2019-20. This indicates that India is able to import dry ginger, each year at lower prices from Nigeria and the price is far lower than domestic price. A negligible share of dry ginger is imported from China. The price at which it is imported also indicates a negative growth rate of -19.12 percent per annum, during 2015-16 to 2019-20. Hence the overall picture is that it is much cheaper for India to import dry ginger as international prices are lower than domestic prices.

Table 4.1.10: Country wise Import of Ginger to India

CHINA P RP Dry Ginger	Quantity in tonnes	Values in Rs. Crores	Average Import Price Rs. Per kg.	Quantity Percent Share	Values Percent Share
2015-2016	379.11	7.44	196.15	1.37	7.43
2016-2017	238.09	3.14	132.06	0.65	3.39
2017-2018	97.3	1.31	134.18	0.29	1.44
2018-2019	648.21	6.62	102.19	1.89	4.63
2019-2020	363.2	3.05	83.95	2.11	3.25
Growth Rate	-1.07	-19.98	-19.12		
NIGERIA Dry Ginger	Quantity in tonnes	Values in Rs. Crores	Average Import Price Rs. Per kg.		
2015-2016	4529.71	60.94	134.53	16.34	60.87
2016-2017	2750.32	34.60	125.81	7.50	37.33
2017-2018	4223.41	38.32	90.72	12.57	42.13
2018-2019	12609.24	95.30	75.58	36.82	66.64
2019-2020	7062.7	62.26.	88.16	40.98	66.45
Growth Rate	11.74	0.54	-10.03		
NIGERIA and China Dry Ginger	Quantity in tonnes	Values in Rs.crores	Average Import Price Rs. Per kg.		
2015-2016	4908.82	68.38	165.34	17.71	68.30
2016-2017	2988.41	37.74	128.93	8.15	40.73
2017-2018	4320.71	39.62	112.45	12.86	43.57
2018-2019	13257.45	101.92	88.89	38.72	71.27
2019-2020	7425.9	65.31	86.06	43.09	69.71
Growth Rate	10.90	-1.14	-15.06		
Fresh Ginger					
NEPAL	Quantity in tonnes	Values in Rs. Crores	Average Import Price Rs. Per kg.		
2015-2016	22808.44	31.74	13.91	82.29	31.70
2016-2017	33664.14	54.94	16.32	91.85	59.27
2017-2018	29281.15	51.33	17.53	87.14	56.43
2018-2019	20984.19	41.08	19.58	61.28	28.73
2019-2020	9808.68	28.38	28.93	56.91	30.29
Growth Rate	-19.02	-2.76	20.09		

Source: Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

4.1.11: World Trade in Imports of Ginger:

Ginger is an important commercial crop grown for its aromatic rhizomes and used as a spice as well as medicine. It is also used as an ingredient in a wide range of semi processed and processed products for the food manufacturing sector. The ginger market is gathering momentum as the health consciousness across the globe is increasing and natural herbal ingredients are preferred to synthetic products. Many of the developed countries are not able to cultivate ginger due to their climatic conditions and source it from developing countries. In Table 4.1.11 (A) the quantity of ginger imported by various countries is indicated.

It can be observed from Table 4.1.11(A) that world imports of ginger were 6.47 lakh tonnes and the main importer was USA, followed by Japan and Netherlands. The share of USA was 13.75 percent, followed by Japan which has a share of 10.51 percent and Netherlands with a share of 9.27 percent. The global and especially European market for ginger is likely to increase mainly due to cold weather.

Table 4.1.11 (A) : World Trade in Imports of Ginger : [Quantity in Tonnes, Price USD Per Tonne and Rs/kg.] 2018-19

Country	Quantity (tonne)	Percent	USD \$ Per Tonne	Rs./ kg.
USA	89000	13.75	1280	84.1
Japan	68000	10.51	1165	81.3
Netherlands	60000	9.27	1478	103.7
Pakistan	46000	7.1	1150	80.6
UAE	47000	7.26	694	48.36
Malaysia	45000	6.95	667	46.96
Bangladesh	42000	6.49	974	68.27
Saudi Arabia	28000	4.32	981	68.75
U.K.	26000	4.02	1480	103.73
India	24000	3.71	771	54
Germany	23000	3.55	2422	169.62
Others	149000	23.02	-	
Total Imports	647000	100.00		

Source: <https://www.globaltrademag.com>global-ginger-market>

In Europe, Netherlands is the not only the largest importer but also trader of ginger. And the country is a trade hub for intra-European trade. Netherlands imports ginger and then re-exports it by adding value to imported dried ginger by further processing and packaging it. United Kingdom is the second largest importer of ginger in Europe and this could possibly be due to the fact that there is a large Indian population residing in Europe. Germany and other

European countries also import ginger although their share is small. While some of these countries import from Netherland, many of them also source it from India. The growing demand for dried ginger in European markets is stimulated by consumers becoming health conscious and ginger is well known to have medicinal properties. In 2018-19, the average import price of ginger was \$1275 per tonne, which works out to approximately Rs 89.25 per kg.

In Table 4.1.11 (B) the world trade of ginger in value terms is indicated. It can be observed that the value of imports in 2018-19 were \$942 million, and the same increased to \$ 976.42 in 2019-20.

Table 4.1.11 (B) World Trade in Import of Ginger in Value Terms (\$)

\$USD and Percentage share					
	Country	\$ USD Million (2018-19)	\$ USD Million (2019-20)	% (2018-19)	% (2019-20)
1	USA	114	128.16	12.1	13.13
2	Japan	79.2	100.76	8.41	10.32
3	Netherlands	88.7	83.85	9.42	8.59
4.	Pakistan	107	81.51	11.36	8.35
5	Bangla Desh	40.9	71.32	4.34	7.30
6	Germany	55.7	62.19	5.91	6.37
7	U.K	38.5	42.37	4.09	4.34
8	Malaysia	30	34.58	3.18	3.54
9	Russia	18.3	28.21	1.94	2.89
10	UAE	32.6	27.41	3.46	2.81
11	Saudi Arabia	25.5	27.18	2.71	2.78
12	Canada	25	26.89	2.65	2.75
13	India	18.5	17.43	1.96	1.79
14	France	15.2	15.9	1.61	1.63
15	Morocco	15	15.41	1.59	1.58
16	Italy	13.6	14.11	1.44	1.45
17	Spain	11.6	13.3	1.23	1.36
18	South Korea	6.37	5.18	0.68	0.53
19	Vietnam	21	4.94	2.23	0.51
20	Quatar	5.03	5.05	0.53	0.52
21	Turkey	3.41	3.48	0.36	0.36
22	Iran	3.99	0.63	0.42	0.06
23	China	3.3	0.77	0.35	0.08
24	Indonesia	3.22	1.93	0.34	0.20
25	Australia	2.61	2.59	0.28	0.27
26	Thailand	2.59	2.9	0.27	0.30
27	Sri Lanka	1.5	1.7	0.16	0.17
28	Nepal	1	1.08	0.11	0.11
29	Others	158.68	155.59	16.85	15.93
	Total	942	976.42	100	100.00

Source: nationmaster.com/nmx/ranking/import-of-ginger

The share of USA in imports was largest and valued at \$128.16 million in 2019-20 with a share of 13.13 percent of total world imports. The share of Japan in world imports was 10.32 percent and hence the country ranked second. Netherlands ranks third, but as noted earlier, Netherlands imports ginger, and after processing and packaging exports it to other European countries. Hence, it also emerges as one of the exporters of ginger. Many countries like Pakistan, UAE, Bangla Desh import ginger as it is an ingredient in their food while western countries import as ginger has medicinal properties. Overall, imports of ginger have potential to increase, as all countries are not in a position to cultivate, especially European countries, but the demand is likely to increase in view of its usage for health considerations.

4.2 Trade in Turmeric and Turmeric Products:

India is a world leader in production and consumption of turmeric. The crop is reported to have originated in India, and about 78 percent of production of turmeric is produced in India and hence India dominates the global scene with respect to turmeric.

4.2.1 Export of Turmeric and Turmeric Products:

In Table 4.2.1, the exports of turmeric and turmeric products for the period 2015-16 are indicated. It can be observed from Table 4.2.1 that the total exports of turmeric and turmeric products which were 89321 tonnes in 2015-16, increased to 139184 tonnes in 2019-20, registering a growth rate of 11.73 percent per annum. The value of exports registered a growth rate of 10.52 percent per annum during the corresponding period. However, unfortunately the average unit price of all turmeric products exported registered a negative growth rate of -1.08 percent per annum. This indicates that the value of turmeric exported increased only due to increase in quantity but not in unit price. Exports of fresh turmeric was negligible and constituted 1.80 percent of value of total exports of turmeric and turmeric products. Turmeric is mainly used in dry form and only a very small portion of the fresh produce is used for pharmaceutical purposes or for other purposes.

Out of total exports of turmeric, the share of dry turmeric was highest in quantity and value terms. In quantity terms, the share ranged between 44.38 percent in 2016-17 to 59.84 in 2019-20 while in value terms, the share ranged from 24.67 percent in 2018-19 to 31.51 percent in 2019-20.

Table 4.2.1 : Export of Turmeric and Turmeric Products

Turmeric Fresh	Quantity (tonnes)	Value (Rs in crores)	Average Exported price (Rs/kg)	Percent Share Quantity	Percent Share Value
2015-16	5043.9	50.98	101.07	5.65	3.86
2016-17	12139.22	108.66	89.51	9.62	5.95
2017-18	3856.25	33.54	86.98	3.41	1.97
2018-19	15183.53	118.69	78.17	10.80	4.95
2019-20	3895.61	35.39	90.85	2.80	1.80
Growth Rate	-6.25	-8.72	-2.63		
Turmeric Dry	Quantity (tonnes)	Value (Rs in crores)	Average Exported price (Rs/kg)	Percent Share Quantity	Percent Share Value
2015-16	42183.97	398.56	94.48	47.23	30.21
2016-17	55978.09	530.03	94.69	44.38	29.04
2017-18	58332.34	477.49	81.86	51.62	28.02
2018-19	71360.11	591.16	82.84	50.74	24.67
2019-20	83287.39	620.22	74.47	59.84	31.51
Growth Rate	18.54	11.69	-5.78		
Turmeric Powder	Quantity (tonnes)	Value (Rs in crores)	Average Exported price (Rs/kg)	Percent Share Quantity	Percent Share Value
2015-16	33469.32	408.53	122.06	37.47	30.97
2016-17	44046.93	543.0	123.28	34.92	29.75
2017-18	40890.74	481.43	117.74	36.18	28.25
2018-19	42862.06	521.15	121.59	30.48	21.75
2019-20	42136.02	479.74	113.86	30.27	24.37
Growth Rate	5.93	4.10	-1.72		
Turmeric Oil	Quantity (tonnes)	Value (Rs in crores)	Average Exported price (Rs/kg)	Percent Share Quantity	Percent Share Value
2015-16	40.51	33.80	8343.96	0.05	2.56
2016-17	84.56	33.94	4013.79	0.07	1.86
2017-18	47.33	10.26	2168.75	0.04	0.60
2018-19	44.43	16.21	3648.95	0.03	0.68
2019-20	27.41	11.58	4225.76	0.02	0.59
Growth Rate	-9.30	-23.49	-15.64		
Turmeric Oleoresin	Quantity (tonnes)	Value (Rs in crores)	Average Exported price (Rs/kg)	Percent Share Quantity	Percent Share Value
2015-16	814.68	274.87	3374.01	0.91	20.84
2016-17	932.99	380.10	4074.05	0.74	20.83
2017-18	1188.93	534.39	4494.78	1.05	31.36
2018-19	1663.82	593.91	3569.6	1.18	24.79
2019-20	2090.53	560.04	2678.94	1.50	28.45
Growth Rate	26.57	19.47	-5.60		
Other Turmeric	Quantity (tonnes)	Value (Rs in crores)	Unit price (Rs/kg)	Percent Share Quantity	Percent Share Value
2015-16	7768.68	152.49	196.3	8.70	11.56
2016-17	12951.97	229.30	177.04	10.27	12.56
2017-18	8695.47	166.77	191.79	7.69	9.79
2018-19	9514.72	554.72	583.01	6.77	23.15
2019-20	7747.19	261.59	337.67	5.57	13.29
Growth Rate	-0.07	14.44	14.52		
Grand Total	Quantity (tonnes)	Value (Rs in crores)	Unit price (Rs/kg)	Percent Share Quantity	Percent Share Value
2015-16	89321.06	1319.25	147.7	100	100
2016-17	126133.76	1825.03	144.69	100	100
2017-18	113011.06	1703.90	150.77	100	100
2018-19	140628.67	2395.85	170.37	100	100
2019-20	139184.15	1968.57	141.44	100	100
Growth Rate	11.73	10.52	-1.08		

Source : Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

The next item of export which was important was turmeric powder and the share in quantity ranged from 30.27 percent in 2019-20 to 37.47 percent in 2015-16. Therefore in 2019-20, the share of dry turmeric and turmeric powder in terms of quantity exported was 90.11 percent while the value was 55.88 percent. However, both items showed negative growth rate during the period 2015-16 to 2019-20 in terms of average exported price.

The quantity of turmeric oil exported showed a decline over the period 2015-16 to 2019-20. While the quantity exported was as high as 84.56 tonnes in 2016-17, it declined sharply to 27.41 tonnes, thus showing a negative growth rate of 9.30 percent per annum. There was sharp decline in average export price from Rs 8343.96 per kg in 2015-16 to Rs 2168.75 per kg in 2017-18. There was again an increase in average exported price to Rs 4225.76 per kg but during the period 2015-16 to 2019-20, the growth rate in average export price was -15.64 percent.

Turmeric oleoresin however showed a steady increase in exports and the quantity exported increased from 814.68 tonnes in 2015-16 to 2090.53 tonnes in 2019-20. The per unit export price however showed a negative growth rate of -5.60 percent per annum during the period. The share in total quantity of exports was 1.50 percent but the share in value of exports was 28.45 percent which indicates that it is a low volume but high value product.

4.2.2 Export of Turmeric and Turmeric Products: A Trend Analysis:

There has been a steady increase of dry turmeric powder being exported and the quantity exported of dry powder which was 32988.15 tonnes in 2007-08 gradually increased to 83287.39 tonnes in 2019-20 registering a growth rate of 8.02 percent per annum.

Similarly, the quantity of turmeric powder exported also increased from 16262 tonnes in 2007-08 to 42136 tonnes in 2019-20. Indians are major consumers of turmeric and over the years there is huge migration of Indian population to other countries. This could be a major reason for increase in export of turmeric powder.

With respect to turmeric oil, it can be observed that exports of this product were negligible till 2014-15. However, since 2015-16, the quantity exported began to show an increase. In case of turmeric oleoresins, the quantity exported was 370.74 tonnes in 2007-08 and this figure increased to 2090.53 tonnes in 2019-20. Countries which import turmeric, prefer to buy the product in the form of oil and oleoresin because they are free from contaminants, possess a flavour that is uniform and occupy less space. The essential oils and oleoresins also

remain stable for a longer period of time and they can easily be mixed with liquid flavour concentrates and the flavour can also be controlled.

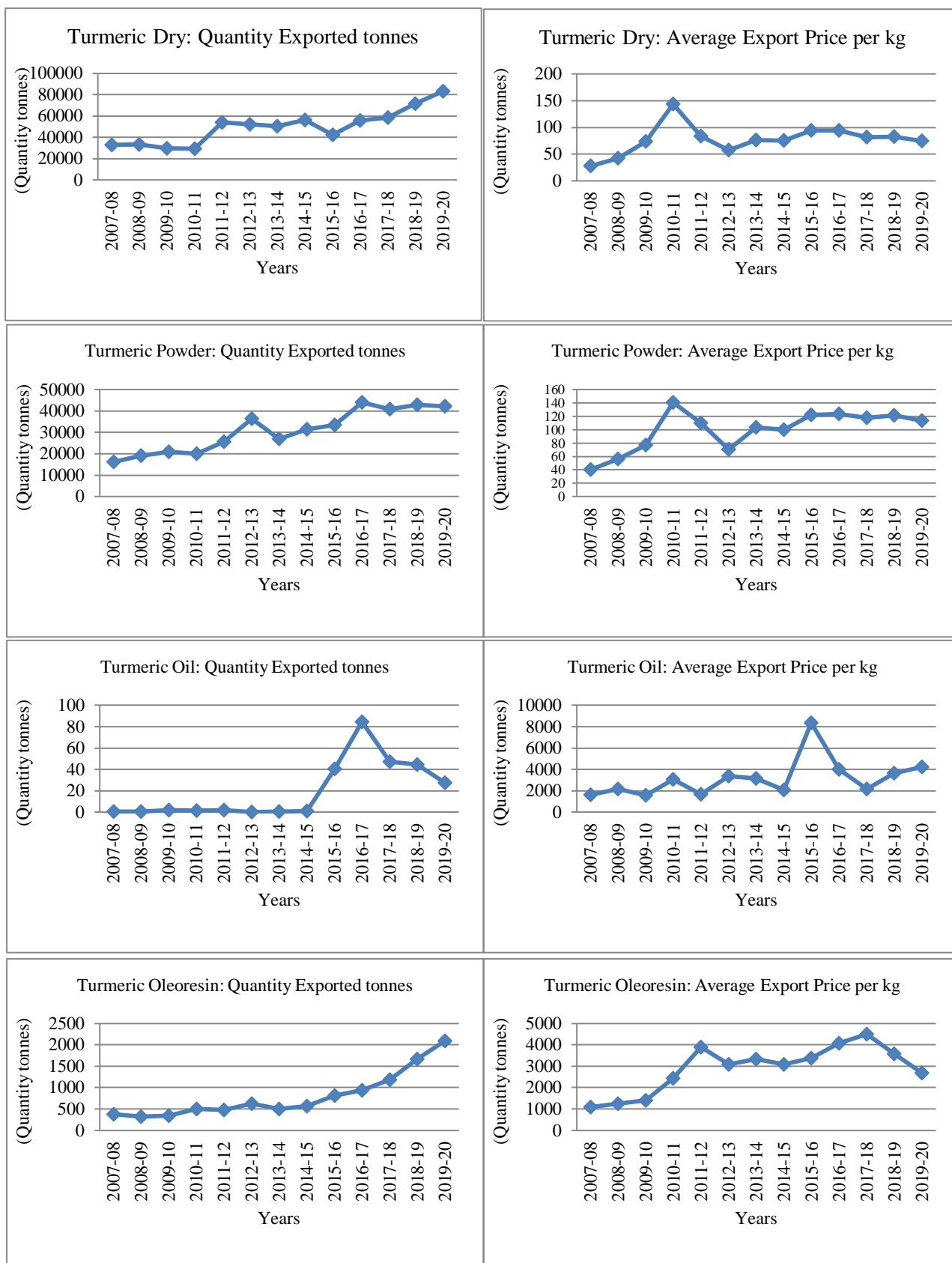
Table 4.2.2 Export of Turmeric and Turmeric Products (2007-08 to 2019-20)

Export of Turmeric (Kozihode)			
Turmeric Dry			
Years	Quantity (tonnes)	Value (Rs in crore)	Average Export Price (Rs/kg)
2007-08	32988.15	90.98	27.58
2008-09	33320.08	140.39	42.13
2009-10	29823.72	219.55	73.62
2010-11	29298.61	421.33	143.81
2011-12	53904.72	452.17	83.88
2012-13	52085.37	298.44	57.3
2013-14	50474.92	386.72	76.62
2014-15	56246.23	425.73	75.69
2015-16	42183.97	398.56	94.48
2016-17	55978.09	530.03	94.69
2017-18	58332.34	477.49	81.86
2018-19	71360.11	591.16	82.84
2019-20	83287.39	620.22	74.47
Growth Rate	8.02	0.17	8.63
Turmeric Powder			
Years	Quantity (tonnes)	Value (Rs in crores)	Average Export Price (Per kg)
2007-2008	16262.01	66.02	40.6
2008-2009	19180	10.82	56.41
2009-2010	20926.37	161.67	77.26
2010-2011	19951.49	281.51	141.1
2011-2012	25595.12	282.17	110.24
2012-2013	36427.7	256.43	70.4
2013-2014	26933.34	236.02	103.72
2014-2015	31436.47	314.29	99.98
2015-2016	33469.32	408.54	122.06
2016-2017	44046.93	543	123.28
2017-2018	40890.74	481.43	117.74
2018-2019	42862.06	521.15	121.59
2019-2020	42136.02	479.74	113.86
Growth Rate	8.26	0.18	8.97
Turmeric Oil			
Years	Quantity (tonnes)	Value (Rs crores)	Average Export Price(Rs/kg)
2007-2008	0.52	0.08	1632.69
2008-2009	0.69	0.15	2147.83
2009-2010	1.98	0.31	1580.3
2010-2011	1.54	0.47	3051.3
2011-2012	2.13	0.36	1687.32
2012-2013	0.1	0.03	3400
2013-2014	0.39	0.12	3148.72

2014-2015	1.2	0.25	2077.5
2015-2016	40.51	33.80	8343.96
2016-2017	84.56	33.94	4013.79
2017-2018	47.33	10.26	2168.75
2018-2019	44.43	16.21	3648.95
2019-2020	27.41	11.58	4225.76
Growth Rate	39.15	2.62	8.25
Turmeric Oleoresin			
Years	Quantity (tonnes)	Value (Rs in crores)	Average Export Price (Rs/kg)
2007-2008	370.74	39.95	1077.54
2008-2009	320.61	40.20	1256.69
2009-2010	345.88	48.54	1403.26
2010-2011	503.57	122.87	2440
2011-2012	475.15	184.74	3888.06
2012-2013	623	191.74	3077.69
2013-2014	497.3	165.33	3324.58
2014-2015	569.76	175.27	3076.26
2015-2016	814.68	274.87	3374.01
2016-2017	932.99	380.10	4074.05
2017-2018	1188.93	534.40	4494.78
2018-2019	1663.82	593.92	3569.6
2019-2020	2090.53	560.04	2678.94
Growth Rate	15.50	24.61	7.88
Curcumin			
Years	Quantity (tonnes)	Value (Rs in crores)	Average Export Price (Rs/kg)
2015-16	263.15	186.21	7076
2016-17	630.04	440.84	6997
2017-18	631.40	478.03	7571

Source : Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

Graph 4.2.2 Export of Turmeric and Turmeric Products (2007-08 to 2019-20)



It can be observed that curcumin extracted from turmeric is mainly exported and only a small part of production is retained in the domestic market which is mainly consumed by the pharmaceutical sector, followed by cosmetic and dye sector. In the domestic market, the demand for curcumin is limited because turmeric already forms an essential ingredient of the food habits of every Indian household and hence products such as curcumin tablets produced by the pharmaceutical sector will not be in demand. Further, the price of curcumin and products made of curcumin will not be affordable for Indian consumers, except perhaps a small niche demand. However, curcumin serves as an important export value added product with increasing demand in international markets.

4.2.3 Country-Wise Export of Dry Turmeric by India:

India is a major exporter of dry turmeric and several countries import the product from India. The same can be observed in Table 4.2.3. It can be observed that highest exports of dry turmeric are to Iran and since 2013-14 to 2017-18 the average share of exports to Iran is 20.7 percent. While UAE also had a considerable share in imports of turmeric powder till 2011-12 when one-fourth of the exports were sent to UAE, the share has declined over the years and was as low as 3.97 percent in 2015-16 with slight recovery in the following years. Bangla Desh, Malaysia and Sri Lanka also import dry turmeric from India as can be observed in Table 4.2.3

Table. 4.2.3 Country Wise Export of Dry Turmeric

	Average Export Price Per Kg.	Percent Share in Quantity Exported									
		Iran	U.A.E	Bangla Desh	Malaysia	Sri Lanka	Japan	Morocco	Saudi Arabia	Total	Other
2007-08	27.58	10.8	13.84	8.73	7.87	10.29	6.68	3.26	2.32	63.79	36.21
2008-09	42.13	16	13.73	13.79	12.29	10.45	7.49	1.75	2.92	78.42	21.58
2009-10	73.62	14.15	13.19	13.81	12.21	10.68	8.86	2.94	1.92	77.76	22.24
2010-11	143.81	8.49	22.54	8.69	14.36	6.19	8.82	3.49	2.06	74.64	25.36
2011-12	83.88	7.04	25.83	15.89	7.79	0.51	4.93	4.06	3.62	69.67	30.33
2012-13	57.3	14.62	10.44	7.76	8.62	7.5	5.64	3.22	3.09	60.89	39.11
2013-14	76.62	22.05	10.06	3.61	8.12	8.29	4.17	3.77	4.77	64.84	35.16
2014-15	75.69	18.06	7.71	12.85	6.68	8.6	4.77	4.97	4.27	67.91	32.09
2015-16	93.57	23.92	3.97	8.75	9.93	8.45	3.9	4.18	5.64	68.74	31.26
2016-17	97.18	20.33	4.63	11.76	8.17	6.57	2.79	7.27	5.67	67.19	32.81
2017-18	83.96	19.55	6.82	6.33	9.1	7.75	3.56	9.02	4.65	66.78	33.22
Growth Rate	11.78										

Source : Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

4.2.4 Country Wise Export of Turmeric Powder:

Besides dry turmeric, India is also a major exporter of turmeric powder and the same is indicated in Table 4.2.4 The highest share of exports of turmeric powder is to USA which was 15.33 percent in 2017-18. UAE also has a relatively high share in imports and in 2012-13 the

share in imports was 14.94 percent. European countries such as UK, Netherlands and Germany also import turmeric powder. Infact turmeric powder is imported by large number of countries in the world.

Table 4.2.4 Country Wise Export of Turmeric Powder

	Average Export Price per kg.	Percent Share in Quantity Exported									
		U.S.A	U.A.E	U.K	South Africa	Nether Lands	Germany	Saudi Arabia	Tunisia	Total	Others
2007-08	40.6	14.13	3.6	12.94	5.02	9.74	6.77	2.91	0.46	55.57	44.43
2008-09	56.41	11.99	6.97	13.8	4.28	7.97	6.09	5.01	0	56.11	43.89
2009-10	77.26	10.1	13.31	14.72	8.23	7.1	5.06	3.66	0.54	62.72	37.28
2010-11	141.1	11.53	11.96	8.7	9.29	7.34	5.65	3.66	2.33	60.46	39.54
2011-12	110.24	11.49	10.95	6.39	7.83	6.63	4.53	3.88	4.12	55.82	44.18
2012-13	70.4	14.11	14.94	7.22	7.79	5.93	4.63	5.76	3.41	63.79	36.21
2013-14	103.72	13.52	6.45	8.28	8.97	6.49	4.42	3.98	3.49	55.6	44.4
2014-15	99.98	13.68	9.31	9.29	7.91	5.47	3.99	3.21	3.39	56.25	43.75
2015-16	121.37	15.08	11.08	10.55	6.56	6.87	4.33	3	3.17	60.64	39.36
2016-17	122.06	14.81	10.98	7.4	5.89	4.94	4.59	2.61	3.11	54.33	45.67
2017-18	117.9	15.33	8.41	10.11	6.86	6.98	4.51	2.18	3.51	57.89	42.11
Growth Rate	11.25										

Source: Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

4.2.5 Country Wise Import of Turmeric Oil:

The country wise import of turmeric oil can be observed from Table 4.2.5. The exports of turmeric oil from India were negligible and picked up slightly since 2015-16. It can be observed that in 2017-18, turmeric oil was exported mainly to USA and Canada

Table 4.2.5: Country Wise Import of Turmeric Oil

	Average Export Price per kg.	Percent Share in Quantity Exported				
		U.S.A	Canada	Japan	Total	Others
2007-08	1632.69	0	0	0	0	100
2008-09	2147.83	0	2.9	5.8	8.7	91.3
2009-10	1580.3	0	1.01	0.51	1.52	98.48
2010-11	3051.3	32.47	0.65	19.48	52.6	47.4
2011-12	1687.32	0	0.94	0.47	1.41	98.59
2012-13	3400	0	0	0	0	100
2013-14	3148.72	0	28.21	0	28.21	71.79
2014-15	2077.5	0	0	1.67	1.67	98.33
2015-16	2075.50	3.19	4.01	0.82	8.02	91.98
2016-17	2276.17	27.08	8.3	4.69	40.07	59.93
2017-18	1900	43.85	50.27	2.14	96.26	3.74

Source : Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

4.2.6 Country Wise Export of Turmeric Oleoresin:

The country wise export of turmeric oleoresin is indicated in Table 4.2.6. It can be observed that since 2007-08, the main importer has been USA and from 2007-08 to 2017-18, the share of USA in imports of turmeric oleoresin approximately ranged from 40 percent to 58 percent. Besides, USA, a large number of European countries import turmeric oleoresin. European countries prefer to import value added products such as oleoresins as they are more convenient to use, more hygienic with less scope for contamination and can be more easily transported.

Table 4.2.6: Country wise Export of Turmeric Oleoresin

	Average Export Price per kg.	Percent Share in Quantity Exported									
		U.S.A	Germany	Denmark	U.K	Japan	France	Nether lands	Australia	Total	Others
2007-08	1077.54	47.94	5.6	6.58	10.29	3.56	2.56	3.86	1.8	82.19	17.81
2008-09	1256.69	47.29	5.46	4.47	9.46	6.48	2.35	3.54	1.95	81	19
2009-10	1403.26	39.27	7.99	7.05	9.46	3.76	3.84	3.99	2.35	77.71	22.29
2010-11	2440	42.46	6.54	6.1	7.58	14.62	1.19	4.17	1.67	84.33	15.67
2011-12	3888.06	44.75	7.74	6.79	5.79	3.73	2.11	3.8	3.21	77.92	22.08
2012-13	3077.69	52.01	5.78	5.94	7.06	2.89	1.93	2.41	1.12	79.14	20.86
2013-14	3324.58	41.67	6.69	6.8	7.51	3.51	1.23	3.54	1.24	72.19	27.81
2014-15	3076.26	44.1	11.89	4.82	3.88	3.89	3.14	3.24	1.52	76.48	23.52
2015-16	4059.03	51.92	6.5	4.47	4.19	1.61	3.61	2.45	4.04	78.79	21.21
2016-17	4925.46	58.58	5.4	4.97	2.55	2.62	3.6	2.05	2.09	81.86	18.14
2017-18	5180.64	58.27	4.76	4.87	2.43	1.11	4.36	2.41	1.48	79.69	20.31
Growth Rate	17.00										

Source: Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

4.2.7 Imports of Turmeric By India:

It is well known that India is a major producer, consumer and exporter of turmeric. Despite being a leader in production and far ahead of other countries, India still imports turmeric from other countries and the same can be observed from Table 4.2.7.

The quantity that was imported in 2015-16 was 15922 tonnes and this figure increased to 28613 tonnes in 2019-20 registering a growth rate of 15.78 percent. Other countries are able to export at competitive rates and are not major consumers of their domestic production. India therefore imports turmeric and it is mainly the producers of value added products such as oils and oleoresins that import turmeric.

There are several reasons why India still imports turmeric from other countries despite being a major producer of turmeric. An important factor that is responsible for imports is the

price differential. Discussion with traders who mainly sell to processors and extraction units reveal that the price in the domestic market are higher than that in the international markets and hence processors find it cheaper to import the produce. Secondly, in India there are few varieties such as *Alleppey* and *Lakadong* which have high curcumin content. The demand from extraction units of essential oils and oleoresins is mainly of varieties which have high curcumin content. *Lakadong* variety is grown in North Eastern part of India and transport to extraction units has inherent problems which makes imports more convenient. Finally, the production of turmeric also depends upon climatic conditions and is subject to fluctuations which can have an impact on prices. Hence price volatility in domestic markets can also induce imports of the product.

Table 4.2.7: Import of Turmeric by India

Country	Quantity Imported (Tonnes)	Average Price Per kg.
2015-2016	15922	97
2016-2017	14467	86
2017-2018	17127	93
2018-2019	31040	103
2019-2020	28613	116
Growth Rate	15.78	4.57

Source: Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

4.2.8 Country Wise Imports of Turmeric By India:

In Table 4.2.8, the country wise import of turmeric by India is indicated.

Table 4.2.8: Country wise Imports of Turmeric

Import	Average Price Per Kg.	Country wise Quantity Imported ()Percent Share				
		Ethiopia	Myanmar	Vietnam Soc Rep	Total	Others
2015-16	97	12	27	7	47	53
2016-17	86	20	31	4	54	46
2017-18	93	24	19	15	58	42
2018-19	103	13	11	48	72	28
2019-20	116	17	20	39	75	25
CAGR	4.57	9.10	-7.23	76.71	12.39	-17.13

Source: Directorate of Arecanut & Spices Development, Ministry of Agriculture and Farmers' Welfare, Calicut, unpublished data.

It can be observed from Table 4.2.8 that while Ethiopia and Myanmar were the main countries from which India was importing turmeric from 2015-16 to 2017-18, in the recent years, i.e 2018-19 and 2019-20, imports are mainly from Vietnam. Hence other countries are becoming competitive in producing turmeric and exporting to international markets.

Overall, it can be concluded that though India is a major producer of ginger and turmeric, the country has not been successful in meeting the real challenges of ginger export mainly due to high and increasing domestic demand and slow progress in export of low volume but high value added products such as essential oils and oleoresin. The domestic prices are comparatively higher which adversely affects exports. Further, other countries have less domestic consumption as compared to India and have increased their area under these two crops with the purpose of entering international markets. Their productivity too is higher and hence they can export at competitive prices. India has to face this challenge but can also capitalize on the opportunity considering that developed countries source spices from developing countries.

Policy Implications

Backdrop

India is globally recognized as the home of spices with a rich trading history. The area under spices is 3.91 million hectares which constitutes about 2 percent of the gross cropped area in the country. However, spices are low volume but high value products. The spices produced in the country besides being used for culinary purposes are also converted in to value added products which besides being useful in the food processing industries, are also gaining importance in the pharmaceutical, nutraceutical, cosmetic and textile sector, in view of their useful properties. Among the various spices cultivated in the country, the production of ginger is 12.5 percent while that of turmeric is 13 percent and hence these two crops account for about one-fourth of the country's spice production. The production in fresh and dry form of these two spice crops was observed and further, the usage of ginger and turmeric in different forms such culinary, volatile oils, oleoresins and other uses was roughly estimated after discussion with all stakeholders. The study also observed the intra seasonal and inter seasonal fluctuations in prices of ginger and turmeric as well trade with respect to these two crops. An important objective of the study was to observe the issues that should be addressed by policy which would help to evolve strategies aimed at strengthening the sector and finally usher a robust growth for the agricultural sector.

5.1 Policy Implications:

The spice sector has immense growth potential which can be capitalized only if it is strengthened at every stage, i.e production stage, harvesting and post harvesting stage. Further the value chain also requires interventions and overall development of this sector will help to not only meet the increasing domestic demand but also promote exports. The following policy interventions emerge from our study:

1. India ranks first in the production of ginger and turmeric with a share of about 35 percent in world ginger production and 78 percent share in world turmeric production. However, the country is lagging behind in productivity and there is tremendous scope to increase the same. This is possible by using quality, disease free planting material and better input management which can greatly increase the yield. Both ginger and turmeric crops are impacted by abiotic and biotic stress which leads to crop loss. The

crops cannot withstand waterlogging and hence soils with good drainage are required. A number of diseases such as soft rot, bacterial wilt, stem borer, leaf spot etc often destroy the crop. Certain diseases such as bacterial wilt are not easily eradicated and if the farmers use saved seeds which have been impacted by diseases then the productivity is likely to be reduced. There is therefore need to use certified seeds which are free from diseases and quality planting material in order to enhance yield. Seed replacement with improved varieties is a priority in order to enhance productivity. Integrated Pest Management also plays an important role for quality produce and higher yield. High yield will reduce the cost of production and this will benefit the farmers.

2. Ginger and turmeric are nutrient exhausting crops and if grown continuously on the same soil, the productivity is likely to get reduced. It is therefore important to shift the cultivation of the crop and also apply suitable nutrients in order to enhance productivity. Intercropping with leguminous crops, crop rotation and organic manure are some practises which must be followed to maintain the fertility of the soil.
3. Suitable storage facilities are also important so that no damage is caused, especially if the crop is used as seed in the next season. Non-availability of cold storages and godowns lead to huge post harvest losses. Hence intervention is required to increase the availability of scientific storage facilities. Processing of ginger and turmeric is largely in the form of sun drying and modern infrastructure such as mechanical driers should be encouraged to expedite the drying process and also produce high quality clean produce.
4. Ginger and turmeric are gaining importance in North East and they have the potential to promote the agricultural sector. However, there are several constraints to achieving this as farmers are resource poor and there are infrastructure bottlenecks. Majority of farmers use their own seed which suffer from quality and thus the crop suffers from diseases such as rhizome rot which lowers the yield. The North Eastern states also suffer from labour shortage, the post harvest practises are also obsolete. While marketing the produce also, the farmers have small lots to offer and there is poor connectivity in the interiors. Hence these issues must be addressed by providing farmers with disease free seeds and also promoting mechanization to cope up with labor shortage.
5. Sikkim is an entirely organic state and hence the produce of ginger and turmeric is purely organic. However, farmers are not able to realize a premium price for their produce. There is no organized wholesale market in Sikkim and the produce is aggregated by traders who operate in procurement centres in Sikkim. The produce after

being aggregated is normally transported to a regulated market in Siliguri which is a nearby regulated market in West Bengal. The market infrastructure in Siliguri is not suitably designed to handle organic produce. Often the organic produce in such markets is mixed with conventional produce which lowers the price realized by producers. Hence while attempts are being made to ensure that organic produce fetches a premium price, more emphasis must be placed on branding the produce so that the grower can benefit from organic farming.

6. Organic turmeric is also produced in Erode in Tamil Nadu. While the cost of cultivating the produce was much higher, some farmers stated that they also benefitted from premium price especially in export markets. However, several farmers are reluctant from cultivating organic turmeric is because they have to pay unaffordable fees for certification. If the produce is rejected as organic produce by the certification agency, then the farmers find it difficult to sell their output even in domestic markets. Therefore the loss to the farmers is on two counts, i.e high cost of cultivation as well as loss of markets if the produce is not accepted as organic. Hence, subsidy should be given for certification and proper training to farmers who practise organic farming so that their produce is pure.
7. Ginger and turmeric both suffer from intra seasonal as well as inter seasonal price fluctuations. If prices of the products are high in a particular season and farmers make reasonable profits, then they tend to increase the area under the crop in the next season. This leads to excess production and without corresponding demand the prices tend to fall thus causing losses to farmers. Hence efforts should be made to ensure that huge fluctuations in prices do not occur as it brings instability in the ginger and turmeric economy. In case of turmeric, there is a futures market which can reveal the assessment of anticipated future demand and supply. Hence the price in the futures market must serve as a guiding factor to the farmer to make the decision on allocation of area to the crop. This will enable the farmer to withstand price fluctuation and the demand and supply can also match. However, most farmers are small and marginal and cannot directly participate in futures market because of minimum trading quantity thresholds and also maintaining daily mark to margins is difficult. The farmers also have limited knowledge about market operations on futures trading. Hence farmers can benefit from futures trading only if producer organizations are formed which can participate in the market on behalf of farmers. The farmers must also be trained on the benefits of futures

markets as the prices in these markets will be more useful in deciding their cropping pattern, as compared to resorting to the previous year's price as a guiding force.

Farmers must also bring quality produce to the markets as this will enable them to fetch higher prices. It was noted that in certain markets such as Nizambad market, the turmeric that is brought to the market has very high moisture content. Normally moisture content should not exceed 12 percent, and if the moisture exceeds this limit, the produce has to be sold at a discount. Farmers should be given suitable training to ensure that they bring quality produce to the market.

8. While India is a world leader in the production of ginger and turmeric, the produce is largely consumed in the domestic market. Although exports have high potential, only a limited portion of the produce is exported. There is tremendous scope to increase the productivity of the crops and hence increase the production. The increased production will not only satisfy the domestic demand but also make the country competitive in the export markets. Value addition of both the products have huge demand in international markets and India has huge opportunity to capitalize on this potential. Barely 5 percent of ginger produced is exported, although the demand is increasing in the international markets. World export trade in quantity of ginger exported reveals that the share of China is 69.14 percent (2018) while that of India is 3.72 percent. This reveals that India can increase its share in world trade, by increasing productivity and this opportunity must be capitalized as developed countries largely source their requirements from developing countries.
9. China also leads in export of crushed or ground ginger in value terms, with a share of 37 percent while India ranks second but is far below with a share of 14.63 percent. The ground ginger exported from India was mainly from varieties grown in Kerala which had good flavour, low fibre and high oil content. However, India can no longer be competitive as labor costs are high in Kerala. Efforts must be made to promote cultivation of such varieties at competitive prices.
10. The export of ginger products such as ginger oil and turmeric oil from India is negligible and constitute even less than 1 percent of total quantity of exports. The demand for such products is increasing in developed countries by fast food chains and pharmaceutical sector because they provide consistency in flavour, have low microbial load and easy to transport. Hence efforts should be made to increase the export of such value added products.

11. India also imports ginger and the value of dry ginger imported constitutes about 40 percent of the total ginger and ginger products imported. Discussion with stakeholders revealed that dry ginger is imported for further processing into value added products such as ginger essential oils and oleoresins. The country must ensure that suitable varieties with high yield are cultivated so as to make the product available in domestic markets at competitive prices.
12. In order to promote exports of turmeric to countries such as USA and West Europe, it is necessary to improve the production of varieties which have high curcumin content. In India, Lakadong variety in North East, and a few other varieties in the south are known to have high curcumin content and hence all post harvest management with respect to these varieties which is must be practised so as to capitalize on export earnings. The demand for curcumin is increasing by the pharmaceutical and food sector in domestic as well as international markets. Hence the production which is less than one thousand tonnes, must be increased as it will bring considerable gains to the turmeric economy of the country.
13. While India produces about three fourth of the world production of turmeric, the country still imports the product. While the product was traditionally imported from Ethiopia and Myanmar, in recent years, Vietnam has become a major exporter to India. Hence it is important that the country produces high yielding varieties of turmeric with high curcumin content in order to restrict imports but instead be a major exporter of the produce.

Overall, it can be concluded that there is tremendous potential for ginger and turmeric to strengthen the agricultural sector by adopting suitable strategies. But this needs to happen scientifically at every stage from production to post harvest and finally processing stage. There is scope to widen markets in both domestic and international markets for both the crops as well as their value additions. The government is certainly aware of the potential of spice crops and many schemes are in place to meet these challenges. If the bottlenecks are addressed, the spice economy will certainly boost the agricultural sector.

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Annexure I
Comments on the Draft Report received from
Agro-Economic Research Centre, Sardar Patel University,
Vallabh Vidyanagar, Anand, Gujarat

Comments on draft report	
1. Title of report	Assessment of ratio of different products/forms of spices being marketed: Study based on Ginger and Turmeric (Consolidated report)
2. Date of receipt of the Draft report	December 8, 2020
3. Date of dispatch of the comments	December 10, 2020
4. Comments on the Objectives of the study	Covered all the objectives that required for the study.
5. Comments on the methodology	Study is based on both primary and secondary data. Primary data were collected through field visits to selected markets in the states of Assam, Andhra Pradesh, Telengana, West Bengal, Kerala, Chennai and Maharashtra. Methodology followed in the study is proper to justify the objectives of the study.
6. Comments on analysis, organization, presentation etc.	The overall analysis, chapter organization and presentation is very good and impressive.
7. References	The references are adequate and cited properly.
8. General remarks:	It is a very good and comprehensive report covering the status of

production and marketing of two important spice communities in India. The suitable policy implications are suggested.

9. Overall view on acceptability of report:

Few minor suggestions are marked on soft copy of the report which can be incorporated. The report may be submitted to the Ministry after incorporation of minor suggestions.

Annexure II

The edit comments made by Agro-Economic Research centre, Sardar Patel University, Vallabh Vidyanagar, Anand, Gujarat have been addressed.