

**TRENDS IN ARRIVALS AND PRICES OF MAJOR
VEGETABLES IN GONDIYA DISTRICT OF
MAHARASHTRA**

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B.Sc. (Agriculture)

**MASTER OF SCIENCE
IN
AGRICULTURE
(AGRICULTURAL ECONOMICS)**



**DEPARTMENT OF AGRICULTURAL ECONOMICS
COLLEGE OF AGRICULTURE, LATUR
VASANTRAO NAIK MARATHWADA KRISHI VIDYAPEETH,
PARBHANI- 431 402 (M.S.), INDIA**

2021

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VEGETABLES IN GONDIYA DISTRICT OF
MAHARASHTRA**

BY
Miss. RAUT PRAJAKTA SEVAK
B.Sc. (Agriculture)

**A thesis Submitted to the
Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani
in partial fulfillment of the requirement for the degree of**

**MASTER OF SCIENCE
IN
AGRICULTURE
(AGRICULTURAL ECONOMICS)**



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COLLEGE OF AGRICULTURE, LATUR
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PARBHANI – 431 402 (M.S.), INDIA**

2021

DECLARATION BY THE CANDIDATE

I hereby declare that the thesis entitled, "TRENDS IN ARRIVAL AND PRICES OF MAJOR VEGETABLES IN GONDIYA DISTRICT OF MAHARASHTRA", submitted by me is based on the actual work carried out by me under the guidance and supervision of **Rajesh Digambarrao Shelke**. The extent of information derived from the existing literature have been duly cited and referenced. The existing research work or its any part is not submitted anywhere else for the award of any degree.

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Place: Latur

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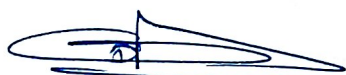
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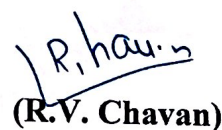


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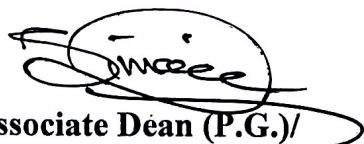
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"A successful venture is not only the effort of an individual but also it is an artistic creation with the help of eminent persons".

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Place : Latur

Date 30/7/2021


(Raut P. S.)

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THESIS
ABSTRACT

THESIS ABSTRACT

1. Title of the thesis : Trends in arrivals and prices of major vegetables in Gondiya district of Maharashtra.
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-

ABSTRACT:

India is the second largest producer of vegetables, next only to china. India accounts for 14% of world production of vegetables with an annual production of 189 million tones during the year 2019-2020. India ranks first in the world production of okra, second production of brinjal, cabbage, cauliflower, onion, potato and third in production of tomato. The major vegetable producing states in India are Uttar Pradesh, west- Bengal, Bihar, Orissa and Tamil Nadu, accounting for 17%, 16%, 10%, 7%, and 6% respectively of total vegetables production in India. Vegetable crop are grown in India under various agro climatic-ecological conditions. The commercial cultivation of Vegetables has resulted into improved socio- economic and nutritional status of the masses. Vegetables are essential constituents of nutritional security and Indian agriculture due to their economic viability, nutritional Effluence high yield,

and ability to bring forth on- farm as well as off- farm employment. It is one of the most important and fast growing sub - sectors of the food processing sector. The huge geographical area and innumerable agro- climatic niches in India exert a substantial influence. Yearly growth rates (compound) of arrival were calculated with respect to Potato in Gondiya market and in Gondiya market growth rate was calculated for four periods. Highest growth rate was in period IV is (15.06 per cent) among all four periods. In case of prices the highest compound growth rate was in period II (28.49 per cent). CGR for period I, III, and IV was 8.82, 11.58 and 9.017 respectively. Yearly growth rates (compound) of arrival were calculated with respect to Cauliflower in Gondiya market growth rate was calculated for four periods. Highest growth rate was in period IV is (11.79 per cent) among all four periods.. In case of prices the highest compound growth rate was in period II (17.35 per cent). Yearly growth rates (compound) of arrival were calculated with respect to Cabbage in Gondiya market and the growth rate was calculated for four periods. Highest growth rates was in period IV is (13.77 per cent) among all four periods. In case of prices the highest compound growth rate was in period II (16.73 per cent). Yearly growth rates (compound) of arrival were calculated with respect to Brinjal in Gondiya market and the growth rate was calculated for four periods. Highest growth rate was in period IV is (13.44 per cent) among all four periods. In case of prices the highest compound growth rate was in period I (12.65 per cent).

From the results of the analysis of the Market Movement in Arrival and Prices of Major Vegetables in Gondiya Market, it found that the Growth in prices is positive and significant in whole period. Instability Indices of the prices of the Vegetables were more unstable as compared to arrivals during the selected period. The increase in arrival of Vegetables in market led to decline in prices.

The seasonal indices of arrival of Chilli was computed and it revealed that monthly indices were highest in month of July (125.95 per cent) and lowest is in the month of January (78.59 per cent). Seasonal indices of prices of Chilli was also computed. It is observed that monthly indices of prices were highest in month of January (128.55 per cent) and the lowest in the month of August (73.42 per cent). The seasonal indices of arrival of Ladies Finger was computed that monthly indices were highest in month of February (174.14 per cent) and lowest is in the month of September (65.25 per cent). And seasonal indices of prices of Lady Finger was computed. It is observed that monthly indices

were highest in month of September (124.88 per cent) and the lowest in the month of January (82.52 per cent).

The seasonal indices of arrival of Ginger was computed that monthly indices were highest in month of July (128.08 per cent) and lowest is in the month of September (79.71 per cent). And seasonal indices of prices of Ginger was computed. It is observed that monthly indices were highest in month of April (122.75 per cent and the lowest in the month of February (64.08 per cent). The seasonal indices of arrival of Garlic was computed that monthly indices were highest in month of December (125.33 per cent) and lowest is in the month of March (85.82 per cent). And seasonal indices of prices of Garlic was computed. It is observed that monthly indices were highest in month of April (143.14 per cent) and the lowest in the month of January (75.28 per cent). In Onion crop the cease end result published that, the degree of association used to be located between Gondiya and Amgaon markets. i.e. about 0.798** which used to be discovered to be noticeably significant at one per cent stage of significance. Association was once located to be statistically huge at 0.05% of significance. In Potato crop the cease end result published that, the degree of association used to be located between Gondiya and Amgaon markets. i.e. about 0.899** which used to be discovered to be noticeably significant at one per cent stage of significance. In Tomato crop The cease end result published that, the degree of association used to be located between Gondiya and Amgaon markets. i.e. about 0.894**t which used to be discovered to be noticeably significant at one per cent stage of significance. Yearly growth rates (compound) of arrival were calculated with respect to Onion in Gondiya market and the growth rate was calculated for four periods. Highest growth rate was in period IV is (11.21 per cent) among all four periods. In case of prices the highest compound growth rate was in period I II (29.89 per cent).

The results of the study show that there is strong market integration among selected market pairs which can be due to movement of produce from one market to another market. Therefore, in order to continue the competitive condition of these markets there is need to strengthen the market intelligence and communication within markets which would provide a better platform for guiding the farmers in marketing their produce.

CHAPTER – I

INTRODUCTION

CHAPTER-I

INTRODUCTION

India is the second largest producer of vegetables, next only to china. India accounts for 14% of world production of vegetables with an annual production of 189 million tones during the year 2019-2020. India ranks first in the world production of okra, second production of brinjal, cabbage, cauliflower, onion, potato and third in production of tomato. The major vegetable producing states in India are Uttar Pradesh, west- Bengal, Bihar, Orissa and Tamil Nadu, accounting for 17%, 16%, 10%, 7%, and 6% respectively of total vegetables production in India. Vegetable crop are grown in India under various agro climatic-ecological conditions. The commercial cultivation of Vegetables has resulted into improved socio- economic and nutritional status of the masses. **(Source: www.statista.com).**

Vegetables are essential constituents of nutritional security and Indian agriculture due to their economic viability, nutritional Effluence high yield, and ability to bring forth on- farm as well as off- farm employment. It is one of the most important and fast growing sub - sectors of the food processing sector. The gargantuan geographical area and countless agro- climatic niches in India exert a substantial influence. On the supply of most of the agricultural commodities. This is especially residence for the vegetable crops due to wide ecological amplitude and the shorter growth periods as compared to many other crops, Incremental per capita income, urbanization, health awareness, transformation of farmers preference to high value crops is the important element for fuelling the vegetables growth in the country. Marketing of horticultural crop is complex especially because of perishability, seasonality and bulkiness within horticulture, Vegetables growing is considered more important as it generates more income and employment, promotes equity, improves nutrition and protects and to retain environment. As far as production is concerned India has emerged as the second largest produce of vegetables with the production of 189 Million metric tons. In the year (2019-20) and area covered under vegetables is 10.1 Million hectares and in Maharashtra the production of vegetables is 50.96 lakh MT per year, whereas the area is covered under vegetables is 4.04 lakh ha). **(Source: www.statista.com).**

Vegetable cultivation is an important source of income to the farmers besides having potential for generating employment in rural and sub- urban areas. Vegetables

crops like other agricultural crops are produced seasonally but some of them are marketed throughout the year. This leads to violent fluctuation in the arrivals and prices over time which introduces an element of uncertainty that affects both producers and consumers in terms of lower prices received by the farmers and higher prices paid by the year. Vegetable production is highly seasonal, which leads to seasonality in the market arrivals and prices. The effects of seasonality in the arrivals and prices of vegetables are further intensified by the year to year variation in the production of vegetables. The importance of such seasonality in vegetables arrivals and prices is well known and deserves proper consideration while attempting any improvement in the vegetable marketing system. Agriculture producer means all produce (whether processed or not) of agriculture, horticulture, animal husbandry and forests as specified in the schedule. The agricultural produce market committee were established by State government for regulating the marketing of different kinds of agricultural produce. The market information relating to market prices and arrivals over a period of time helps the farmers to take decision about the future production pattern and sale of agricultural commodities in the market during specific period and Agriculture is an important sector of the Indian economy, accounting for 14 per cent of the nation's GDP, about 11 per cent of its exports, about half of the population still relies on agriculture as its principle source of income.

Price fluctuations play a predominant role in creating uncertainty in the income levels of vegetable growers and prices paid by consumers. It is believed that producers share in consumers rupee is very low in vegetable crops are compared to many other field crops. In addition to this, an increase in consumers price is not fully reflected in a matching increase in producers price. Therefore, a greater share of the consumers price taken away by the intermediaries. In fact low producers share in consumers rupee, particularly in high production and arrival period, has been a matter of serious concern for policy makers in India. The seasonality in production associated with poor marketing facilities exaggerates the adverse movements of arrivals and prices.

1.1 Nutritive value of vegetables

Vegetable cultivation provides a good source of income to the grower and plays an important role in human nutrition. Higher nutritive value and high economic returns per unit area are the advantages of vegetable growing from the nutritional point of view vegetables are of greater significance in enriching the food resources. This per capita daily consumption of vegetables in advanced countries is 316 gms, whereas in India, it

is only 30 gms. According to dieticians the per capita daily requirement of vegetables in 280 gms per capital consisting 85 gms of root vegetables, 115 gms of leafy vegetables and remaining 80 gms of other vegetables. This quantity should be on higher side because majority of Indian population is vegetarian, but the present vegetable consumption of India constitutes hardly 8 to 10 per cent of the total food intake.

1.2 Marketing of Vegetables

Marketing of vegetables involves a scientific procedure with regards to grading, packaging, transportation, storage for domestic selling and export since the vegetables are highly perishable in the nature. Agricultural prices on the one hand determine the income of farmers and on the other hand affect the level of consumption of people engaged in other sections of the economy. Vegetable prices are very sensitive to supply and income of the people. The vegetables business provides an excellent opportunity for producers and consumers to diversify their business and tastes, respectively.

1.3 Vegetables source of income and employment

Majority of the vegetables production is seasonal in nature, which provides good source of year round employment to the vegetable producer. It is also a good source of income generating activity. The income received from vegetable crops. Vegetables reduces the income risks of producers.

Therefore, marketing rightly considered an basal activity in addition to improved input like seed and fertilizer in modern agriculture. The study of the relationship between market arrivals and prices is very helpful. Larger production and larger arrivals affect adversely to the prices. As a result, the prices usually go down. To accomplish the bourne of efficient marketing, in-depth studies on seasonal variations and prices are needed. Such studies make the farmers aware of the optimum time to sell their products and also help the policy makers chasten the supplies and to fix the prices.

OBJECTIVE:

1. To study trends in arrival and prices of major vegetables.
2. To know seasonal fluctuation of arrival and prices of major vegetables.
3. To study market integration in different major vegetables market of Gondiya district.

SCOPE OF THE STUDY

The present study of price differentials between the wholesaler and retail markets of vegetables in Gondiya will be useful to both producers and consumers in know the relative advantages. The study would also be useful to the research worker, policy markers/planners and extension workers in many fold ways. Research workers would study the further reasons and reduce the gap between the prices in wholesale and Retail markets. Further findings will also helpful to farmers to manage the supply of vegetables. The results of the study will also be useful to the State government to implement the concept of parallel marketing channel. That is Shetakari Bazar on the line of Apni mandi in Uttar Pradesh and Raythu Bazars in Andhra Pradesh by providing good infrastructural facilities to the producers for the benefits of producers and consumers.

LIMITATIONS OF THE STUDY

1. The source of data may not provide sufficient supporting material to allow the researchers to judge the quality of the research.
2. The data sources may lack realiability and creditability.
3. Some secondary data may simply be inaccurate.

HYPOTHESIS

1. Prices of major vegetables are low in peak season and high in slack season.
2. Market prices determine the market arrival of the vegetables in the market.

CHAPTER – II

REVIEW OF LITERATURE

CHAPTER-II

REVIEW OF LITERATURE

Review of literature forms an integral part of research work. Review of literature published elsewhere related to the subject under study is always useful to the investigator to outline the problem of research, formulate objectives, choose suitable methodology and avoid unnecessary duplication of efforts. It also provides general orientation about the topic of investigation by creating an insight and sense of integration about the subject as a whole. An attempt is made to review the literature on the problem in this chapter. The review of literature is grouped under the following heads.

1. To study trends in arrival and prices of major vegetables.
2. To know seasonal fluctuation of arrival and prices of major vegetables.
3. To study market integration in different major vegetables market of Gondiya district.

1.1 To study trends in arrival and prices of major vegetables.

Sidhu *et al.* (2010) the present study was conducted in Rajpura block of Patiala district in Punjab with a sample of 50 vegetables growers. The total cost of cultivation was estimated at Rs 49563/ha for onion and Rs 34840/ha for cauliflower. The net returns were found higher for onion (Rs 74597/ha) as compared to that from cauliflower (Rs 38072/ha). Majority of these vegetables were being disposed off through commission agent/wholesaler (more than 90 per cent) followed by retailer and directly to the consumer. The efficiency of these market channels can be enhanced through competition by organized retail chains and modernizing the vegetable market system in the state. The wholesale markets of Pune, Ludhiana and Patiala for onion and that of Shimla, Ludhiana and Patiala for cauliflower have been found integrated with price of onion and cauliflower transmitting quickly from the independent to the dependent markets. The highest elasticity of price transmission in onion has been observed between Ludhiana and Patiala markets with almost 90 per cent of the price change in Ludhiana getting transmitted to the Patiala market. Such transmission has been 100 per cent for cauliflower between Shimla and Patiala markets. The price transmission has been observed faster in cauliflower than onion. Though a long-term equilibrium relationship exists between all the studied markets in terms of weekly price of the two

vegetables crops, there also exists a short-run disequilibrium between some of the market pairs with almost 15 to 25 per cent of the fluctuations usually getting corrected within a week. Greater integration in these markets may help the farmers as well as consumers of the vegetables through better price signals.

Kumawat *et al.* (2014) the study revealed that the seasonal indices analysis of arrivals and prices revealed that when major portion of the produce was received in the market, the prices were at the lowest. There was a significant negative correlation between prices and arrivals of Moth bean in Nagaur and Jodhpur. However, there was negative but non-significant correlation in Merta and Jaipur markets. However, in Nokha market, the correlation between arrivals and prices was positive but non-significant. Trend analysis of arrivals of moth bean in Nagaur, Merta, Jodhpur and Jaipur markets showed decreasing trend (nonsignificant) except Jodhpur market where it was significant. However, the trend values of arrivals in Nokha market showed positive but non-significant trend over the years. The result showed that During the peak period, the prices of moth bean are depressed. Therefore, government should enhance efforts in procurement of moth bean at MSP in the peak period. Farmers should also avail of marketing loans to withhold their produce for some time so that they can get remunerative price during mid period and lean period. Credit facilities should also be given to farmers under Gramin Bhandaran Yojana to have scientific storage facilities at village level.

Bhat *et al.* (2015) the study revealed that the vegetables are perishable nature, if marketed under the Model Act due to shortage of storage facility there is high level of volatility in arrivals and prices. The GOI advised the states to delist fruits and vegetables from the Model WTO amended APMC Act 2003. During the first week of July, 2014, the government of New Delhi has officially delisted fruits and vegetables from the Act. By delisting fruits and vegetables, a new supply chain can be created to guarantee faster supply of these products to consumers by liberalizing trade at the farm gate. This study tries to find out the impact of delisting of vegetables from above Act on market arrivals and prices. To find out the impact of delisting on market arrivals and prices of vegetables in the markets of New Delhi, homogeneity tests were employed. Under, these homogeneity tests, there are many techniques; however Pettitt's test and Buishand's test were used in this study. There was a significant negative shift in arrivals of major vegetables to the markets of New Delhi, while there was rapid increase in prices of vegetables during July to December, 2013 later on started declining. After

June, 2014, prices of major vegetables have shown the upward trend. As arrivals have declined significantly and prices have not shown any significant changes, this implies that delisting has impacted the arrivals of vegetables in the markets of New Delhi. Monthly prices of major vegetables like onion, potato and tomato revealed that there was rapid increase in prices of these vegetables during July to November, 2013 which then started declining. After June, 2014, prices of these major vegetables have shown the upward trend up to September 2014. Monthly prices of onion, potato and tomato in the wholesale markets of New Delhi.

Narwariya *et al.* (2015) the study revealed that the arrivals of chick pea in Jabalpur regulated market is increased over the years from 57256q (2001) to 175034 q/year (2010) during the last ten years with the annual fluctuation of 129.3% (78223.1q). Out of the total 57.1% of the arrival of chick pea was arrived in the peak season while 32.5% to 20.4% was found to arrive in the mid and lean season respectively. The price of chick pea was found to be maximum in lean season that is 102% more than the average price (Rs1654/qt) followed by peak period (3%) less and mid season (1%), The rate of change of chick pea showed negative response in the year 2004. The elasticity of supply of chick pea was also found positive and inelastic for all the years, The correlation between annual arrivals of chick pea was 0.8 to 0.9 for the different months of the years.

Navadkar *et al.* (2015) to study the arrivals and prices of green gram in Barshi tahsil of Solapur district. The time series data on monthly arrivals and prices of green gram were collected from the purposively selected APMC, Barshi for the years from 2001-02 to 2011-12 in order to compute the trends, growth rates and relationship between arrivals and prices. The market arrivals of green gram revealed that variability in arrivals of green gram was maximum during the month of August and minimum in the month of May. In case of price variability of green gram there was maximum variability in prices during the month of February and minimum in the month of August. At the Barshi market, the prices of green gram have been increasing rapidly over the period of 11 years ending 2011-12 and at a faster rate. The arrivals could not increase at the similar rate of prices during this period, where they otherwise showed a casual increase which may be due to decline in production and productivity of green gram in the study area. The arrivals in this market were, thus, inversely correlated to prices.

Kanungo (2015) the study revealed that turmeric is grown as a Kharif crop in India. The crop-harvesting season starts between end of January and March in India. The country is the leading producer, consumer and exporter of turmeric in the world. It has

near monopoly in this commodity. Indian turmeric has been known to the world since ancient times. India accounts for 78% of world turmeric production and it contributes 60% to the world market. Major turmeric growing states are Andhra Pradesh (57%), Tamil Nadu (23%), Karnataka (6%) and Orissa (4%). Indian turmeric is considered as the best in the world because of its high curcumin content. The statistical analysis explains that the market arrival has a great impact on price formation. This impact is explained by an inverse relationship between market arrival and price. It is a well known fact that the agriculturist particularly the small and marginal farmers and tenant cultivators have a weak bargaining strength and very low retention power. They cannot sustain withholding the surplus stock even for a week after harvesting. Many reasons are attributed for this distress sale such as lack of storage, low level of pecuniary income, a disrupted income flow, current social obligation, and indebtedness to the unauthorized money lenders or village mahajanas, proper infrastructure, lack of all weather transport and inadequate market information.

Shelke *et al.* (2016) an attempt has been made in this study to find out the trends in arrivals and prices of onion, in two market of Ahmednagar and Rahuri. On the basis of major findings of the study, the seasonal indices of arrivals were noticed higher during the month of January to July and highest in the month of March i.e. 127.04, which was lower during August to September and lowest in September i.e. 62.10. For Rahuri market, the arrival indices were noticed higher in the month of February i.e. (153.10) and lower in the month of October (71.00). Regarding price indices, it was highest in the month of December (130.60) and lowest in the month of April (75.10) when the arrival of Rabi onion commences in the market. During November to December, prices of onion were high, indicating scope for producers to plan the storage period, accordingly. The important marketing functions in the marketing of onion are grading, packaging, storage and transportation. At the overall level, the variability in arrivals of onion was 78.26 per cent and 75.03 per cent for Ahmednagar and Rahuri markets, respectively. In the case of the variability in the prices, it was noticed to be 47.72 per cent and 35.45 per cent for 10 years period (2002-03 to 2011-12) in Ahmednagar and Rahuri market, respectively.

Singh *et al.* (2016) the study was based on the secondary data collected from the State Agricultural Marketing Board that was set up in 1983. The Regulated Market is managed by the Mawiong Market Committee which is constituted by the applied for the study. the study reveal that the compound annual growth for quantity arrival of

broom stick and tezpatta were positive but for potato it was found to be negative during the year 1996-97 to 2015-16. During December the price of broom stick was found to be highest as the quantity arrival was found to be lowest in this month. But for potato, price was found to be highest in the month of November when the quantity arrival was also highest. During August the price of tezpatta was found to be highest where quantity arrival was low. The peak season for broom stick government of Meghalaya as per the provision of the Meghalaya. Secondary data were collected from marketing board of Meghalaya for the commodities that are notified by the state government. Compound annual growth and seasonal index were, potato and tezpatta was found during the month of March, November and January, respectively.

Hile *et al.* (2017) the study revealed that APMCs were established by state government for regulating the marketing of different kinds of agriculture produce for the same market. The market information relating to market prices and arrivals over a period of time helps the cereal growers to take decision about the future production pattern and sale of agricultural commodities in the market during specific period. In Maharashtra state crops are generally marketed in regulated markets, these regulated markets are called as APMC (Agriculture Produce Market Committee). Agriculture Produce Market Committee's help the farmer in disposing of their produce in the market smoothly by reducing the exploitation level and to promote fair trade by providing infrastructural facilities to farmers. The information about organization of APMC was collected from official records of the market committee. Trends in arrivals and prices, seasonal indices, coefficient of variability were estimated by using appropriate statistical technique. The study of APMC, Satara revealed that, organizational structure and composition was established well according to the Maharashtra Agricultural Produce Marketing (Regulation) Act, 1963. The analysis of trends in arrivals and prices revealed that, arrivals of jowar, wheat, soybean, Pigeon pea and chick pea had showed fluctuations yearly during the period under study (2000-01 to 2011-12). The prices of all commodities were found to be increased over entire period. This study suggested that the jowar growers shall bring Jowar for sell in the APMC, Satara during the month of November to January and the wheat growers shall bring wheat for the sell in the APMC, Satara during the month of March to May and in case of soybean, the growers shall bring soybean for sell in APMC, Satara during December to January. Pigeon pea can be brought for sell in APMC, Satara during the month of January to March and the chick pea during December to January in order to get good prices for their produce.

Warade & Chakravorty (2018) the study revealed that the Vegetables' production varies over the period and the arrival of Vegetables in Market led to change in Prices of the Vegetables in Market. The movement in Market can affect consumption and income of growers. Study of stability in Arrival and Prices of Vegetables is need of the hour. For the present study the monthly data on Arrival and Prices on Major Vegetables *i.e.*, Tomatoes, Potatoes, Onion and Red Chili is collected from the records of the Nagpurs' Kalamna Market from 1997 to 2017. The Compound Growth Rates, Instability Indices and Impact of Arrival on Prices are estimated to study Market Movement of Vegetables. From the results of the analysis of the Market Movement in Arrival and Prices of Major Vegetables in Kalamna Market, it found that the growth in Arrival was negative in first period and was positive in tomatoes and Red Chili in second period. Growth in prices is positive and significant in whole period. Instability Indices of the Prices of the Vegetables were more unstable as compared to Arrivals during the selected period. The increase in Arrival of Vegetables in market led to decline in Prices.

Dinesha (2019) the study revealed that the Beans belong to the family Leguminosae. They are considered as nutritious vegetables as they contain high amounts of vegetable proteins besides carbohydrates and vitamins. In India beans are grown in almost all the states. The major beans producing belts are Andhra Pradesh, Karnataka, West Bengal, Tamil Nadu, Maharashtra, Gujarat, Orissa and Punjab. Karnataka is one of the important state producing beans. The major districts producing beans in Karnataka are Belgaum, Dharwar, Bijapur, Hassan, Mysore, Kolar and Bangalore rural. There is regular supply of beans in the market. In view of this an attempt is made to study arrivals and prices of beans in Bangalore rural. The study is based on secondary data. It is collected from the records of the Raitharasanthe market, Yelahanka, Bangalore rural. Raitharasanthe is the first farmers market established in 2002 in Karnataka. The time period is between 2014 to 2016 across a period of 36 months. Simple statistical tools *i.e.*, Pearson's correlation method were used to analyze the relationship between arrivals and price of beans. It is understood that the arrivals were at their peak during September, November, and July. Next peak of arrival were in the months of August and October. The lowest arrivals were observed in the months of April, January and May. The months of high arrivals incidence were obviously associated with the low prices in the market under study. Similarly, the incidence of lower arrivals was associated with the high prices in the market. The result showed that

clearly indicates that the operation of law of demand in the market, attributing to seasonality of perishable commodities.

Kundu *et al.* (2019) to study vegetables are seasonal crops and their supply in the town market is subjected numerous to natural vagaries. Further, due to their perishable nature, they have to be dispatched to market without delay. The supply of vegetable on one hand and the demand for them on the other, at a particular time and market, determines the price. The changes in these determinants over a period of a time will affect the price. High seasonality in prices is generally observed for vegetables. The magnitude of such seasonal fluctuation could be reduced by storing the vegetable for off-season sales. Further, the price spread of vegetables depends on the length of marketing channels and their marketing efficiency. The analysis of such seasonal and other components of time series data on wholesale prices of vegetables and price spread, marketing efficiency of different marketing channel of vegetable are very much important for the policy makers.

Nabi & Tushinder (2019) the study has analyzed the scenario of the vegetables market in India. The principal objective of the study is to examine the scenario of unstable vegetable prices the major causes and its possible solutions, if any. The findings revealed that the roots are both from the supply as well as the demand side. Prices are mostly not affected by its season but it has a strong relation with the dynamic changes which takes place in a particular year in the country. Supply-side causes include higher input prices like an increase in fuel price, increase in transportation cost, poor management and distribution, hoarding system and poor supply chain management. The study suggested some of the solutions for controlling this price volatility to mention few; increase the number of cold storage facility which has higher capacity and qualified personnel, proper supply chain management, vast dried vegetable market, adoption of cooperative farming technique and transparent and e-mandi system. The authors also suggested product diversification to be encouraged for the un-marketed parts of vegetables for removing the problem of price fluctuation.

Chauhan *et al.* (2020) the study revealed that India is ranked third after Canada and China sharing about 11.0% of the global rapeseed-mustard production (72.41 m t) and 24.7% and 29.4% in terms of area and production, respectively, of oilseeds in India during 2018-19. Of the projected demand of 82-101 m t of oilseeds by 2030, contribution of rapeseed-mustard is projected at 16.4-20.5 m t, considering its share of 20%-25% in production. Near doubling the production of rapeseed-mustard from its

current production of 9.26 m t within 10 years is a daunting challenge necessitating multi-pronged strategy. First and foremost approach would be to bridge the exploitable yield reservoir (EP II) of 57.2% in rapeseed-mustard. Seed chain of rapeseed-mustard during 2019-20 was maintained with 55 varieties comprising 35 of Indian mustard, 11 of *toria*, 5 of yellow sarson and 2 each of *gobhisarson* and *taramira*. Varietal mismatches in the breeder seed production was only 5.6% during 2019-20. Breeder seed production was higher by two to three folds than the indents during the last 11 years (2009-10 to 2019-20). During the last 10 years there has been a surge in seed requirement from 2.20 lakh q to 2.64 lakh q. Seed availability during this period was always higher by 2.3%-27.8% than the requirement, except during 2016-17 when a marginal deficit (0.8%) was observed. The seed replacement rate (SRR) is above the threshold level (33% for self- and 50% for cross-pollinated crops) and varietal replacement rate (VRR) is also high as contribution of old and obsolete varieties (released up to 1993) has substantially reduced from 49.4% (2014-15) to 1.7% (2019-20) for Indian mustard; 81.1% (2014-15) to 25.1% (2019-20) for *toria* and 64.0% (2014-15) to 18.9% (2019-20) for yellow sarson. Increased availability of seed, adequate SRR with high VRR are some of the contributing factors for enhanced yield from 1143 kg/ha to 1511 kg/ha during 2008-09 to 2018-19 in rapeseed-mustard. This paper also highlights some of the issues and strategies for quality breeder seed production.

Deekshitha (2020) the study analysed that India is basically an agrarian economy. The growing population urges to emphasis on the emergence of mass agricultural production. Horticulture, being a lions' share in the total agricultural produce, plays a significant role in the progress of this mission. Horticulture is concerned with the growing of vegetables, fruits, flowers and other such plants. Vegetable production has been gaining more importance as the demand is everlasting. In this backdrop, it becomes pivotal to study the current trend in vegetable production in India. Quantitative analysis of vegetable production is being done to explore the trends in the production of vegetables. It is essential to explore the production related issues of vegetables to get better understanding of the ground realities. Hence, a rigorous literature review of agriculture production across the world is done. It is observed that, there are studies on specific issues in the vegetable production in general. However, no paper was found which gives overall picture of vegetable production. Therefore, an attempt was made to study the various issues in the cultivation of vegetables. This include current trends, innovative practices and factors affecting production such as irrigation, fertilisers,

pesticides, technology, finance, market etc. In addition, there were interactions with farmers and government officials regarding the current status of the Agri-affairs. In this paper, the vegetable production issues in other regions, the problems encountered, potent challenges and the possible solutions to adapt to the present situation are also discussed.

Dhende *et al.* (2020) the present study was conducted to access the trends in arrivals and prices of selected agricultural commodities in APMC, Sangli. The trends in arrival and prices of selected agricultural commodities were worked out by using exponential form of equation. The trends in arrival and prices for selected commodities in APMC Sangli during 2007-2008 to 2017-2018 were depicted. The result indicates that, significant increase in arrivals of gram, turmeric and raisins whereas; significant decrease in arrivals of soybean was noticed in the APMC, Sangli during study period (2007-08 to 2017-18). The prices of all commodities were found to be significantly increased over entire period of study.

Meena *et al.* (2020) the present study was undertaken to study seasonality in arrivals and prices of coriander seeds in Rajasthan, a second largest coriander producer in India, using monthly data from January, 2008 to June, 2019. The results of the study depicted the typical seasonal pattern in coriander arrivals. seasonality index shows more than two hundred percent arrivals during peak months i.e. from February to April. Almost 50 to 60 per cent of annual productions arrives in markets during March, April and May months. The variation in prices was comparatively lower than arrivals. Following the law of demand, lowest index in prices was measured in February and highest was seen in November. Seasonal Index for prices varies between 88 to 111 per cent. The coefficient of variation was measured high in arrivals than prices. The prices has shown increasing trend till 2014 but started declining in later years resulted in decreasing supply in the studied market in recent years. There was inverse relationship between arrivals and prices in five out of six studied markets. Findings of this study highlights lower prices during peak arrival seasons adversely affects the income of coriander growers in the states, consequently coriander acreage in the state is shrinking. Therefore it is recommend that coriander seed should be covered under price policy support for adherence to ceiling and floor price so that further decline in area under this crop can be arrested.

Saha *et al.* (2020) to study the onion is a significant and essential commodity used in all the Indian delicacies either in raw form or dehydrated form to add flavor and tastes

to cuisine. India is the second largest producer of onion next to china and it is also second highest yielded vegetables in India. Though it shares a considerable amount of area and production among all the vegetables along with high marketable surplus, it fails to approve steady price throughout the year. Instability in market arrival contributing to the price fluctuation is mainly caused by substantial dependence on meterological condition and perishable nature of the crop. Often this high price fluctuation and variation in price causes suffering to the farmers by affecting their income level. It impacts the consumers adversely and also cause inefficiency in the functioning of the market. Realising the importance of the situation, through this paper it has been investigated. The trends in market arrival were positive in three markets expect Azadpur. Trend in nominal price is found positive and for real price it was found negative in all the markets. The result revealed that the Seasonal index of the arrival of different markets remained on the higher side during the peak harvesting season of the particular region and it collides with the low seasonal price index. Variability index revealed the existence of high variability for both of price and arrivals of onion. However, because of presence of significant seasonality in price there is scope for increasing the income of farmers by concentrating on marketing during lean periods.

Saroha *et al.* (2020) the study revealed that the unprecedented crisis hovering over the world due to Covid-19 pandemic has structurally impacted every sector of the world economy. This paper attempts to study the impact of ongoing pandemic in the agricultural sector specific to pulses in India. This paper finds that there is a significantly negative impact of Covid-19 on the pulses market. The market arrival of pulses has declined in the recent period while market demand for pulses has increased, therefore, there exists a supply side shortage for pulses in the domestic economy of India. This paper suggests that Government of India (Agriculture Department) urgently needs to deal with this shortage in supply of domestic pulses in “*mandis*” (agricultural markets). In this paper market arrival for pulses particularly green gram (Moong whole) has been forecasted for the next few months in Indian Agricultural Markets with the forecasting techniques such as Auto Regressive Integrated Moving Average (ARIMA) model and Artificial Neural Network (ANN) technique for pre and during pandemic period by using the arrival data in agriculture markets of India from Agmarknet. The results of this study using ARIMA models and ANNs have been compared to obtain the final conclusions with higher visibility in forecasting performance, which shows that there will be a sharp decline in market arrival with an average arrival of 494 quintals

per day which can be maximized up to 623 quintals per day by stimulating the modal price at maximum possible point. Therefore, the urgent need of upscaling the technical efficiency of the farmers in different agro-climatic zones is needed to meet the domestic demand with domestic supply.

Selvi *et al.* (2020) the present study was conducted to analyse the behaviour of onion arrivals and prices in major markets of Tamil Nadu. The secondary data pertaining to monthly arrivals (qtls) and prices (Rs/qtl) were collected from respective market Management Committee of Oddanchatram, Paravai and Coimbatore vegetable market for 8 years (2011-18). The arrivals of onion had showed an increasing trend up to April 2014 and then start decreasing trend over the year in Oddanchatram market but it showed mixed trend in Paravai and Coimbatore Vegetable market. Prices of onion had displayed an increasing trend in all three markets. Peak arrivals were noticed in the month of March and lowest were observed in September in Oddanchatram markets; maximum arrivals were in May and minimum were in December pertaining to Paravai market whereas arrivals were loftier in January and lean in August in Coimbatore market. The onion prices were high in the month of October and November and low in the month of March and February for all three markets. Results revealed that presence of seasonality within a year and seasonal pattern did not change over years in all markets except the onion prices in Coimbatore vegetable Market.

Timilsina, Bhandari (2020) to study the price and volume variability pattern and analyze the relationship between in market arrival with the prices of major vegetables, a study was conducted in Pokhara wholesale market, Nepal. The study collected seventeen year's monthly data of the wholesale market starting from 2001/02. Farmgate and retail market prices of major vegetables were collected by market surveys. The results revealed that the mean variability in the arrival of sponge gourd was higher, followed by green peas, tomato, bitter gourd, cucumber, cauliflower, and cabbage. The study reported stability in the price of green peas, bitter gourd, and cucumber compared to the prices of cabbage and tomato. The study confirmed numerous cases of positive relationships, though statistically non-significant, between market arrival and prices in terms of coefficient of correlation across months, although a negative relationship was found over the years in almost half of the cases. Computation of compound annual growth rate revealed a 7.22% growth in price and 13.95% growth in the arrival volume of selected vegetables over the years. Regression analysis confirmed that the volume of cauliflower was affected by the price and quantity of its close substitutes. A comparison

between the farms gate, wholesale, and retail prices reveals that the mean price spread of fresh vegetables was 57.33%. The most crucial effect of these price differential was on producers since the mean producer's share was only 42.67%. The study suggested due consideration of the Government of Nepal to enhance market intelligence, stability in price, cold chamber, and cold chain development.

2.2 To know seasonal fluctuation of arrival and prices of major vegetables.

Kumar *et al.* (2005) the study revealed that variability pattern of market arrivals and prices of selected vegetable crops (cabbage, cauliflower, tomato and peas) in metropolitan markets of Delhi, Mumbai, Bangalore and Kolkata. The market arrivals and wholesale prices of different vegetable crops were collected from the selected markets and Agricultural and Processes Food Products Export Development Authority (APEDA), New Delhi, for the period 1990-2001. The results had shown that the extent of variability in the arrivals of cabbage was lower in Bangalore and higher in Mumbai. The prices were relatively stable in Mumbai but were more volatile in Bangalore. A similar pattern in the price variability was seen across different months in Kolkata and Delhi markets. In case of cauliflower, the variability in the market arrivals was more pronounced in Kolkata than the remaining three markets. The price variability was however more marked in Delhi. The extent of variability in the market arrivals of tomato across different months was very high in all the four markets. Likewise, while the maximum variability in the prices of peas was noted for Delhi, these were relatively less marked in Bangalore. The study revealed a negative relationship between market arrival and prices in terms of correlation coefficients over the years and across months in all the four metropolitan markets, though there were several instances of positive relationship.

Delaquis *et al.* (2007) to study the leafy vegetables, including lettuce and spinach, have been implicated in several outbreaks of foodborne disease caused by *Escherichia coli* O157:H7, a pathogen of increasing public health significance because of the severity of the gastrointestinal illness and long-term, chronic sequelae that can result from infection. A definitive association between the consumption of leafy vegetables and human disease provides implicit evidence of transfer from animal sources to field crops and retail commodities, including minimally processed or fresh-cut products. Understanding the behavior of *E. coli* O157:H7 in leafy vegetables during production,

after harvest, in storage, during processing, and in packaged fresh-cut products is essential for the development of effective control measures. To this end, previous research on the fate of the species at each step in the production of market-ready leafy vegetables is reviewed in this study. Several critical gaps in knowledge are identified, not ably uncertainty about the location of contaminating cells on or in plant tissues, behavior in packaged products stored at low temperatures, and the influence of environmental stresses on growth and infectivity.

Kumar *et al.* (2009) the study revealed that the seasonality in arrivals and prices of important vegetable crops (green-chilly, onion, potato and tomato) in Bangalore market for the period 1999-2008. The secondary data pertaining to monthly arrivals and prices were collected from Agricultural Produce Market Committee (APMC) and Karnataka State Agricultural Marketing Board, Bangalore. The Multiplicative Time Series Analysis, twelve month centered moving average and two-way ANOVA were used to evaluate the seasonality in arrivals and prices. Results revealed that seasonality within a year was found in all the crops with respect to arrivals and prices and seasonal pattern had not changed over years in the market except in onion prices.

Sharma (2011) to study India is the second largest producer of vegetables after china. The geographical area and diverse agro climatic niches in the country exert a strong influence on the supply of vegetable crop. The output variations of vegetable crops lead to wide fluctuation in price exposing the growers to high risk. The paper examines the behavior of market arrivals and prices of tomato and their nature of relationship in selected markets over the year. It has been found that both market arrivals as well as price of tomato have shown increasing trends in all the markets during 1991 to 2003. The seasonality in prices of tomato was higher than the seasonality in market arrivals in all the selected markets emphasizing the improvement in the production and protection technologies and imperfection in markets and marketing system of tomato. The selected markets were also not found integrated as shown by the monthly price variations across the markets. The lagged price is an important factor in determining the current price than the market arrivals.

Chikkamath *et al.* (2012) this paper analyses the factors affecting consumer purchase behaviour for major vegetables. The research is based on the data collected from vegetable consumers of NCR of Delhi. The data were collected by personal interviews of 120 respondents. To analyse the data, ANOVA, Chi-Square and Exact Chi-Square tests were used. The results showed that the proportion of income spent on

vegetables decreases as level of income increases. The proportion of consumers preferring to purchase off-seasonal, processed, pesticide free and organically produced vegetable was high in HIG. Majority of low and MIG consumers purchase vegetables from local market or vendors whereas HIG consumers purchase at super markets. Monthly income of family, credit facility/credit card facility, price, education, condition of store, appearance of produce, organic produce, service facility offered by shop and type of market were the factors that significantly affect purchase behaviour of vegetable consumers. The respondents were divided in to three groups based on their monthly family income *viz.* low income group (LIG: Rs. 5187 to Rs 7500), middle income group (MIG: Rs. 7500 to Rs. 25000) and high income group (HIG: Rs. > 25000). The average family income of LIG, MIG and HIG was Rs. 5187, Rs. 18645 and Rs. 49900, respectively.

Naidu *et al.* (2014) the present study was conducted to know the statistical investigation of arrivals and price behaviour of red chillies (*Capsicum annuum*) in Khammam and Warangal markets of Andhra Pradesh, India. Purposive sampling was used to select the markets. In both the markets, the highest and the lowest arrivals of seasonal indices were observed during the month of March and November, respectively. On the other hand, in Khammam market the highest price was observed during the month of March while it was lowest in September. In case of Warangal market, the highest and lowest prices were observed during the month of January and October, respectively. Well defined cycles could not be observed during the study period in both markets. The forecasted arrivals and prices in both the markets differed during the study period. A significant relation between arrivals and prices was observed during the period in both the markets.

Shukla and Rai (2014) to studied An economic study of behaviour of market arrivals and prices of onion, garlic and turmeric in selected markets of U.P. This study has been undertaken with the twin objectives of examining the variability pattern of market arrivals and prices of selected crops (Onion, Garlic and Turmeric) in selected markets (Lucknow and Kanpur) of Uttar Pradesh and analysing the relationship between market arrivals and prices. The study is based on market arrivals and wholesale prices of selected crops collected from Rajya Krishi Utapadan Mandi Parishad, Lucknow (U.P.), Krishi Utapadan Mandi Samiti, Lucknow and Krishi Utapadan Mandi Samiti, Kanpur for the period 2001-2010. data was analysed in terms of mean value for each month and the co-efficient of variation. The Karl Pearson correlation co-efficient

was computed to find the degree of relationship between market arrivals and prices. The prices of the different commodities were predicted for different months using appropriate statistical models. The study has shown that the extent of variability in market arrival of onion was lower in Lucknow market but higher in Kanpur market. Its prices variability was lower in Kanpur market and higher in Lucknow market. In case of garlic, the variability in market arrivals and prices was lower in Kanpur market but higher in Lucknow market. In case of turmeric, the variability in market arrivals and prices was lower in Lucknow market but higher in Kanpur market. The study has confirmed the negative relationship between market arrivals prices of onion, garlic and turmeric over the years in all two markets. However, across different months, there have been several instances of positive relationship between market arrivals and prices in Lucknow and Kanpur market.

Sharma & Burark (2015) the paper investigates the price behaviour of maize and market concentration in Nimbahera market of Rajasthan. In view of this the present study was undertaken by collecting monthly wholesale prices of maize in major maize markets of Rajasthan for a period of 12 years (2002 to 2013). The seasonal price index provides a measure of the month to month variation in maize prices. Price of maize was found to be highest during off season and lowest during harvest season. Since maize is a *Kharif* crop, the arrivals were high during October to January. The higher seasonal indices of prices were observed during April to August during which the arrivals were found to be low. The Lorenz ratio was less than 0.5 in Nimbahera market. It can be concluded that the moderate market competitiveness in markets as the arrivals were concentrated among few large traders. The Lorenz ratio 0.49 for maize in Nimbahera market showing moderate market concentration.

Bera *et al.* (2017) the study of extreme volatility in prices of potato is haunting the producers and consumers of the state for the last few years. The instability is greater in market arrival compared to prices across the markets and months within the same markets. In general, peak/ just after harvesting periods have experienced the higher level of fluctuations than lean periods in both cases. Trend in market arrivals is negative in all the markets except Champadanga whereas price trend is positive in all markets with difference in magnitudes. Seasonal indices of markets arrivals reflect an upward movement starting from harvesting season to lean season in Champadanga, whereas a continuous deceleration is recorded in Dhupguri and Memari. Irregular movement is observed in Bishnupur and Jhargram markets may be due to differences in availability

of marketing facilities particularly storage, transport, nearby large terminal markets. Excepting Champadanga market, current price is negatively related with market arrivals and positive with lagged prices which are very common in highly perishable vegetable crops like potato.

Brandon *et al.* (2017) the study revealed that was aimed to examine the behaviour and pattern of fluctuations in market volume and prices of 21 major vegetables consumed in Trinidad and Tobago. The study used monthly data for a period of 10 years from 2006 to 2015 obtained from the National Agricultural Marketing and Development Corporation (NAMDEVCO) to investigate fluctuations in market volume and prices of the selected vegetables. Growth trend and seasonality were worked out using linear and lag models. The seasonal indices were worked out by using ratio to moving average decomposition method which was followed by the evaluation of seasonality. Besides, the nature of relationship between market volume and prices was analysed using a lag-linear model. The results revealed that the seasonality was high (38.71 per cent) in the arrival of large melongene and low (11.79 per cent) in medium sweet peppers arrival to the market. However, the seasonality in price was more (53.68 per cent) in Christophene arrival, while it was less (11.96 percent) in green plantains. The results of lagged linear models indicated that past prices and volumes were important factors that determine the current prices and the marketed volumes in many vegetables. The study found significant importance to trend in market arrivals and price behavior of vegetable crops both over the years and across the months, also confirming a negative relationship between market arrivals and prices over the years. Thus, indicating imperfection in marketing of vegetables in the wholesale market, as the traders used the previous week price as guide for setting the current price of the vegetable.

Singh *et al.* (2017) the study revealed that the Potato is the major vegetable of India. Variation in output of potato over the years leads to wide fluctuation in its price exposing the growers to a high risk situation. To cope with this, information on potential market and quantum of arrivals and prices of potato in different months of year is necessary for farmers. The current study attempted to analyze the variation in arrivals and prices of potato in highest potato producing district of Uttar Pradesh *i.e.* Agra. Time series data for last 10 years on area and production as well as market arrivals and prices of potato was collected from various government organizations. The findings indicated that the annual growth rates in area and production of potato during last ten years were

significant and positive. However in case of productivity, it was insignificant and negative. The annual compound growth rates of arrivals were comparatively higher than that of market price. Inter year variations in market arrivals and prices of potato were observed. The monthly arrival of potato was highest in the month of January and lowest in the month of October. Accordingly, the market price was highest during October-November and lowest in the month of February. The seasonal index of arrival showed that the arrivals were low during June to November and higher during December to May. The results confirmed that there were both negative and positive relationships across months between market arrivals and prices in terms of correlation coefficients.

Agarwal *et al.* (2018) the study assesses the behavior and relationship between arrivals and prices of potato in Dehradun market and tomato and onion in Haldwani market of Uttarakhand. The statistical tools employed includes, exponential function, coefficient of variation, seasonal indices and linear regression analysis. The empirical analysis showed that the area and production of these vegetables are significantly increasing. The arrival of potato and tomato negatively and significantly influenced their prices while the lagged prices had a significant and positive effect on current prices of all selected vegetables. The variability in price of onion is highest amongst all the vegetables and 92 per cent of this is caused by factors other than market arrivals and lagged year prices.

Chaudhary *et al.* (2019) the study revealed that within horticulture, vegetable production is considered important for agricultural development and the economy of the country as it generates more income and employment and promotes equity when marketing is done rightly. The present study was undertaken to examine the trends, relationship, as well as seasonal fluctuations in arrivals and prices of selected vegetables in Baijnath, regulated market of district Kangra in Himachal Pradesh for the year 2010-11 to 2015-16. The analysis shows that the rate of increase in the monthly arrivals is highest for cauliflower whereas for monthly prices it is highest for ladyfinger. The prices of vegetables move contrary to arrivals i.e. prices increased with decreasing arrivals in the market hence negatively correlated. The average monthly variability in arrivals and prices was found the maximum for cucumber and ladyfinger, respectively. The study of seasonal fluctuations in arrivals and prices showed that arrivals of most of the vegetables were higher in the peak season and lower in the lean season. The

correlation coefficient calculated from different market prices of vegetables showed that study market was highly integrated with Kangra market for most of the vegetables.

Asmitaben & Singh (2020) this study explores the behavior of cauliflower markets in the Gujarat. The result revealed that arrivals of cauliflower increases over the year in Ahmedabad. Vadodara and Kheda markets, while declining trend were observed in Surat and Gandhinagar markets. The significant increasing trend were observed in monthly wholesale price of cauliflower in Surat, Ahmedabad, Gandhinagar, Kheda and Vadodara markets. The seasonality in cauliflower arrivals exists in all the selected market of Gujarat. The indices of arrivals were at peak in November-march in most of the markets. The indices of prices of cauliflower was high in month of September and October, later it declined in the month of November to December. Fluctuation in market arrival were largely contributed by price instability. High degree of price association were found between, ahmedabad and Vadodara, Gandhinagar and Vadodara, Kheda and Vadodara markets pairs. This indicated that selected markets were integrated stalwartly.

Haroon *et al.* (2020) the present research was conducted to determine the seasonal volatility of four important vegetables in Punjab. The four vegetables included in this study are onion, tomato, potato, and cabbage. The first three of which are necessary kitchen items in the food consumption of the country. The study area is comprised of the Lahore district of the Punjab province which is the most populous city in the province and the major producer of the vegetables in the country. Secondary data of the year 2010 and 2011 about prices and quantity of these four vegetables were collected from the market committee and agriculture marketing information system Lahore. The price flexibility coefficient was estimated along with the seasonal behavior concerning prices for perishable vegetables. The results indicate that the irregular seasonal and cyclical fluctuations observed every year. Price fluctuations for onion, tomato, potato, and cabbage are seasonal. After the harvest, low prices were observed while price were observed high before the start of the season when relative supply shortage occurs and vice versa. Hence, the study suggests that prices can be controlled by intervening in the market by increasing supply and production using new technology and high yielding seed varieties.

Mulla *et al.* (2020) the present study was to analyse the behaviour of onion prices in Kurnool market and forecasting the prices for the future. Based on secondary data from January 2003 to December 2017, the future prices were predicted for the months

of January to June, 2018 by employing the Auto Regressive Integrated Moving Average (ARIMA) technique. The annual increase in prices of onion in Kurnool market was observed to be ₹ 6.22 per quintal per annum. The highest seasonal index was observed in the month of August and lowest seasonal index was recorded in May. Price cycles were not identified in onion prices. Maximum R-Square (62.34), minimum Mean Absolute Percentage Error (MAPE) (34.96), Root Mean Square Error (RMSE) (454.71) and Mean Absolute Error (MAE) (263.19) was used as a criteria to select the best model for price forecasting. Based on the above criteria the model (1,1,1) (1,1,1) was found to fit the time series to predict future prices. The forecasted price of onion would be ranging from ₹ 2956 to ₹ 1651 per quintal for the months from January to June 2018 respectively.

Saha *et al.* (2020) to study the vegetable plays key role in providing nutrition to human body. Vegetables are major sources of vitamins, minerals, fiber, iron, calcium etc. Potato is the highest yielding vegetable in the world as well as in India. It is one of the significant vegetables of Indian consumer's food basket. Despite of high production, due to seasonal production and perishable nature market arrival and price are highly volatile in nature. So, the present study was conducted with an intension to study the trend in arrival and price of potato in four major markets in India along with their Compound Annual Growth Rate (CAGR) and seasonality and variability associated with them. The study is based on secondary data collected from www.agmarknet.gov.in. Data was collected for the period March 2009 to March 2019, and the analysis was done based on that. Linear trend in arrival and nominal prices were found to be positive across the markets, however for real prices, it was found negative except Bangalore (₹ 5.50/q per annum). CAGR for arrival in all the four markets were found positive, and for real prices it was negative in most of the months. The main season of arrival of potato in different markets was December to March, and for prices index is highest during the off season. Variability in arrival is highest in Agra market and in price variability is highest in Azadpur market.

Sreepriya & Sidhu (2020) the study revealed that the potato is an integral part of the global food system and the world's number one non food grain commodity. During 2018-19 potato acreage in India was 21.84 lakh ha with a production of 52.58 million tonnes. Major potato growing states are Uttar Pradesh, West Bengal, Bihar, Gujarat, Madhya Pradesh and Punjab. Prices of potato exhibit both inter-year and intra-year variations. This price fluctuation in potato is a major concern among farmers,

consumers and policy makers. The current study is an attempt to analyze the behavior of prices and arrivals of potato in the major markets of India. The time series data on the price and arrivals of potato in the major markets of leading producing states were collected from Agmarknet. The data corresponding to the potato prices in future market were collected from MCX (Multi Commodity Exchange of India Ltd.) where it has been traded till 2014. The prices of potato significantly increased over the last ten years compounded annually in all the selected markets. Significant positive growth rate of arrivals was found in Agra and Ahmadabad markets and negative growth rate was found in Jalandhar market. The price and arrivals series have shown significant negative correlation in all the markets. Seasonal indices depict that prices of potato are usually high during the months of October to December and starts declining till April which is in par with the post harvest period of the crop. Price discovery of potato is a complex process and is affected by a number of factors like production, total arrivals, lagged price, future prices, which have been quantified here and other factors like transportation, storage, weather uncertainties and pests and disease attack.

Tamilselvi *et al.* (2020) the study revealed that has been undertaken with the twin objectives of examining the variability pattern of market arrivals (Qtls) and prices (Rs/qrtl) of tomato in three major markets of Tamil Nadu *viz.*, Ottanchatrams Gandhi market, Madurai Paravai market and Coimbatore wholesale market and analysing the relationship between market arrivals and prices. The study is based on market arrivals and wholesale prices of tomato were collected from the respective agricultural marketing committees for the period 2011-2018. Arrivals of tomato showed a decreasing trend in Oddanchatram and Paravai markets whereas an increasing trend in Coimbatore vegetable market. In prices, there was a mixed trend in all the markets. The result showed that Peak arrivals observed during the month of March and lowest in August whereas maximum price observed in July and lowest in February in Oddanchatram market; maximum arrivals in November and minimum in August while highest price in November and lowest in February in Paravai market; peak arrivals observed in December and lean in June whereas maximum prices were.

2.3 To study market integration in different major vegetables market of Gondiya district.

Awal *et al.* (2009) the paper examined the pricing efficiency of exportable fresh vegetables markets in Bangladesh and its export markets by using Engle-Granger (EG)

test, Cointegration Regression for Durbin Watson (CRDW) test and Error Correction Methods (ECM). For the test of pricing efficiency of exportable fresh vegetables markets, the monthly export earnings data were used to test cointegration from July 2004-05 to July 2006-07 yielding a total of 36 observations. Engle-Granger test was used to estimate the integration among the fresh vegetables exports markets in Bangladesh. In the cointegrating set up, error correction method estimated the long-run relationship between Bangladesh and selected export markets. The vegetables export markets of UK-Saudi Arabia, UK-UAE markets and UK-Singapore markets are not integrated and these markets prices were non-responsive. Bangladesh-UK; Bangladesh-UAE; Bangladesh-Singapore; UAE-Saudi Arabia and UAE-Singapore markets are highly integrated due to having the facility of information technology, which closely connected the markets to each other. Bangladesh-UK; Bangladesh-Saudi Arabia; Bangladesh-UAE, Bangladesh-Singapore and Saudi Arabia-UAE markets are found strong form of market integration due to congenial atmosphere existed in these markets. The rest combinations of markets do not support the strong form of market integration because of complication of export procedures, lack of bi-lateral agreement. The speed of price adjustment (8) ranges from 9% to 66 % indicating that price adjustment takes around 3 to 20 days in transmitting information from one market to the others export markets. The highest percentage speed of adjustment was found in Bangladesh and UK markets. This exhibits that if any divergence appears from the long-run equilibrium, it is adjusted towards the equilibrium value by the speed of 66% or 20 days. Price adjustments among the selected export markets were found to be quicker in Bangladesh-United Arab Emirates market (3 days).

Firdaus and Gunawan (2012) to study the Horticulture played an important role in the Indonesian economy. Its share of GDP, which was dominated by vegetables and fruits, tended to increase since 2003 up to 2008. However Indonesian per capita consumption of vegetables was still under FAO recommendation. The study of price integration among regions is important in order to increase the marketing efficiency of vegetables in Indonesia. Government intervention is needed both at the producer and consumer level, especially in determining the efficient prices. The success of this intervention depends heavily on government's understanding of price transmission in the fruits market. This research measured the integration level of regional vegetables markets in Indonesia. Engle-Granger test showed that all vegetable prices at PIKJ integrated with producer's prices, except red chili price.

Ravallion model showed that integration did not exist for all commodities. However, there was no significant difference of the market integration performance between the highest and the lowest production area.

Reddy *et al.* (2012) the study revealed that the availability of market intelligence on various aspects like the potential markets, quantity arrived and prevailing and expected prices in different regions during different months of the year are important in mitigating many of market related problems. Study reveals that there was high variability in the arrival of onion in the month of March and April in selected markets. Among the markets, the coefficient of variation in both arrivals and prices were found to be higher in Ahmedabad and Kolkata. The zero order correlation matrix between two markets average wholesale prices of onion indicated the high integration among the selected markets except Ahmedabad with Mumbai market. This might be due to the movement of produce from one market area to another depending upon price prevailed in the markets. The competitive conditions prevailing in the selected markets might have influenced the movement of prices in the same direction. The magnitude of regression coefficient revealed that an increase in market arrivals by a MT in a month led to an increase in prices by Rs.6.00/MT and Rs. 0.40/MT in Bangalore and Delhi markets respectively. On the contrary, prices of onion decreased in Ahmedabad (Rs. 6.00), Mumbai (Rs. 10.00) and Kolkata (Rs. 2.00) markets with increase in arrivals by one MT in a month.

Omar and Mohammad (2014) the study revealed that the marketing efficiency and price structure in terms of marketing cost and margin, growth, and seasonal price variation of potato marketing. The study was conducted in four districts namely Bogra, Jamalpur, Rangpur and Munshigonj of Bangladesh. Both primary and secondary data were used for the study. Six performance indicators were used for measuring marketing efficiency Growth rate of real prices, area, yield and production increased over the period due to increase demand of the people. Seasonal price variation of potato was the highest in Bogra and the lowest in Jamalpur. Average price was the lowest in February and the highest in December.

Singh(2014) the study revealed that investigates the level of market integration in the South Gujarat onion and potato markets. The results indicated that the correlation co-efficient in monthly wholesale prices for onion and potato between all the selected market pairs were positive and significantly different from zero. The onion and potato prices in these markets were interdependent to the corresponding

market. The results of the study show that there is strong market integration among selected market pairs which can be due to movement of produce from one market to another market. Therefore, in order to continue the competitive condition of these markets there is need to strengthen the market intelligence and communication within markets which would provide a better platform for guiding the farmers in marketing their produce.

Praveen & Inbasekar (2015) the study revealed that of integration among various domestic markets of select agricultural commodities in India has been documented. The degree of integration and the speed of price transmission were found to be different across various commodities. Cereals like rice and wheat showed better integration compared to other perishable commodities. The wholesale and retail markets of rice and wheat were integrated in the long run as well as in the short run. Grams also showed better market integration which may be due to the absence of trade restriction on the domestic trade of grams in India. The domestic apple markets in India were poorly integrated due to weak market infrastructure and institutions as well as lack of competition between domestic suppliers. Markets of other fruits like banana and pineapple also showed poor integration. Among the vegetables, domestic potato markets were poorly integrated in contrast to the better integration among the onion markets. The information flow and the price transmission was found to be effective among the futures and spot markets of some of the agricultural commodities. The spot and futures were integrated in the case of chickpea, wheat and maize, and that of barley was not integrated. Wheat and maize markets showed better efficiency in price discovery.

Patil & Kerur (2016) the study revealed that the India, known as “Land of Spices”, is the largest producer, consumer and exporter of variety of spices in the world. Karnataka is the 12th largest garlic producing State in the country. An attempt was made to know the trend in arrivals and prices as well as Co-integration of the major markets of Karnataka. Bengaluru was the major market for garlic in Karnataka which had a great influence over other markets which were clearly indicative from the results. There was increase in arrivals and prices in Bengaluru market over a period of time. Co-integration results revealed that the prices of garlic in Bengaluru market has a major influence on the prices of all other garlic markets of Karnataka.

Richard and Mathur(2016) the study focused on assessing the spatial price transmission between mustard markets pairs in Rajasthan state of India using monthly

mustard price series of six (6) markets from 2006-2014. The co-integration tests results indicate, Tonk and Alwar; Tonk and Dausa; Bharatpur and Alwar and Sri Ganganagar and Dausa are integrated in the long run at lag one. Tonk and Bharatpur and Bharatpur and Dausa are also integrated in the long run at lag two. Error correction model showed that, the lowest speed of adjustment towards long run equilibrium was from Tonk to Bharatpur at rate of 43.2%. The highest speed of adjustment was 103.8%, running Bharatpur to Alwar market towards long run equilibrium. Impulse response function results shows when an unexpected positive shock is given to market price in Tonk, Sri Ganganagar and Bharatpur, the response thereof from other trading markets will be permanent over a period of twelve months.

Chandra (2017) the study revealed that a country which has a predominance of small land holdings and surplus labour, horticulture and vegetable cultivation, particularly the latter is most suitable. Jharkhand is one of the major producers of vegetables in our country. About 3.2% of the gross cropped area of the State is under vegetable crop. The major vegetable crops grown in the state in order of area covered by them are potato, tomato, lady finger, peas, cauliflower, brinjal, & cabbage. Growing of vegetables has added significance from the point of view of its contribution to national income and employment generation. Cultivation of vegetables is highly profitable. It has the potential of earning almost four times more income per hectare than food crops. Vegetable marketing is a complex issue because of perishability factor. Farmers producing vegetables market it only after consumption. Thus in case of vegetables, marketed surplus is very important. It is the quantum of marketed surplus that decides the choice of different market channels for the farmers. The present paper analyses the marketable and the marketed surplus of selected vegetables and its distribution in different marketing channels in three districts of Jharkhand. Using multistage random sampling method 150 vegetable cultivators were selected from Ranchi, Lohardaga and West Singhbhum districts of Jharkhand for the study. The study found that price has no impact on marketed surplus. There is a need to restructure primary co-operative marketing societies.

Ahmed and Singla (2017) the study revealed that the Market integration and prices in horticultural crops such as onion play an important role in determining the production decisions of the farmers and diversification to high value crops. In this context, the study explores market integration and price transmission in selected onion markets using Johansen cointegration, Granger causality and impulse response

function. The outcomes of the study strongly buttressed to the co-integration and interdependence of onion markets in India. The impulse response function supported that except Mumbai and Kozhikode, all other selected markets are responded well to standard deviation shock given to any of the markets. One of the possible reasons might be that Mumbai is the largest supplier of onion and Kozhikode is geographically dispersed and is a sea port, where foreign produce may be arriving in a larger quantity. The overall regional markets of onion are strongly cointegrateds that allows the private traders and restricts the role of government intervention.

Kumari *et al.* (2017) the present study was undertaken to assess the market integration of oilseeds in India. Secondary data on monthly whole sale prices were collected for the period of 24 years i.e., 1980-81 to 2003-04. The data collected from Agricultural prices in India year books. Price series correlation and Augmented Dicky Fuller (ADF) tests were used as analytical tools. The results revealed that all the selected oilseeds namely groundnut, rapeseed and mustard, linseed, castor, sesame, soybean and sunflower markets were well integrated at the same order and there is existence of integration of prices among the selected oilseeds markets in India. Therefore, emphasis should be laid on marketing efficiency of the above selected oilseeds by high quality seeds by creating awareness to farmers on latest agronomic practices. The recent move towards market reform in most developing countries has renewed interest in the working of agricultural markets as a source of income, employment and food security. The success of the reform process in promoting equity and efficiency is constrained by numerous structural deficiencies in local markets. One of the main consequences of these structural deficiencies is poor market integration, the difficulty with which information and trade flows among spatially separated markets. Therefore, among other things, the reform process needs to take into account the extent of agricultural market integration. Market integration analysis has been done to test whether the selected oilseeds markets in India are integrated or not. Two tests were carried out to test market integration, namely, (a) price series correlation, (b) Augmented Dicky Fuller (ADF) test.

Mohpatra *et al.* (2017) to study the Various statistical/econometrical analytical techniques were used for the analysis of price integration of cauliflower among the major markets of Punjab and New Delhi. The stationarity property of time series of prices was checked through Dickey-Fuller(ADF) unit root test. The correlation coefficients in monthly prices of cauliflower between all the selected market pairs

were positive and significantly different from zero indicating strong market integration. Johansen multiple co-integration procedure implied that there was long-run price association among the sample markets. Granger causality test explored the causality of relationship between the sample market pairs. Vector Error Correction Method (VECM) revealed that in the selected markets the flow of market information had occurred both in short run and long run. Despite of fair level integration, the presence of only unidirectional causality among some market pairs points towards the need to further strengthen the integration between markets. This could be achieved by establishment of sound market information and intelligence system along with strengthening of the cold storage and transportation facilities.

Paul *et al.* (2017) to study the Despite being the second largest producer in the world, the price of onion witnesses a significant degree of temporal and spatial variation in India. Addressing this issue has become a major challenge for the policymakers of the country. The present study intends to identify the most influential onion markets in India. Johansen cointegration and vector error correction model (VECM) techniques are used to analyse the monthly wholesale price between 2005 and 2015 in 10 major markets. The results show that Hubli is the most dominant market jointly followed by Kolkata and Lasalgaon. The results exhibit the predominant role played by the non-producing markets.

Venujayakanth *et al.* (2017) to study the Market integration is a good proxy for measuring efficiency in the marketing system, whereby the underlying infrastructure is best put to use coupled with effective resource allocation. This way, the emerging price signals from the markets can be utilized to benefit both producers and consumers alike. The present study examines the performance of major groundnut domestic markets viz. Kurnool (Andhra Pradesh), Rajkot (Gujarat) and Villupuram (Tamil Nadu) in terms of market integration by using Engle Granger bivariate co-integration test and Johansen multivariate co-integration test. The findings revealed the existence of long-run equilibrium between the markets in such a way that a 1% price rise in Kurnool market leads to 1.22% price rise in Villupuram market. Similarly, for every 1% price rise in Rajkot market, price in Villupuram market increases by 1.13%. Besides, causality test indicated the existence of feedback relationship between Kurnool and Rajkot market, Kurnool and Villupuram market and the presence of unidirectional relationship between Rajkot to Villupuram market. The presence of short run disequilibria between market pairs was also captured using Vector Error

Correction Model (VECM) and the findings revealed that almost 11 to 37% of the short-run fluctuations get corrected with a month. Overall, the results signified effective price transmission mechanism in the domestic markets and any further boost to the existing infrastructure will only help in improving both producer's and consumer's surpluses.

Devi *et al.* (2019) the study has analyzed price and arrivals pattern and market integration of major pulse crops i.e. gram and tur in Gujarat state. The secondary data on monthly wholesale prices and arrivals were collected from the website of agmarknet.gov.in of selected regulated markets for last ten years (2007 to 2016). The study has indicated that the inter-year price analysis shows upward trend of annual price indices and there was a significant increase in the price of gram and tur in all the selected markets with positive and statistically significant compound growth rate during the study period. The intra-year price analysis revealed that the general pattern of seasonal variations in prices were found with increased the prices in off season and decreased in main season all most in all the selected markets in both the crops. The pattern of arrivals shows that the quantity of arrival was more in off season in the selected markets. This may be due to that the stockiest released their stocks with the commencement of new season. The results of market integration exposed that there was positive and significant correlation was found for each market pairs that means the wholesale prices of gram and tur was integrated in all the selected markets. Thus, it can be inferred from the above results that the prices increased in one market, it leads to increase the prices in other markets.

Shah *et al.* (2019) the present study analyzed the spatial price integration and seasonal price variations of brinjal and yard-long bean in the Chittagong hill districts of Bangladesh. Secondary data were amassed from the Department of Agricultural Marketing (DAM) for the time period of 2006-2015. Correlation coefficient and Engle-Granger (EG) co-integration tests were used as a tool for analyzing price integration among selected district markets. For the estimation of seasonal price variation, ratio to moving average method was adopted for the study. The findings of the study from this observed evaluation of spatial price linkage through correlation coefficients and co-integration among the selected markets of Bangladesh considering the wholesale price of selected vegetables indicated that these markets were well integrated but not strongly integrated. That means the Chittagong market for each commodity was significantly integrated but not significantly highly

integrated because of not as much developed transportation system in the hilly areas. The average seasonal variation of price of brinjal was found to be the maximum in the month of October and the minimum in the month of March. The average seasonal price variation of yard long bean was utmost in February and lowest in the month of June. The outcome of the present study could benefit the farmers and market actors monetarily if the production and marketing system of vegetables are well developed.

Hossain *et al.* (2020) the study revealed that the Vegetable cultivation in our country is growing day by day. We are now planting vegetables in our cultivable land area of 2.63 percent. Vegetables benefit farmers even more than other crops. It can play a vital role in improving the nutritional status of the chronically malnourished population of Bangladesh. There are various types of agricultural markets in Bangladesh through which agricultural products are traded. These are rural primary markets, rural assembly markets, rural secondary markets, and urban retail market. Before reaching the customers, vegetables are sold to wholesalers and retailers in Bangladesh. There is effectively a complete shortage of sophisticated vegetable handling equipment and facilities on the markets. Sorting, displaying, and selling are often performed from and into baskets at the ground level. Though Bangladeshi fruits and vegetables are exported to about 38 market destinations, the key buyers are primarily located in two regions: the United Kingdom and the Middle East. Bangladesh mostly exports fresh fruits and vegetables. However, during recent years export of processed as well as frozen vegetables had underway on a limited scale. The regular supply chain is for intermediaries to collect orders from exporters, go to production areas, collect crops from farmers/local markets, and arrange to deliver the same to exporters on the day of shipment. Owing to the opportunistic actions of sellers and consumers, the marketing cost rises, each seeking to take advantage of the other by means such as adulteration of the goods, cheating on weights and measures and violating distribution contracts. In Bangladesh, the vegetable marketing system is challenging, awkward, and unorganized and needs to be established for the well-being of common citizens.

Nayak *et al.* (2020) this study has analyzed market integration across six major wholesale markets for groundnut, sunflower, and soybean. This paper investigates the market integration of selected oilseeds and respective oil markets in India by employing monthly wholesale prices from 2009 January to 2020 February. The stationarity property of the time series of prices was checked through the Augmented

Dickey-Fuller (ADF) unit root test. To get the evidence in which direction the price transmission is occurring among the selected markets, Granger causality test has been used, which confirmed that some markets are influencing each other in a unidirectional way. Others have a bidirectional relationship at a five per cent level of importance, meaning that the chosen oilseed market prices have long-run association. In view of vertical integration Bellary pod market, Chennai oil and Ahmadabad oil markets are the key markets for groundnut, sunflower, and soybean, respectively. Thus, the study concluded that regional markets for selected oilseeds are strongly co-integrated. Furthermore, the study suggested that the Government can smoothen the price in most influencing markets and expect a similar result in other markets. Therefore, there is a need for faster market information movement by strengthening market intelligence by establishing an online marketing system through networking.

Sharma *et al.* (2020) the study investigates four selected markets of onion and potato for capturing the price volatility. The monthly wholesale price data were used for study of price behavior. The results indicated that a negative trend in arrival was observed in Ahmedabad and Vadodara market and price trends was positive in both the commodities. In seasonal indices, fluctuation in the monthly indices of onion and potato arrivals was more than the monthly indices of their prices in selected markets during the study period. Potato crop observed relatively more stability as compared to onion in the selected markets. The results confirmed that there was high volatility in prices of onion in these selected markets as compared to potato. Policies need to be developed to control the volatile nature of onion prices, which is directly affecting people in the low income group.

Sowjanya *et al.* (2020) the study revealed that the undertaken in Guntur district of Andhra Pradesh to assess the prices and profitability of chilli marketing. The study used both primary and secondary data collection. The elasticity coefficients for area (1.177) and material costs (3.699) were positively significant in Cobb- Douglas production function. In multiple regression analysis area, expenses on production material and expenses on marketing services were found significantly influencing the income of the farmers. In ARDL model for factors influencing market arrivals of commodities analysis R² showed that 73 percent of variation and current prices were found significantly influencing the arrivals of the farmers. In ARDL model factors influencing current prices of commodities analysis R² showed that 84 percent of variation and lagged prices (Pt-1 and Pt-2) were found significantly influencing the

current price of the farmers. Also price spread analysis of data indicated that majority of farm produce was routed through two marketing channels, Channel-I (producer-trader-wholesaler-retailer- consumer) and Channel-II (producer-processor-retailer-consumer). Producer's share in consumer's rupee was found to be 80.51%, 76.72% and price spread was `1500.67, `1971.92 for Channel-I and Channel-II respectively. Marketing efficiency in channel I and channel II were 3.53, 14.11 and 2.93, 16.87 respectively in Acharya's and Shepherd's methods. Low price for the produce at the time of harvest and lack of transportation with scores 78.26 and 63.13 was the most important constraint faced by the farmers.

CHAPTER – III

MATERIALS AND METHODS

CHAPTER – III

MATERIALS AND METHODS

In Indian markets, fluctuation in market arrivals and prices are the general feature of Agriculture marketing. Indian farmers generally sell their produce in market immediately after the harvesting of crop, which leads to fall in the prices due to full of arrivals in market. It is seen that, seasonal fluctuation in prices of agricultural products are more and the benefits of these fluctuation have been reaped by the middle men only. In addition to this, those who are involved in the marketing, would take decision favorably to the cultivators if they supply such information, keeping this view in mind the present work was undertaken with following methodology.

3.1 Salient features of Gondiya district

3.1.1 Location

Gondiya district is situated in the North-Eastern side of Maharashtra, at latitudes 20.39 and 21.38 North and longitudes 79.27 to 80.42 East. The district occupies area of 5,431 km square. Gondiya district is famous as 'Rice city'. There are eight taluka in Gondiya district; they are Amgaon, Arjun - Morgan, Deori, Gondiya, Goregaon, Sadak- Arjuni, Salekasa, Tirora.

3.1.2 Soils and Climate

Gondiya falls in high rainfall zone and in IXth agro climatic zone which is characterized by rainfall of 1412.8 mm and soil is originated from rocks of mixed origin. Minimum temp is 7.4°C in Gondiya district and Maximum temp is 47.5°C. Major crops in the district are paddy, chickpea, pigeon pea, and sugarcane.

3.2 Sampling Design

3.2.1 Selection of Market

It felt necessary that this study would help the farmers, organisers and market committees for taking appropriate decisions regarding marketing of vegetables. Gondiya district is selected purposively for present studies. In Gondiya district arrival of different agricultural product are in good quantity as compared to other Amgaon APMCs market. Gondiya district was selected due to the availability of continuous time series data for the vegetables crops.

3.2.2 Selection of commodities

To study the trends of market arrivals and prices of 10 major vegetables was selected because of their importance in their present situation.

3.2.3 Collection of Data

The present study is based on time series data compiled from the arrival and prices. Data were collected from the records of the selected market committee.

3.2.4 Period of Data

The monthly arrivals and prices data was pretend for the periods 2006-07to 2019-20.

3.3 Statistical Tools:

3.3.1 Analysis of Data

Data were analyzed by using simple tabular analytical tools such as mean, frequencies, ratios, percentages etc. To arrive at a meaningful conclusion. In addition to this functional analysis was also performed which is presented in following section.

3.3.2 Functional analysis

After data compilation functional analysis such as market arrival and prices, seasonal indices, standard deviation and coefficient of variation was computed for precision in conclusion. The computation procedure of these analysis is given in the following section.

3.3.2.1 Trends in market arrival and prices:

The following forms of equation were used to examine the trends in market arrival and prices.

$$M = a+bt.....\text{equation 1}$$

$$P = c+dt.....\text{equation 2}$$



Fig.3.1 Map of Gondiya District

Where,

M = Monthly market arrivals of vegetables in quintals.

P = Price of vegetables in rupees per quintals.

a = Intercepts.

b = Regression coefficient (rate of change in monthly market arrivals for a unit change in the time dp/dt).

t = Time variable in years.

c = Intercept.

d = Regression coefficient (dp/dt).

3.3.2.2 Seasonal indices:

To examine the peak and slack period monthly seasonal indices were worked out by simple average method.

$$\text{Seasonal indices} = \frac{X_i}{X} \times 100$$

Where,

X_i = monthly average for 15 years.

X = The mean of 12 months, average.

3.3.2.3 Standard deviation:

Standard deviation is the measure of dispersion. This measure of dispersion were calculated by squaring the deviation of each observation from the mean, adding the squares and dividing by number of observation (n) and extracting the square root.

$$SD = \sqrt{\frac{\sum (X_i - X)^2}{n}}$$

Where,

X_i = arrivals/prices

X = Mean of arrivals/prices

N = number of years/months

3.3.2.4 Coefficient of variation:

Coefficient of variation is the “percentage variation in the mean as the standard deviation being stated as the total variation in the mean”. The coefficient of variation of each market arrival and prices work out comparing the variability present in arrival and prices.

$$C.V = \frac{SD}{Mean} \times 100$$

Where,

SD = Standard deviation

Mean = Arithmetic mean

CV = Coefficient of variation

3.3.2.5 Growth rates:

Linear average growth rates were worked out by the following formula. Linear average percentage = $b/y \times 100$. Compound growth rate (CGR) was estimated by using the formula, $CGR = \text{Anti} - \log (B-1) \times 100$.

For calculation of CGR the data was collected from 2006-07 to 2019-2020. Further this period is grouped into three groups viz. period I (2006-2010), Period II (2011-2015), Period III (2016-2020), and overall in period IV (2006-2020) respectively.

3.3.2.6 Market Integration:

In market integration to choose the comparisons between the two markets i.e. Gondiya and Amgaon market. In gondiya market there is a higher arrival as compare to amgaon market. The common methodology used for testing market integration involves estimation of bivariate correlation coefficient (r) between price changes in different selected market. (Acharya and Agarwal 1994).

$$r = \frac{\sum (P_{11} - P_1) (P_{21} - P_2)}{\sqrt{\sum (P_{11} - P_1)^2 (P_{21} - P_2)^2}}$$

Where,

r = Simple correlation coefficient

P_{11} = Price of the commodity in the first market.

P_{21} = Price of the commodity in second market.

P_1 = Mean of price in first market.

P_2 = Mean of the prices in second market.

CHAPTER – IV

RESULTS AND DISCUSSION

CHAPTER – IV

RESULTS AND DISCUSSION

A seasonal fluctuation is a well-known feature of agriculture and prices. Understanding of the seasonal swings of regional variations will arm to on towards misleading interpretation which are in all likelihood to be interpreted as prices taking a downward development. The gathered statistics on marketplace arrivals and prices has been analyzed with the help of statistical tools. Computed the seasonal indices peak intervals and relationship among arrival and prices of Onion, Potato, Cauliflower, Cabbage, Brinjal, Chilli, Tomato, Lady Finger, Ginger, Garlic crops from the market Gondiya. Market findings emerged there of are provided in attribute and mentioned on this Chapter. In this chapter, the consequences of take a look at are introduced in the following sections.

- 4.1 Trends in arrival and prices of major vegetables.
- 4.2 To know Seasonal fluctuations of arrival and prices of major vegetables.
- 4.3 To study market integration in different major vegetables market of Gondiya district.

4.1 (a) Annual changes in arrival and prices of Onion crop

Annual compound growth rates of arrival were calculated with respect to Onion in Gondiya market and the same present in Table 4.1. In Gondiya market growth rate was calculated for four periods. Highest growth rate was in period IV is (11.21 per cent) among all four periods. In period I, period II and period III CGR was -19.35, -7.104, 3.993 are respectively. In case of prices the highest compound growth rate was in period I II (29.89 per cent). CGR for period I, III, and IV was 16.97, 10.97 and 11.80 respectively.

Table 4.1: Compound growth rate of arrival and prices of Onion in Gondiya market

Particulars	Gondiya							
	Arrival				Prices			
	I	II	III	IV	I	II	III	IV
a	8557	11709	14501	3769	5454	8443	18078	6498
b	0.806	0.929	1.040	1.112	1.170	1.299	1.110	1.118
r	-0.713	-0.672	0.221	0.760	0.607	0.864	0.416	0.744
t	-0.630	-0.670	0.213	0.737	0.474	0.885	0.342	0.777
CGR	-19.35	-7.104	3.993	11.21	16.97	29.89	10.97	11.80

Period I = 2006-2010

Significant at 5% level significance

Period II= 2011-2015

Period III= 2016-2020

Period IV= 2006-2020

4.1 (b) Annual changes in arrival and prices of Potato crop

Annual compound growth rates of arrival were calculated with respect to Potato in Gondiya market and the same is present in Table 4.2. In Gondiya market growth rate was calculated for four periods. Highest growth rate was in period IV is (15.06 per cent) among all four periods. In period I, period II and period III CGR was is -6.567, -1.213. And 5.492 respectively. In case of prices the highest compound growth rate was in period II (28.49 per cent). CGR for period I, III, and IV was 8.82, 11.58 and 9.017 respectively.

Table 4.2: Compound growth rate of arrival and prices of Potato in Gondiya market

Particulars	Gondiya							
	Arrival				Prices			
	I	II	III	IV	I	II	III	IV
a	3921.46	9366.40	13261	2492.71	7218.45	7970.08	14735.84	7402.47
b	0.934	0.988	1.055	1.151	1.088	1.285	1.116	1.090
r	-0.360	-0.157	0.773	0.934	0.470	0.985	0.781	0.824
t	-0.332	-0.137	0.778	0.887	0.364	0.979	0.756	0.820
CGR	-6.567	-1.213	5.492	15.06	8.822	28.496	11.587	9.017

Period I = 2006-2010

Significant at 5% level significance

Period II= 2011-2015

Period III= 2016-2020

Period IV= 2006-2020

4.1(c) Annual changes in arrival and prices of Cauliflower crop

Annual compound growth rates of arrival were calculated with respect to Cauliflower in Gondiya market and the same present in Table 4.3. In Gondiya market growth rate was calculated for four periods. Highest growth rate was in period IV is (11.79 per cent) among all four periods. In period I, II, and III CGR was -12.50 , -13.18. And 3.687 respectively. In case of prices the highest compound growth rate was in period II (17.35 per cent). CGR for period I, III, and IV was 12.97, 9.434, and 12.15 respectively.

Table 4.3: Compound growth rate of arrival and prices of Cauliflower in Gondiya market

Particulars	Gondiya							
	Arrival				Prices			
	I	II	III	IV	I	II	III	IV
a	5314	19263	12241	3481	7565	15424	25920	8380
b	0.875	0.868	1.037	1.118	1.130	1.174	1.094	1.122
r	-0.697	-0.688	0.399	0.682	0.560	0.976	0.826	0.944
t	-0.662	-0.746	0.406	0.730	0.400	0.979	0.842	0.880
CGR	-12.506	-13.181	3.687	11.791	12.97	17.353	9.434	12.155

Period I = 2006-2010

Significant at 5% level significance

Period II= 2011-2015

Period III= 2016-2020

Period IV= 2006-2020

4.1(d) Annual changes in arrival and prices of Cabbage crop

Annual compound growth rates of arrival were calculated with respect to Cabbage in Gondiya market and the same present in Table 4.4. In Gondiya market growth rate was calculated for four periods. Highest growth rates was in period IV is (13.77 per cent) among all four periods. In period I, II, and III CGR was -10.79 , -10.90, 4.39 respectively. In case of prices the highest compound growth rate was in period II (16.73 per cent). CGR for period I, III, and IV was 14.82, 6.71, and 12.25 respectively.

Table 4.4: Compound growth rate of arrival and prices of Cabbage in Gondiya market

Particular	Gondiya							
	Arrival				Prices			
	I	II	III	IV	I	II	III	IV
a	4894	19001	13965	3223	5444	11309	21455	6224
b	0.892	0.891	1.044	1.138	1.148	1.167	1.067	1.123
r	-0.656	-0.677	0.539	0.779	0.575	0.960	0.718	0.945
t	-0.594	-0.719	0.560	0.782	0.398	0.968	0.715	0.865
CGR	-10.79	-10.901	4.390	13.775	14.820	16.735	6.712	12.255

Period I = 2006-2010

Significant at 5% level significance

Period II= 2011-2015

Period III= 2016-2020

Period IV= 2006-2020

4.1(e) Annual changes in arrival and prices of Brinjal crop

Annual compound growth rates of arrival were calculated with respect to Brinjal in Gondiya market and the same present in Table 4.5. In Gondiya market growth rate was calculated for four periods. Highest growth rate was in period IV is (13.44 per cent) among all four periods. In period I, II and period III CGR was -8.96 , -7.113, -0.427 respectively. In case of prices the highest compound growth rate was in period I (12.65 per cent). CGR for period II, III, and IV was 5.33, 8.54, and 10.60 respectively.

Table 4.5: Compound growth rate of arrival and prices of Brinjal in Gondiya market

Particulars	Gondiya							
	Arrival				Prices			
	I	II	III	IV	I	II	III	IV
a	8856	42918	29764	6891	5264	13721	16453	6091
b	0.910	0.929	0.996	1.134	1.127	1.053	1.085	1.106
r	-0.551	-0.471	0.0010	0.622	0.566	0.322	0.716	0.878
t	-0.445	-0.495	-0.037	0.704	0.420	0.325	0.716	0.840
CGR	-8.967	-7.113	-0.427	13.44	12.65	5.338	8.543	10.60

Period I = 2006-2010

Significant at 5% level significance

Period II= 2011-2015

Period III= 2016-2020

Period IV= 2006-2020

4.1(f) Annual changes in arrival and prices of Tomato crop

Annual compound growth rates of arrival were calculated with respect to Tomato in Gondiya market and the same present in Table 4.6. In Gondiya market growth rate was calculated for four periods. Highest growth rate was in period IV is (25.50 per cent) among all four periods. In period I, II, and III, is 18.81, -6.973 and 13.71 respectively. In case of prices the highest compound growth rate was in period II (16.56 per cent). CGR for period I, III and IV was 4.362, 2.46, and 10.40 respectively.

Table 4.6: Compound growth rate of arrival and prices of Tomato in Gondiya market

Particulars	Gondiya							
	Arrival				Prices			
	I	II	III	IV	I	II	III	IV
a	1684	33325	22313	2201	6893	10543	20216	6418
b	1.188	0.930	1.137	1.255	1.044	1.166	1.025	1.104
r	0.717	-0.414	0.714	0.846	0.215	0.774	0.284	0.848
t	0.596	-0.442	0.766	0.851	0.114	0.776	0.234	0.764
CGR	18.81	-6.973	13.71	25.50	4.362	16.56	2.46	10.40

Period I = 2006-2010

Significant at 5% level significance

Period II= 2011-2015

Period III= 2016-2020

Period IV= 2006-2020

4.1(g) Annual changes in arrival and prices of Chilli crop

Annual compound growth rates of arrival were calculated with respect to Chilli in Gondiya market and the same present in Table 4.7. In Gondiya market growth rate was calculated for four periods. Highest growth rate was in period I is (20.56 per cent) among all four periods. In period II, III and period IV CGR was -6.366, -7.322 and 5.301 respectively. In case of prices the highest compound growth rate was in period II (25.06 per cent). CGR for period I, III and IV was 14.46, 2.065 and 14.40 respectively.

Table 4.7: Compound growth rate of arrival and prices of Chilli in Gondiya market

Particulars	Gondiya							
	Arrival				Prices			
	I	II	III	IV	I	II	III	IV
a	414.12	2034.68	1596.33	764.07	8361.82	20625.70	45749.05	9912.88
b	1.206	0.936	0.927	1.053	1.145	1.251	1.021	1.144
r	0.648	-0.404	-0.675	0.399	0.486	0.936	0.410	0.856
t	0.653	-0.450	-0.712	0.503	0.279	0.947	0.414	0.781
CGR	20.56	-6.366	-7.322	5.301	14.46	25.06	2.065	14.404

Period I = 2006-2010

Significant at 5% level significance

Period II= 2011-2015

Period III= 2016-2020

Period IV= 2006-2020

4.1(h) Annual changes in arrival and prices of Ladies Finger crop

Annual compound growth rates of arrival were calculated with respect to Ladies Finger in Gondiya market and the same present in Table 4.8. In Gondiya market growth rate was calculated for four periods. Highest growth rate was in period IV is (32.81 per cent) among all four periods. In period I, II and period III CGR was -5.426 ,16.56, -0.501 respectively. In case of prices the highest compound growth rate was in period II (20.66 per cent). CGR for period I, III and IV was 0.294, 8.122, 19.06 respectively.

Table 4.8: Compound growth rate of arrival and prices of Ladies Finger in Gondiya market

Particulars	Gondiya							
	Arrival				Prices			
	I	II	III	IV	I	II	III	IV
a	383.15	2489.22	7614.58	219.35	5526.73	13623.54	27963.6	4152.38
b	0.946	1.166	0.995	1.328	1.003	1.207	1.081	1.191
r	-0.132	0.679	-0.036	0.936	0.048	0.786	0.811	0.930
t	-0.104	0.692	-0.065	0.853	0.010	0.733	0.817	0.874
CGR	-5.426	16.56	-0.501	32.81	0.294	20.663	8.122	19.064

Period I = 2006-2010

Significant at 5% level significance

Period II= 2011-2015

Period III= 2016-2020

Period IV= 2006-2020

4.1(i) Annual changes in arrival and prices of Ginger crop

Annual compound growth rates of arrival were calculated with respect to Ginger in Gondiya market and the same present in Table 4.9. In Gondiya market growth rate was calculated for four periods. Highest growth rate was in period IV is (7.90 per cent) among all four periods. In period I, II, and period III CGR was 2.500, -0.357 and -3.794. In case of prices the highest compound growth rate was in period I (46.00 per cent). CGR for period II, III and IV was 18.005, 9.058 and 12.86 respectively.

Table 4.9: Compound growth rate of arrival and prices of Ginger in Gondiya market

Particulars	Gondiya							
	Arrival				Prices			
	I	II	III	IV	I	II	III	IV
a	193	617.98	551.49	215.88	11190	47479	80891	25004
b	1.025	0.996	0.962	1.079	1.460	1.180	1.091	1.129
r	0.021	-0.145	-0.226	0.496	0.754	0.706	0.572	0.739
t	0.121	-0.018	-0.282	0.617	0.738	0.748	0.524	0.785
CGR	2.500	-0.357	-3.794	7.904	46.006	18.005	9.058	12.861

Period I = 2006-2010

Significant at 5% level significance

Period II= 2011-2015

Period III= 2016-2020

Period IV= 2006-2020

4.1(j) Annual changes in arrival and prices of Garlic crop

Annual compound growth rates of arrival were calculated with respect to Garlic in Gondiya market and the same present in Table 4.10. In Gondiya market growth rate was calculated for four periods. Highest growth rate was in period I is (37.84 per cent) among all four periods. In period II, III and IV CGR was 26.38, -4.585 and 14.27 respectively. In case of prices the highest compound growth rate was in period I (14.92 per cent). CGR for period II, III, and IV was -5.30, 4.74 and 12.22 respectively.

Table 4.10: Compound growth rate of arrival and prices of Garlic in Gondiya market

Particulars	Gondiya							
	Arrival				Prices			
	I	II	III	IV	I	II	III	IV
a	45.9	239.07	503.62	101.11	23946	101074	109170	29083
b	1.378	1.264	0.954	1.143	1.149	0.947	1.047	1.122
r	0.850	0.948	-0.298	0.706	0.447	-0.355	0.322	0.775
t	0.910	0.936	-0.378	0.787	0.373	-0.264	0.258	0.777
CGR	37.84	26.389	-4.595	14.272	14.92	-5.308	4.748	12.22

Period I = 2006-2010

Significant at 5% level significance

Period II= 2011-2015

Period III= 2016-2020

Period IV= 2006-2020

4.1.1 Mean, Standard Deviation and Coefficient of variation

The month-to-month indices give the general trend and distribution of arrivals. For this reason month-to-month, Standard Deviation(SD), Coefficient of Variance(CV) and Mean for arrival and prices of selected vegetables had been discussed and estimated in this section.

4.1.1(a) Month-to-Month Mean, SD and CV of arrival and prices of Onion

The mean arrival of Onion Crop was computed and presented in Table 4.11. It is observed from the Table that monthly mean was highest in the month of May (1332.87 qtl) and lowest mean was in the month of September (671.94 qtl). The highest Standard Deviation was in the month of August (843.09) and lowest is in the month of December (496.33). The highest Coefficient of Variation is in the month of August (96.45 per cent) and lowest is in the month of May (53.02 per cent). Because the onion crop is sell to market in proper month and they get profit.

The mean prices of Onion Crop was computed and presented in Table 4.11. It is observed form the Table that monthly mean was highest in the month of November (2326.67 qtl) and lowest mean is in the month of April (940 qtl). The monthly highest Standard Deviation is in month of November(2137.91) and lowest is in the month of April (495.40). The highest Coefficient of Variation is in the month of November (91.88 per cent) and lowest is in the month of April (52.70 per cent).

Table4.11: Monthly Mean, SD and CV of Arrival and Prices of Onion in Gondiya Market

Months	Arrival			Prices		
	Mean (qtl)	SD	CV (%)	Mean (qtl)	SD	CV (%)
January	769.33	512.10	66.56	1540	1148.17	74.55
February	787.6	533.98	67.56	1426.67	930.02	65.18
March	921.667	606.78	65.83	1069.67	724.03	67.68
April	1039.93	663.25	63.77	940	495.40	52.70
May	1332.87	706.78	53.02	946.67	538.34	56.86
June	1099.27	728.20	66.24	1286.67	736.65	57.25
July	853.34	694.77	81.41	1326.67	827.61	62.38
August	874.06	843.09	96.45	2093.33	1705.23	81.46
September	671.94	637.51	94.87	1866.67	1393.69	74.66
October	675.14	545.38	80.78	2166.67	1647.8	76.05
November	725.8	550.73	75.88	2326.67	2137.91	91.88
December	719.54	496.33	68.97	1986.67	1635.7	82.33

M=Mean, SD= Standard deviation, CV= Coefficient of Variance

4.1.1(b) Month-to-Month Mean, SD and CV of arrival and prices of Potato

The mean arrival Potato Crop was computed and presented in Table 4.12. It is observed from the Table that monthly mean was highest in the month of May (893.34 qtl) and lowest mean was in the month of August (682.6 qtl). The highest Standard Deviation was in the month of May (624.34) and lowest is in the month of March (415.12). The highest Coefficient of Variation is in the month of July (78.09 per cent) and lowest is in the month of March (54.62 per cent).

The mean prices of Potato Crop was computed and presented in Table 4.12. It is observed from the Table that monthly mean was highest in the month of November (1640 qtl) and lowest mean is in the month of April (1000 qtl). The monthly highest Standard Deviation is in month of November (824.44) and lowest is in the month of April (502.84). The highest Coefficient of Variation is in the month of February (56.04 per cent) and is in the month of October (37.34 per cent).

Table 4.12: Monthly Mean, SD and CV of Arrival and Prices of Potato in Gondiya Market

Months	Arrival			Prices		
	Mean (qtl)	SD	CV (%)	Mean (qtl)	SD	CV (%)
January	798	479.46	60.08	1333.33	735.49	55.16
February	776.667	519.53	66.89	1206.67	676.33	56.04
March	759.933	415.12	54.62	1320	676.33	51.23
April	837.8	564.53	67.38	1000	502.84	50.28
May	893.333	624.34	69.88	1140	579.16	50.80
June	792.867	510.53	64.39	1340	641.20	47.85
July	729.533	569.71	78.09	1366.67	643.28	47.06
August	682.6	531.83	77.91	1433.33	726.70	50.70
September	736.4	503.02	68.30	1440	716.93	49.78
October	697.2	423.08	60.68	1620	604.97	37.34
November	766.533	483.25	63.04	1640	824.44	50.27
December	883.4	616.84	69.82	1400	571.96	40.85

M=Mean, SD= Standard deviation, CV= Coefficient of Variance

4.1.1 (c) Month-to-Month Mean, SD and CV of arrival and prices of Cauliflower

The mean arrival Cauliflower Crop was computed and presented in Table 4.13. It is observed from the Table that monthly mean was highest in the month of January (1163.67qtl) and lowest mean was in the month of August (527 qtl). The highest Standard Deviation was in the month of January (752.70) and lowest is in the month of October (318.28). The highest Coefficient of Variation is in the month of August (82.93 per cent) and lowest is in the month of October (47.83 per cent).

The mean prices of Cauliflower Crop was computed and presented in Table 4.13. It is observed from the Table that monthly mean was highest in the month of July (3126.67qtl) and lowest mean is in the month of February (1160 qtl). The monthly highest Standard Deviation is in month of July (1888.49) and lowest Standard Deviation in month of January (589.02). The highest Coefficient of Variation is in the month of July (60.39 per cent) and lowest is in month of October (39.00 per cent).

Table 4.13: Monthly Mean, SD and CV of Arrival and Prices of Cauliflower in Gondiya Market

Months	Arrival			Prices		
	Mean (qtl)	SD	CV (%)	Mean (qtl)	SD	CV (%)
January	1163.67	752.70	64.68	1386.67	589.02	42.47
February	1083	616.87	56.96	1160	609.21	52.51
March	1051.4	552.20	52.52	1586.67	908.58	57.26
April	831.67	456.35	54.87	1606.67	901.16	56.08
May	882	581.43	65.92	1646.67	992.01	60.24
June	743	560.01	75.37	2553.33	1530.11	59.92
July	541	445.54	82.35	3126.67	1888.49	60.39
August	527	437.05	82.93	2693.33	1455.76	54.05
September	655.34	489.65	74.71	2480	1397.04	56.33
October	665.34	318.28	47.83	2273.33	886.78	39.00
November	980.94	554.82	56.56	1793.33	733.35	40.89
December	1067.2	540.28	50.62	1633.33	798.80	48.90

M=Mean, SD= Standard deviation, CV= Coefficient of Variance

4.1.1(d) Month-to-Month Mean, SD and CV of arrival and prices of Cabbage

The mean arrival Cabbage Crop was computed and presented in Table 4.14. It is observed from the Table that monthly mean was highest in the month of January (1267.67 qtl) and lowest mean was in the month of July (568.34 qtl). The highest Standard Deviation was in the month of May (693.05) and lowest is in month of October (406.88). The highest Coefficient of Variation is in the month of August (89.01per cent) and lowest is in the month of December (53.05per cent).

The mean prices of Cabbage Crop was computed and presented in Table 4.14. It is observed from the Table that monthly mean was highest in the month of July (2100 qtl) and lowest mean is in the month of February (906.67 qtl). The monthly highest Standard Deviation is in month of July (1303.29) and lowest is in month of February (407.89). The highest Coefficient of Variation is in the month of July (62.06 per cent) and lowest is in the month of January (41.87 per cent).

Table4.14: Monthly Mean, SD and CV of Arrival and Prices of Cabbage in Gondiya Market

Months	Arrival			Prices		
	Mean (qtl)	SD	CV (%)	Mean (qtl)	SD	CV (%)
January	1267.67	783.44	61.80	1066.67	446.68	41.87
February	1149.2	611.75	53.23	906.67	407.89	44.98
March	1163.47	630.77	54.21	1253.33	725.91	57.91
April	891.8	504.06	56.52	1293.33	740.14	57.22
May	954.34	693.05	72.62	1280.00	726.24	56.73
June	777.86	565.26	72.66	1986.67	1188.56	59.82
July	568.34	451.90	79.51	2100.00	1303.29	62.06
August	657.14	584.94	89.01	1986.67	1045.31	52.61
September	788.74	546.19	69.24	1646.67	908.58	55.17
October	739.54	406.88	55.01	1766.67	674.71	38.19
November	1049.4	592.309	56.44	1473.33	661.67	44.90
December	1125.07	596.957	53.05	1213.33	651.22	53.67

M=Mean, SD= Standard deviation, CV= Coefficient of Variance

4.1.1(e) Month-to-Month Mean, SD and CV of arrival and prices of Brinjal

The mean arrival of Brinjal Crop was computed and presented in Table 4.15. It is observed from the Table that monthly mean was highest in the month of December (2407 qtl) and lowest mean was in the month of August (1540 qtl). The highest Standard Deviation was in the month of December (1476.4) and lowest is in the month of August (974.41). The highest Coefficient of Variation is in the month of June (78.48 per cent) and lowest is in the month of February (54.85 per cent).

The mean prices of Brinjal Crop was computed and presented in Table 4.15. It is observed from the Table that monthly mean was highest in the month of August (1653.33 qtl) and lowest mean is in the month of February (913.34 qtl). The monthly highest Standard Deviation in month of June (1128.51) and lowest Standard Deviation is in month of November (467.21). The highest Coefficient of Variation is in the month of June (80.99 per cent) and lowest is in the month of November (37.08 per cent).

Table4.15: Monthly Mean, SD and CV of Arrival and Prices of Brinjal in Gondiya Market

Months	Arrival			Prices		
	Mean (qtl)	SD	CV (%)	Mean (qtl)	SD	CV (%)
January	2359.33	1445.94	61.28	1013.33	528.97	52.20
February	2100.6	1152.31	54.85	913.333	601.03	65.80
March	2098.93	1308.28	62.33	1060	556.52	52.50
April	1653	1018.8	61.63	1186.67	840.80	70.85
May	2187	1472.02	67.30	1100	815.03	74.09
June	1862.6	1461.89	78.48	1393.33	1128.51	80.99
July	1910.73	1415.74	74.09	1446.67	843.34	58.29
August	1540	974.41	63.27	1653.33	1026.69	62.09
September	1874	1387.56	74.04	1486.67	743.41	50.00
October	1749.33	1120.98	64.08	1486.67	578.01	38.87
November	2236.2	1413.87	63.22	1260	467.21	37.08
December	2407	1476.4	61.33	1300	994.26	76.48

M=Mean, SD= Standard deviation, CV= Coefficient of Variance

4.1.1(f) Month-to-Month Mean, SD and CV of arrival and prices of Tomato

The mean arrival of Tomato Crop was computed and presented in Table 4.16. It is observed from the Table that monthly mean was highest in the month of March (2442.6 qtl) and lowest mean was in the month of July (1245.73 qtl). The highest Standard Deviation was in the month of March (1718.93) and lowest is in the month of June (1094.79). The highest Coefficient of Variation is in the month of April (95.28 per cent) and lowest is in the month of December (69.01 per cent).

The mean of prices of Tomato Crop was computed and presented in Table 4.16. It is observed from the Table that monthly mean was highest in the month of June (2153.33 qtl) and lowest mean is in the month of March (700 qtl). The monthly highest Standard Deviation is in month of June (1308.69) and lowest is in month of February (304.41). The highest Coefficient of Variation is in month of October (74.63 per cent) and lowest is in the month of January (44.04 per cent).

Table 4.16: Monthly Mean, SD and CV of Arrival and Prices of Tomato in Gondiya Market

Month	Arrival			Prices		
	Mean (qtl)	SD	CV (%)	Mean (qtl)	SD	CV (%)
January	2168.93	1626.9	75.00	853.34	375.81	44.04
February	2214.6	1635.95	73.87	653.34	304.41	46.59
March	2442.6	1718.93	70.37	700	331.66	47.38
April	1747.4	1665.02	95.28	1246.67	850.93	68.25
May	1543.27	1295.33	83.93	1440	925.67	64.28
June	1289.73	1094.79	84.88	2153.33	1308.69	60.77
July	1245.73	1131.32	90.81	1953.33	1190.96	69.97
August	1668.8	1409.63	84.46	1573.33	952.04	60.51
September	1733.13	1500.27	86.56	1280	743.73	58.10
October	1704.33	1493.53	87.63	1540	1149.41	74.63
November	1800.73	1363.08	75.69	1466.67	794.32	54.15
December	1894.73	1307.65	69.01	1173.33	531.12	45.26

M=Mean, SD= Standard deviation, CV= Coefficient of Variance

4.1.1(g) Month-to-Month Mean, SD and CV of arrival and prices of Chilli

The mean arrival of Chilli Crop was computed and presented in Table 4.17. It is observed from the Table that monthly mean are highest in the month of January (133.34 qtl) and lowest mean was in the month of July (83.2 qtl). The highest Standard Deviation is in the month of December (97.26) and lowest is in the month of April (46.24). The highest Coefficient of Variation is in the month of September (79.50 per cent) and lowest is in the month of January (46.53 per cent).

The mean prices of Chilli Crop was computed and presented in Table 4.17. It is observed from the Table that monthly mean was highest in the month of August (4026.67 qtl) and lowest mean is in the month of January (2300 qtl). The monthly highest Standard Deviation is in month of August (2623.37) and lowest is in the month of March (1232.3). The highest Coefficient of Variation is in the month of December (70.39 per cent) and lowest is in the month of March (47.39 per cent).

Table 4.17: Monthly Mean, SD and CV of Arrival and Prices of Chilli in Gondiya Market

Months	Arrival			Prices		
	Mean (qtl)	SD	CV (%)	Mean (qtl)	SD	CV (%)
January	133.34	62.05	46.53	2300	1239.24	53.88
February	103	70.43	68.38	2373.33	1261.78	53.16
March	112.67	64.52	57.27	2600	1232.3	47.39
April	85.94	46.24	53.81	2380	1336.95	56.17
May	83.67	64.46	77.04	2940	1634.36	55.59
June	105.54	71.88	68.11	3580	2037.23	56.90
July	83.2	60.97	73.28	3893.33	2401.03	61.67
August	97.8	60.87	62.24	4026.67	2623.37	65.15
September	92.87	73.83	79.50	3453.33	2194.1	63.53
October	108.733	66.81	61.45	2973.33	1883.94	63.36
November	124	73.67	59.41	2653.33	1573.83	59.31
December	126.8	97.26	76.70	2306.67	1623.69	70.39

M=Mean, SD= Standard deviation, CV= Coefficient of Variance

4.1.1(h) Month-to-Month Mean, SD and CV of arrival and prices of Lady Finger

The mean arrival of Lady Finger Crop was computed and presented in Table 4.18. It is observed from the Table that monthly mean was highest in the month of September (514.2 qtl) and lowest mean was in the month of February (192.34 qtl). The highest Standard Deviation was in the month of September (421.02) and lowest is in the month of February (193.35). The highest Coefficient of Variation is in the month of January (100.66 per cent) and lowest is in the month of May (70.40 per cent).

The mean prices of Lady Finger Crop was computed and presented in Table 4.18. It is observed from the Table that monthly mean was highest in the month of January (2260 qtl) and lowest mean is in the month of September (1493.33 qtl). The highest Standard Deviation is in month of February (1908.18) and lowest is in the month of May (969.88). The highest Coefficient Of Variation is in the month of February (103.70 per cent) and lowest is in the month of July (55.05 per cent).

Table 4.18: Monthly Mean, SD and CV of Arrival and Prices of Lady Finger in Gondiya Market

Months	Arrival			Prices		
	Mean (qtl)	SD	CV (%)	Mean (qtl)	SD	CV (%)
January	192.67	193.95	100.66	2260	1719.55	76.08
February	192.34	193.35	100.53	1840	1908.18	103.70
March	219.34	202.17	92.17	1840	1344.19	73.05
April	283.46	249.25	87.93	2033.33	1352.07	66.49
May	425.86	299.82	70.40	1673.33	969.88	57.96
June	382.14	330.59	86.51	1826.67	1180.48	64.62
July	402.67	356.26	88.47	1793.33	987.397	55.05
August	467.6	361.11	77.22	1606.67	1031.27	64.18
September	514.2	421.02	81.87	1493.33	1030.58	69.01
October	395.06	367.66	93.06	1840	1352.67	73.51
November	310.94	271.44	87.29	2180	1417.61	69.61
December	240	212.08	88.36	1993.33	1660.67	83.31

M=Mean, SD= Standard deviation, CV= Coefficient of Variance

4.1.1(i) Month-to-Month Mean, SD and CV of arrival and prices of Ginger

The mean arrival of Ginger Crop was computed and presented in Table 4.19. It is observed from the Table that monthly mean are highest in month of September (47.14 qtl) and lowest mean was in the month of July (29.34 qtl). The highest Standard Deviation was in the month of September (61.79) and lowest is in month of February (18.83). The highest Coefficient of Variation in month of September (131.09 per cent) and lowest Coefficient Variation in month of March (50.59 per cent).

The mean of Prices of Ginger Crop was computed and presented in Table 4.19. It is observed from the Table that monthly mean was highest in the month of February (10293.3 qtl) and lowest mean is in the month of April (5373.33 qtl). The monthly highest Standard Deviation is in month of February (16867.1) and lowest Standard Deviation in month of March (2902.58). The highest is in the month of February (163.86 per cent) and lowest is in the month of March (48.97 per cent).

Table 4.19: Monthly Mean, SD and CV of Arrival and Prices of Ginger in Gondiya Market

Months	Arrival			Prices		
	Mean (qtl)	SD	CV (%)	Mean (qtl)	SD	CV (%)
January	38.34	25.20	65.75	6340	3686.81	58.15
February	34.8	18.83	54.13	10293.3	16867.1	163.86
March	41.4	20.94	50.59	5926.67	2902.58	48.97
April	34.34	18.97	55.28	5373.33	3570.81	66.45
May	37.26	21.79	58.47	6393.33	3809.47	59.58
June	30.74	20.62	67.09	6460	4064.8	62.92
July	29.34	23.66	80.69	6473.33	4297.75	66.39
August	36.54	33.10	90.60	5980	4927.09	67.34
September	47.14	61.79	131.09	6586.67	4602.31	69.87
October	44.6	45.78	102.66	6446.67	3896.49	60.44
November	45.54	26.83	58.92	6700	3693.43	55.12
December	30.93	21.02	67.95	6180	4314.46	69.81

M=Mean, SD= Standard deviation, CV= Coefficient of Variance

4.1.1(J) Month-to-Month Mean, SD and CV of arrival and prices of Garlic

The mean arrival of Garlic Crop was computed and presented in Table 4.20. It is observed from the Table that monthly mean was highest in the month of March (35.34 qtl) and lowest mean was in the month of December (24.2 qtl). The highest Standard Deviation was in the month of August (26.46) and lowest is in the month of November (16.59). The highest Coefficient of Variation is in the month of July (92.58 per cent) and lowest is in the month of November (47.22 per cent).

The mean prices of Garlic Crop was computed and presented in Table 4.20. It is observed from the Table that monthly mean are highest in month of January (9633.33 qtl) and lowest mean is in the month of May (5320 qtl). The highest Standard Deviation is in month of December (7715.56) and lowest is in month of May (3033.2). The highest Coefficient of Variation is in the month of December (82.48 per cent) and lowest is in the month of September (55.10 per cent).

Table 4.20: Monthly Mean, SD and CV of Arrival and Prices of Garlic in Gondiya Market

Months	Arrival			Prices		
	Mean (qtl)	SD	CV (%)	Mean (qtl)	SD	CV (%)
January	24.46	18.22	74.48	9633.33	6060.61	62.91
February	29	18.91	65.23	8186.67	4694.35	57.34
March	35.34	22.47	63.61	6600	4164.3	63.09
April	27.34	20.25	74.10	5066.67	3385.19	66.81
May	32	25.27	78.96	5320	3033.2	57.01
June	31	25.57	82.51	5586.67	3247.83	58.13
July	28.34	26.23	92.58	6133.33	3578.04	58.33
August	34.8	26.46	76.05	6933.33	4144.13	59.77
September	32.46	26.44	81.44	7366.67	4059.67	55.10
October	30	23.22	77.40	7513.33	6183.14	82.29
November	35.14	16.59	47.22	9333.33	5384.06	57.68
December	24.2	18.15	75.02	9353.33	7715.56	82.48

M=Mean, SD= Standard deviation, CV= Coefficient of Variance

4.2 SEASONAL INDICES OF ARRIVAL AND PRICES

The seasonal indices express the monthly percentages of arrival in given market. Seasonal indices of selected vegetables crops in Gondiya market were calculated for the period from 2006-2020 and it is presented in this section.

4.2(a) Seasonal indices in arrival and prices of Onion.

The seasonal indices of arrival of Onion was computed and presented in Tale 4.21. It is observed from the table that monthly indices of arrival were highest in the month of September (129.85 per cent) followed by October (129.23 per cent) and lowest is in the month of May (65.46 per cent). The seasonal indices of arrival and prices of Onion was computed and presented in the table 4.21. It is observed from the table that monthly indices of arrival were highest in the month of April (168.22 per cent) followed by May (167.04 per cent) and the lowest in the month of November (67.96 per cent). In September months there is high arrival and prices is in month of April in onion crop. So the farmer may sell his product.

Table 4.21: Monthly Seasonal Indices of Arrival and Prices of Onion in Gondiya Market

Months	Arrival	Prices
January	113.41	102.68
February	110.78	110.84
March	94.66	147.83
April	83.9	168.22
May	65.46	167.04
June	79.37	122.90
July	102.25	119.19
August	99.82	75.54
September	129.85	84.71
October	129.23	72.98
November	120.21	67.96
December	121.26	79.59

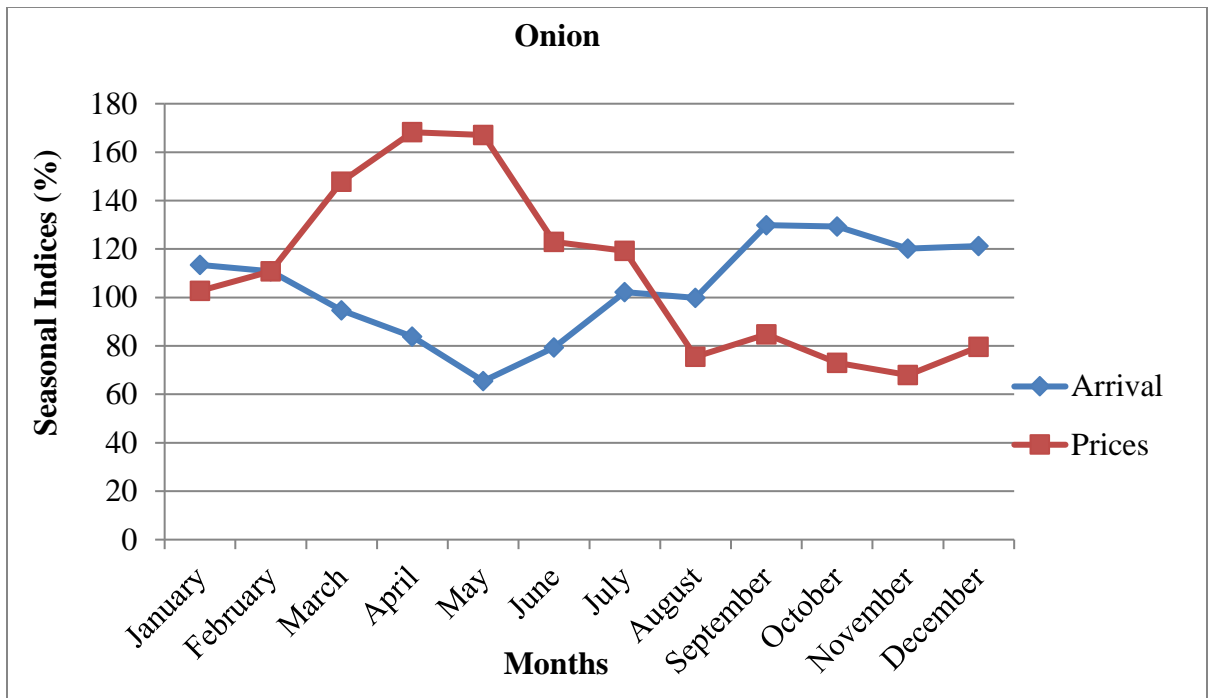


Fig. 4.1 Graphical representation of Seasonal Indices of arrival and prices of Onion Crop in Gondiya Market.

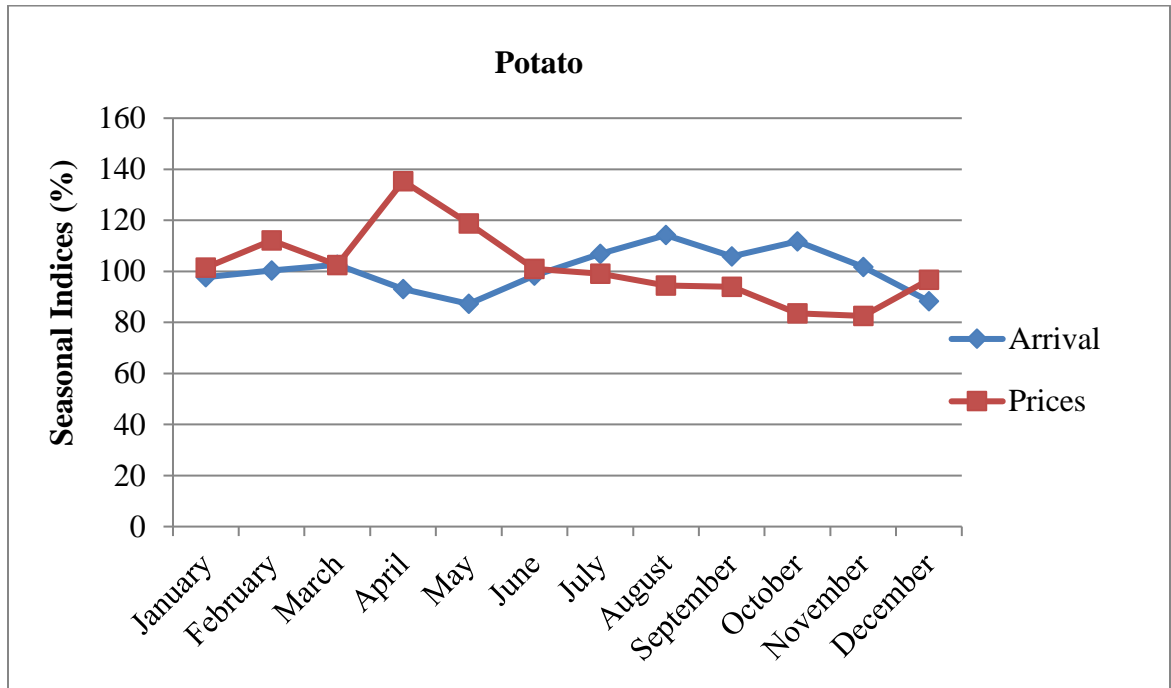


Fig. 4.2 Graphical Representation of Seasonal Indices of Arrival and Prices of Potato Crop in Gondiya Market.

4.2(b) Seasonal indices in arrival and prices of Potato

The seasonal indices of arrival of Potato was computed and presented in Table 4.22. It is observed from the Table that monthly indices were highest in month of August (114.19 per cent) followed by October (111.8 per cent) lowest is in the month of May (87.25 per cent). The seasonal indices of prices of Potato was computed. And presented in the table 4.22. It is observed that monthly indices were highest in month of April (135.34 per cent) followed by May (118.71 per Cent) and the lowest in the month of November (82.52 per cent).

Table 4.22: Monthly Seasonal Indices of Arrival and Prices of Potato in Gondiya Market

Months	Arrival	Prices
January	97.68	101.5
February	100.36	112.15
March	102.57	102.52
April	93.04	135.34
May	87.25	118.71
June	98.31	100.99
July	106.85	99.02
August	114.19	94.41
September	105.85	93.98
October	111.8	83.53
November	101.69	82.52
December	88.24	96.67

4.2 (c) Seasonal indices in arrival and prices of Cauliflower

The seasonal indices of arrival of Cauliflower was computed and presented in Table 4.23. It is observed from the Table that monthly indices were highest in month of July (163.23 per cent) followed by August (141.17 per cent) and lowest is in the month of January (72.18 per cent). And the seasonal indices of prices of Cauliflower was computed. And presented in the table 4.23. It is observed that monthly indices were highest in month of February (171.98 per cent) followed by January (143.78 per cent) and the lowest in the month of July (63.80 per cent).

Table 4.23: Monthly Seasonal Indices of Arrival and Prices of Cauliflower in Gondiya Market

Months	Arrival	Prices
January	72.18	143.87
February	80.72	171.98
March	79.73	125.73
April	104.02	124.17
May	97.21	121.15
June	119.26	78.13
July	163.23	63.80
August	141.17	74.07
September	117.62	80.44
October	125.44	87.75
November	88.4	111.24
December	82.45	122.14

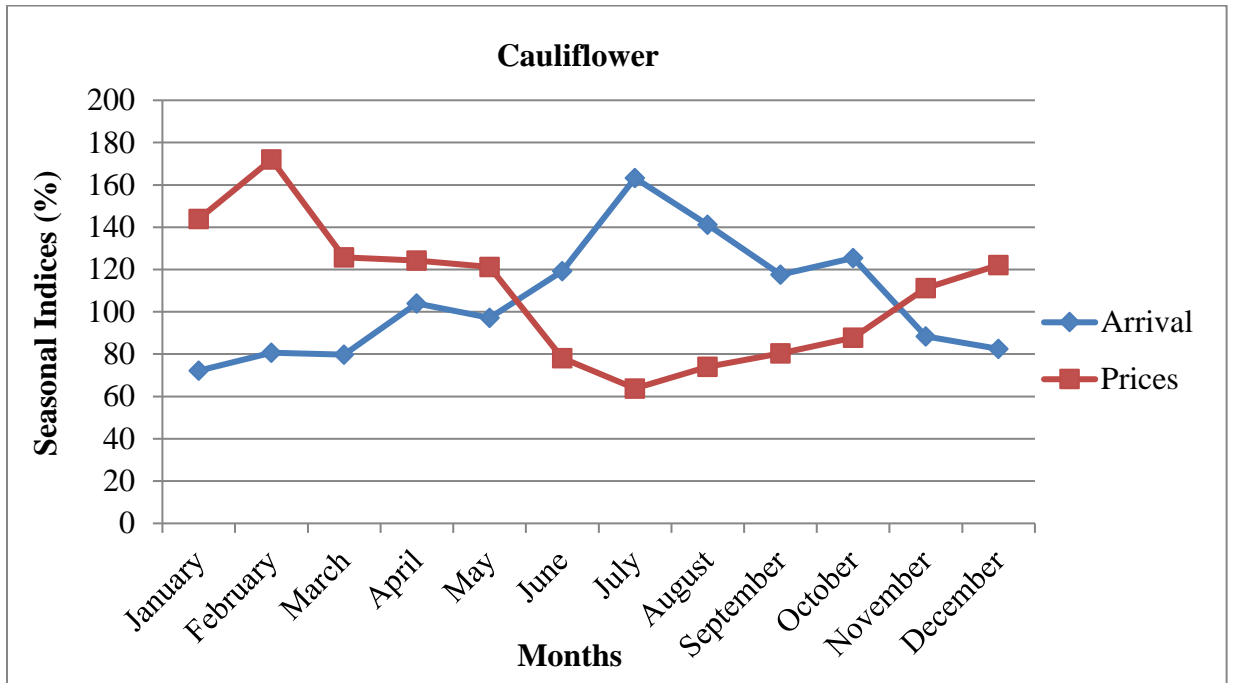


Fig. 4.3 Graphical Representation of Seasonal Indices of Arrival and Prices of Cauliflower Crop in Gondiya Market.

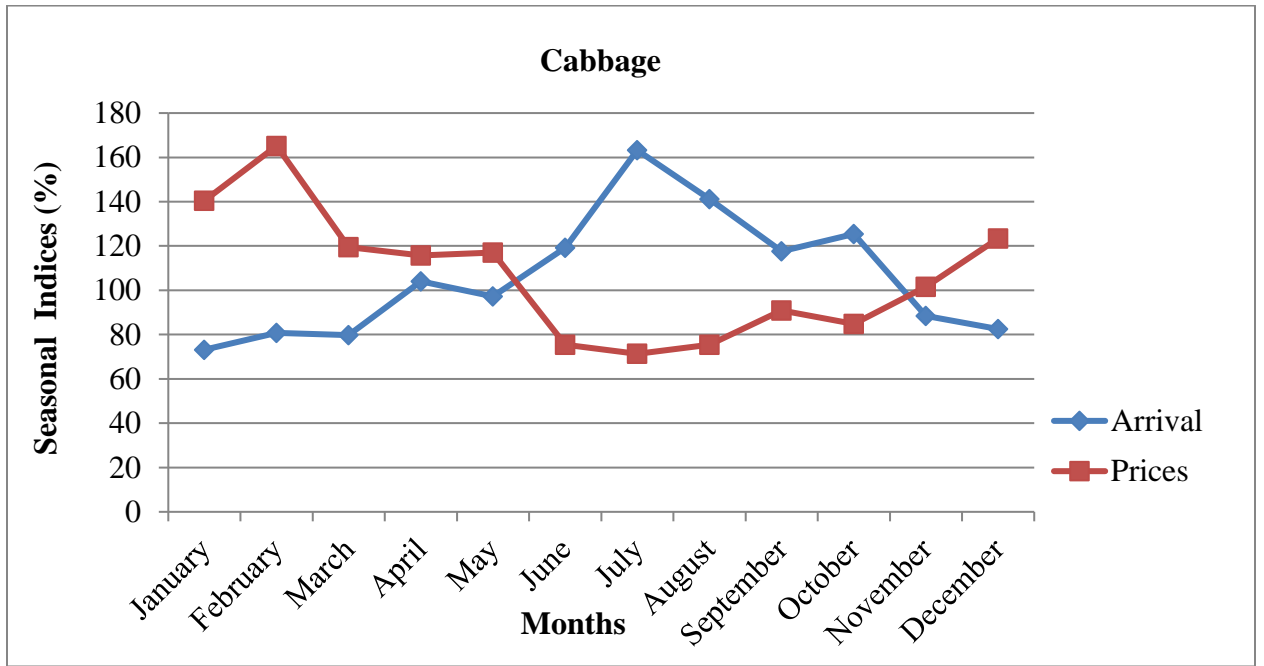


Fig. 4.4 Graphical Representation of Seasonal Indices of Arrival and Prices of Cabbage Crop in Gondiya Market.

4.2(d) Seasonal indices in arrival and prices of Cabbage

The seasonal indices of arrival of Cabbage was computed and presented in Table 4.24. It is observed from the Table that monthly indices were highest in month of July (163.23 per cent) followed by August (141.17 per cent) and lowest is in the month of January (73.18 per cent). The seasonal indices of prices of Cabbage was computed. And presented in the table 4.24. It is observed that monthly indices were highest in month of February (165.19 per cent) followed by January (140.41 per Cent) and the lowest in the month of July (71.32 per cent).

Table 4.24: Monthly Seasonal Indices of Arrival and Prices of Cabbage in Gondiya Market

Months	Arrival	Prices
January	73.18	140.41
February	80.72	165.19
March	79.73	119.50
April	104.02	115.80
May	97.21	117.01
June	119.26	75.39
July	163.23	71.32
August	141.17	75.39
September	117.62	90.95
October	125.44	84.77
November	88.4	101.65
December	82.45	123.44

4.2(e) Seasonal indices in arrival and prices of Brinjal

The seasonal indices of arrival of Brinjal was computed and presented in Table 4.25. It is observed from the Table that monthly indices were highest in month of August (129.75 per cent) followed by April (120.88 per cent) and lowest is in the month of December (83.01 per cent). The seasonal indices of prices of Brinjal was computed. And presented in the table 4.25. It is observed that monthly indices were highest in month of February (139.59 per cent) followed by January (125.82 per Cent) and the lowest in the month of September (85.76 per cent).

Table 4.25: Monthly Seasonal Indices of Arrival and Prices of Brinjal in Gondiya Market

Months	Arrival	Prices
January	84.69	125.82
February	95.12	139.59
March	95.20	120.28
April	120.88	107.44
May	91.36	115.90
June	107.28	91.50
July	104.57	88.13
August	129.75	77.11
September	106.62	85.76
October	114.22	85.76
November	89.35	101.19
December	83.01	98.07

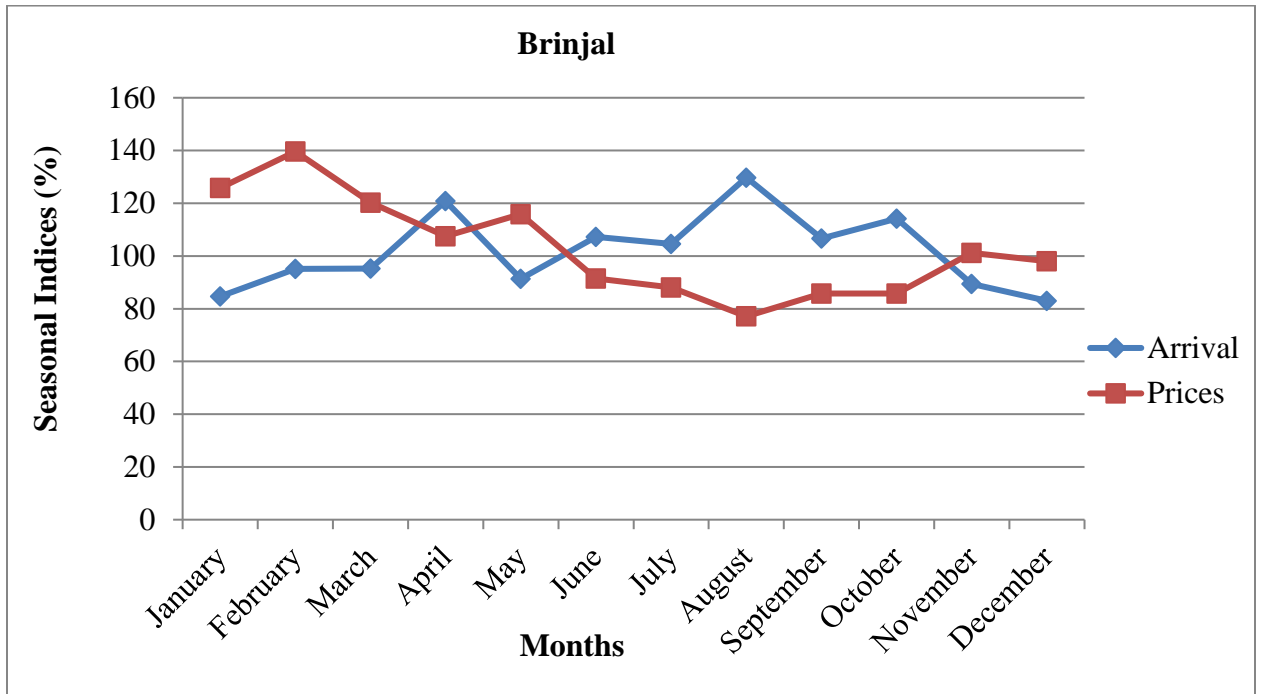


Fig.4. 5 Graphical Representation of Seasonal Indices of Arrival and Prices of Brinjal Crop In Gondiya Market.

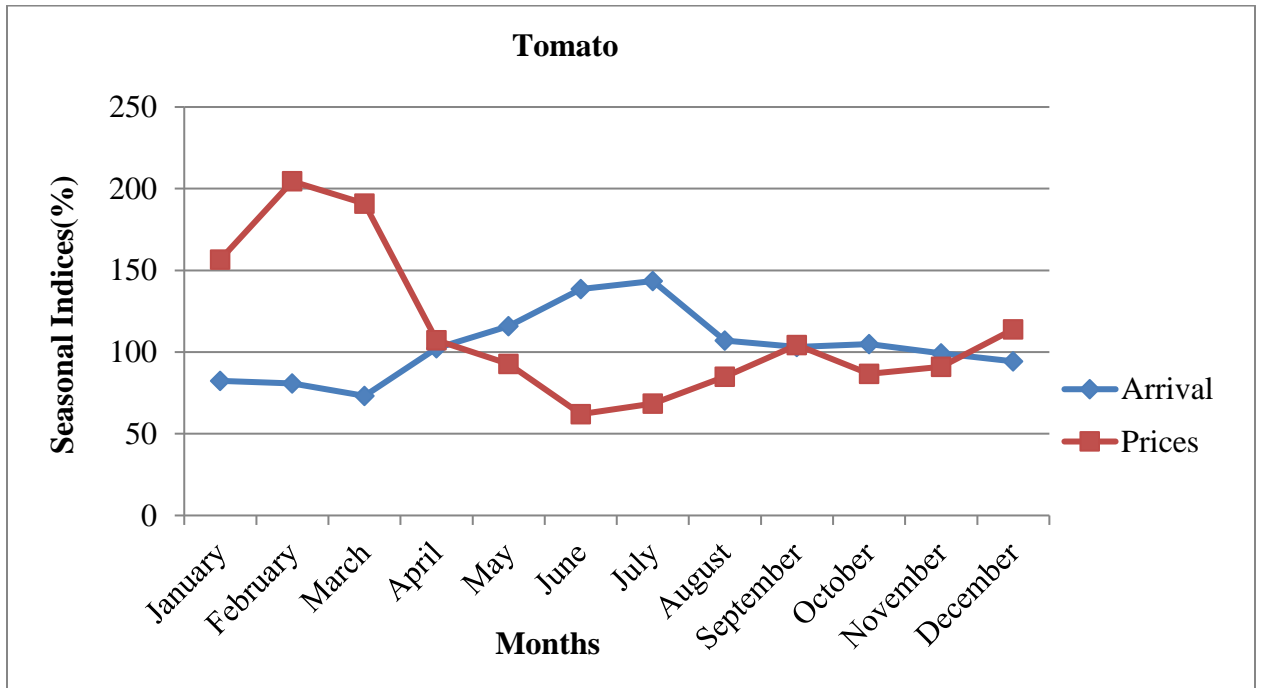


Fig. 4.6 Graphical Representation of Seasonal Indices of Arrival and Prices of Tomato Crop in Gondiya Market.

4.2(f) Seasonal indices in arrival and prices of Tomato

The seasonal indices of arrival of Tomato was computed and presented in Table 4.26. It is observed from the Table that monthly indices were highest in month of July (143.51 per cent) followed by June (138.62 per cent) and lowest is in the month of March (73.19 per cent). The seasonal indices of prices of Tomato was computed. And presented in the table 4.26. It is observed that monthly indices were highest in month of February (204.50 per cent) followed by March (190.87 per Cent) and the lowest in the month of June (62.04 per cent).

Table 4.26: Monthly Seasonal Indices of Arrival and Prices of Tomato in Gondiya Market

Months	Arrival	Prices
January	82.42	156.57
February	80.72	204.50
March	73.19	190.87
April	102.31	107.17
May	115.84	92.78
June	138.62	62.04
July	143.51	68.40
August	107.13	84.92
September	103.15	104.38
October	104.89	86.76
November	99.28	91.09
December	94.35	113.87

4.2(g) Seasonal indices in arrival and prices of Chilli

The seasonal indices of arrival of Chilli was computed and presented in Table 4.27. It is observed from the Table that monthly indices were highest in month of July (125.95 per cent) followed by May (125.25 per cent) and lowest is in the month of January (78.59 per cent). The seasonal indices of prices of Chilli was computed. And presented in the table 4.27. It is observed that monthly indices were highest in month of January (128.55 per cent) followed by December (128.17 per Cent) and the lowest in the month of August (73.42 per cent).

Table 4.27: Monthly Seasonal Indices of Arrival and Prices of Chilli in Gondiya Market

Months	Arrival	Prices
January	78.59	128.55
February	101.74	124.57
March	93.01	113.71
April	121.94	124.22
May	125.25	100.56
June	99.29	82.58
July	125.95	75.94
August	107.15	73.42
September	112.84	85.61
October	96.37	99.43
November	84.51	111.43
December	82.64	128.17

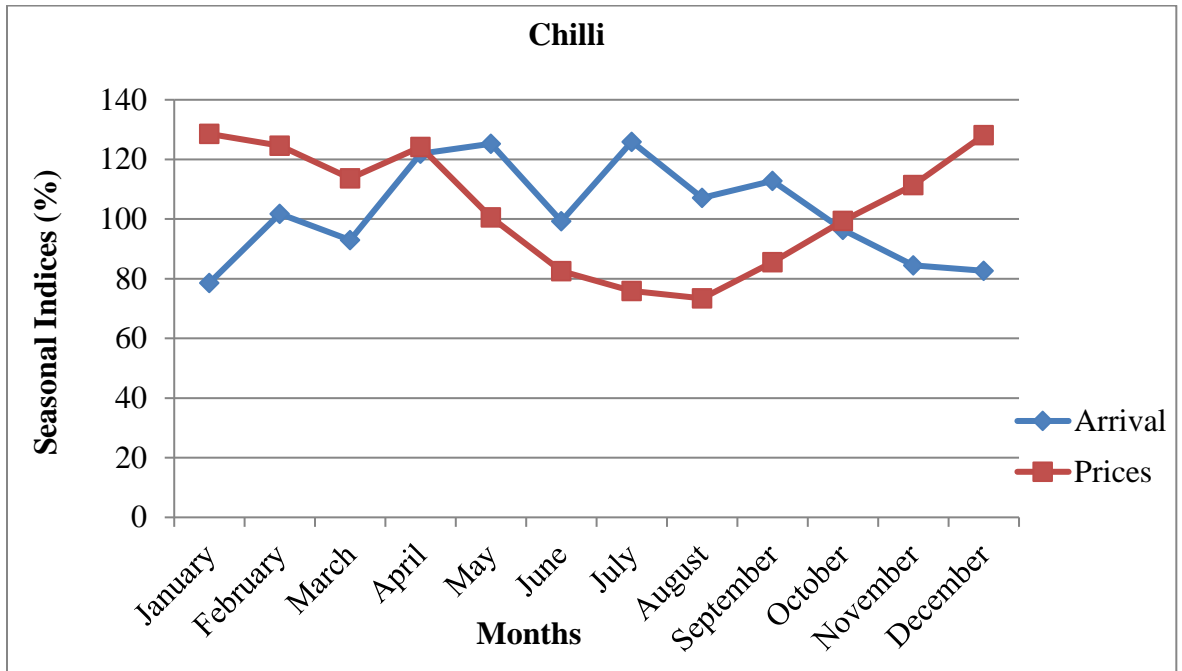


Fig. 4.7 Graphical representation of seasonal indices of arrival and prices of Chilli Crop in Gondiya market.

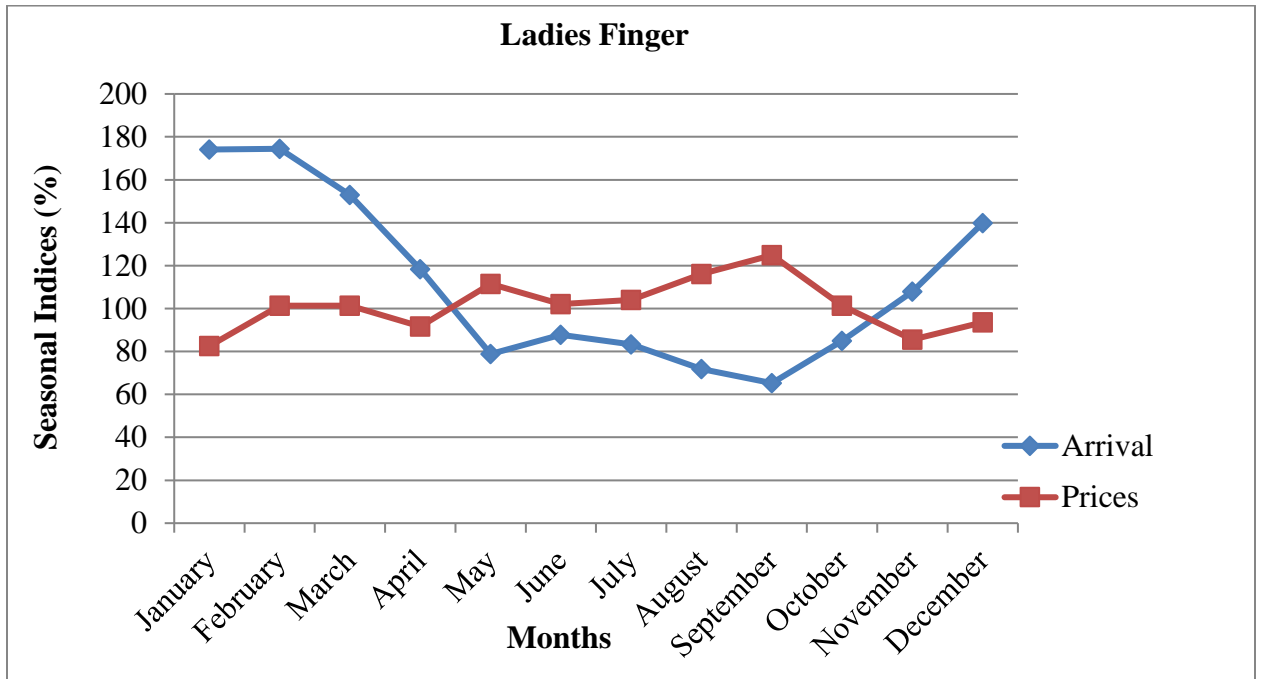


Fig.4. 8 Graphical representation of seasonal indices of arrival and prices of Ladies Finger in Gondiya market.

4.2(h) Seasonal indices in arrival and prices of Ladies Finger

The seasonal indices of arrival of Lady Finger was computed and presented in Table 4.28. It is observed from the Table that monthly indices were highest in month of February (174.14 per cent) followed by January (174.14 per cent) and lowest is in the month of September (65.25 per cent). The seasonal indices of prices of Ladies Finger was computed. And presented in the table 4.28. It is observed that monthly indices were highest in month of September (124.88 per cent) followed by August (116.07 per Cent) and the lowest in the month of January (82.52 per cent).

Table 4.28: Monthly Seasonal Indices of Arrival and Prices of Ladies Finger in Gondiya Market

Months	Arrival	Prices
January	174.14	82.52
February	174.44	101.35
March	152.97	101.35
April	118.36	91.72
May	78.78	111.45
June	87.8	102.09
July	83.32	103.99
August	71.75	116.07
September	65.25	124.88
October	84.92	101.35
November	107.9	85.55
December	139.8	93.56

4.2(i) Seasonal indices in arrival and prices of Ginger

The seasonal indices of arrival of Ginger was computed and presented in Table 4.29. It is observed from the Table that monthly indices were highest in month of July (128.08 per cent) followed by June (122.25 per cent) and lowest is in the month of September (79.71 per cent). The seasonal indices of prices of Ginger was computed. And presented in the table 4.29. It is observed that monthly indices were highest in month of April (122.75 per cent) followed by March (111.29 per Cent) and the lowest in the month of February (64.08 per cent).

Table 4.29: Monthly Seasonal Indices of Arrival and Prices of Ginger in Gondiya Market

Months	Arrival	Prices
January	98.01	104.03
February	107.98	64.08
March	90.77	111.29
April	109.43	122.75
May	100.83	103.17
June	122.25	102.10
July	128.08	101.89
August	102.84	110.30
September	79.71	100.14
October	84.26	102.31
November	82.52	98.44
December	121.46	102.31

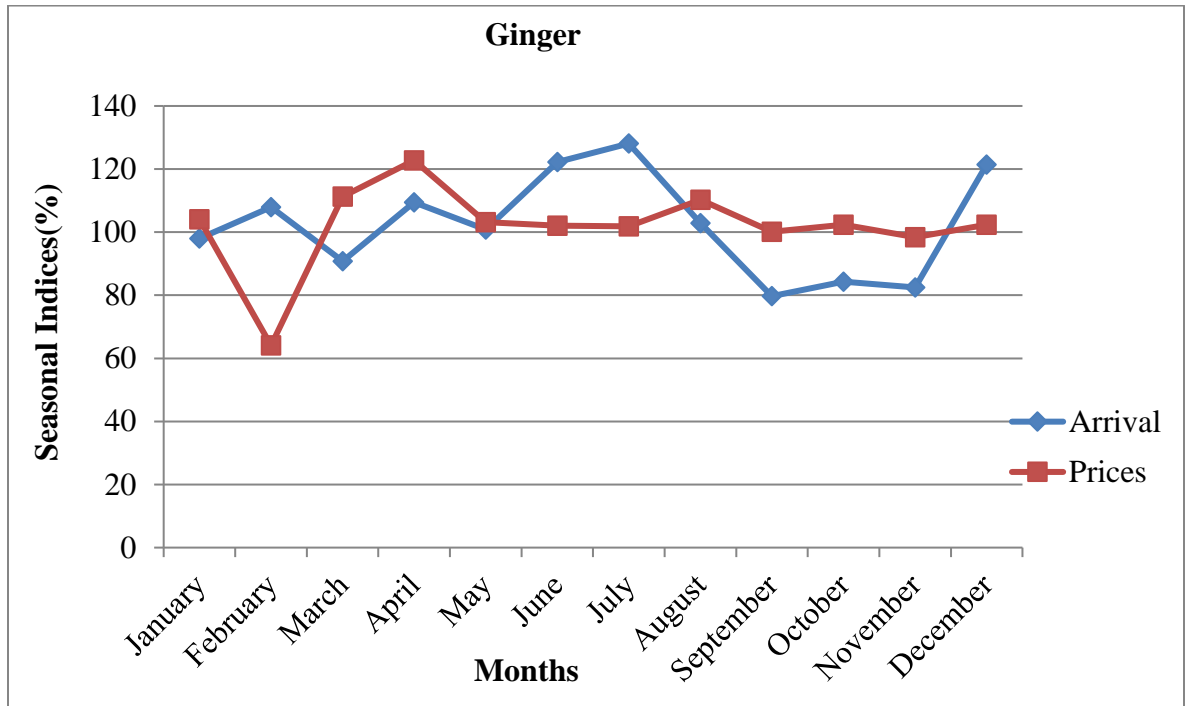


Fig.4. 9 Graphical representation of seasonal indices of arrival and prices of Ginger in Gondiya market.

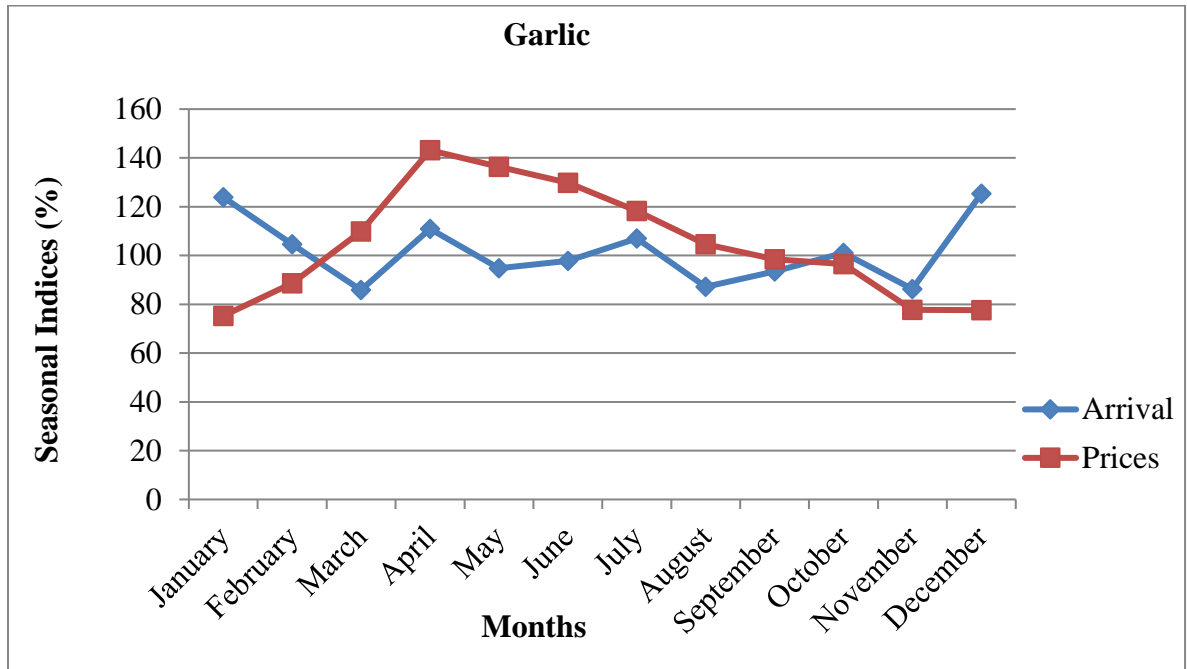


Fig. 4.10 Graphical representation of seasonal indices of arrival and prices of Garlic in Gondiya market.

4.2(j) Seasonal indices in arrival and prices of Garlic

The seasonal indices of arrival of Garlic was computed and presented in Table 4.30. It is observed from the Table that monthly indices were highest in month of December (125.33 per cent) followed by January (123.94 per cent) and lowest is in the month of March (85.82 per cent). The seasonal indices of prices of Garlic was computed. And presented in the table 4.30. It is observed that monthly indices were highest in month of April (143.14 per cent) followed by May (136.32 per Cent) and the lowest in the month of January (75.28 per cent).

Table 4.30: Monthly Seasonal Indices of Arrival and Prices of Garlic in Gondiya Market

Months	Arrival	Prices
January	123.94	75.28
February	104.58	88.58
March	85.82	109.88
April	110.93	143.14
May	94.78	136.32
June	97.83	129.81
July	107.02	118.24
August	87.15	104.6
September	93.4	98.44
October	101.1	96.52
November	86.31	77.70
December	125.33	77.53

4.3 Market Integration

Pearson correlation analysis

4.3.1 Onion

In table 4.31 (a) the descriptive archive of prices statistics of major two Onion markets in Gondiya district. The complete 180 remarks had been used for analysis. The average prices of Onion had been ranges in between Rs. 4000 to Rs. 44490 per quintal in excellent geographically separated Onion markets. Prices sequence in all two market are volatile, the lowest Coefficient of variation appear to be 60.95 per cent in Gondiya market and highest 61.04 in Amgaon market.

Correlation pearson analysis of Onion prices between the major two markets is presented in Table 4.31(b) The cease end result published that, the degree of association used to be located between Gondiya and Amgaon markets. i.e. about 0.798 which used to be discovered to be noticeably significant at one per cent stage of significance. Association was once located to be statistically huge at 0.05% of significance. In all the chosen markets, maximum degree of association for prices used to be determined between one market with that of some different market and all the affiliation have been decided to be statistically large at 0.05% degree of significance.

The degree of association between Gondiya and Amgaon markets would possible also be due the factors that they are the Onion markets. Hence the price signals are except challenge transferred between Gondiya and Amgaon markets. The Gondiya market is depend on Amgaon market for price signal.

Table 4.31(a): Descriptive Statistic of Prices of data of major Onion

Market	N	Mean	STDEV	CV(%)	Minimum (Rs/q)	Maximum (Rs/q)
Gondiya	180	18976	11567.26	60.95	4000	46500
Amgaon	180	18325	11186.99	61.04	4940	44490

N= No of Observation, CV=Coefficient of variation, STDEV = Standard Deviation

Table 4.31(b): Estimation of Correlation Coefficient for Price of Onion between pairs of selected market in Maharashtra

Market		Gondiya	Amgaon
Gondiya	Pearson Correlation	1.000	0.798**
	Sig.(2tailed)	0.000	1.000
	N	180	180
Amgaon	Pearson Correlation		1.000
	Sig.(2tailed)	0.000	0.000
	N	180	180

** Correlation is significant at the 0.01 level (2-tailed)

4.3.2 Potato

In table 4.32(a) the descriptive archive of prices statistics of major two Potato markets in Gondiya market. The complete 180 remarks had been used for analysis. The average prices of Potato had been ranges in between Rs. 6150.00 to Rs. 28500.00 per quintal in excellent geographically separated Potato markets. Prices sequence in all two market are volatile, the lowest Coefficient of variation appear to be 42.38 per cent in Amgaon market and highest i.e 56.37 in Gondiya market.

Correlation pearson analysis of Potato prices between the major two markets is presented in table 4.32(a) The cease end result published that, the degree of association used to be located between Gondiya and Amgaon markets. i.e. about 0.899 which used to be discovered to be noticeably significant at one per cent stage of significance. Association was once located to be statistically huge at 0.05% of significance. In all the chosen markets, maximum degree of association for prices used to be determined between one market with that of some different market and all the affiliation have been decided to be statistically large at 0.05% degree of significance.

The degree of association between Gondiya and Amgaon markets would possible also be due the factors that they are the shut via Potato markets. Hence the price signals are except challenge transferred between Gondiya and Amgaon markets.

Table 4.32(a): Descriptive Statistic of Prices of data of major Potato

Market	N	Mean	STDEV	CV(%)	Minimum (Rs/q)	Maximum (Rs/q)
Gondiya	180	16240.00	6883.18	56.37	5400	28500
Amgaon	180	15452.66	6327.02	42.38	6150	26200

N= No of Observation, CV=Coefficient of variation, STDEV = Standard Deviation

Table 4.32(b): Estimation of Correlation Coefficient for Price of Potato between pairs of selected market in Maharashtra

Market		Gondiya	Amgaon
Gondiya	Pearson Correlation	1.000	0.899**
	Sig.(2tailed)	0.000	0.000
	N	180	180
Amgaon	Pearson Correlation		1.000
	Sig.(2tailed)	0.000	0.000
	N	180	180

** Correlation is significant at the 0.01 level (2-tailed)

4.3.3 Tomato

In table 4.33(a) the descriptive archive of prices statistics of major two Tomato markets in Gondiya market. The complete 180 remarks had been used for analysis. The average prices of Tomato had been ranges in between Rs. 4900.00 to Rs. 26000.00 per quintal in excellent geographically separated Tomato markets. Prices sequence in all two market are volatile, the lowest Coefficient of variation appear to be 42.70 percentage in Amgaon market and highest i.e. 43.43 in Gondiya market.

Correlation Pearson analysis of Tomato prices between the major markets is presented in table 4.33(b). The cease end result published that, the degree of association used to be located between Gondiya and Amgaon markets. i.e. about 0.894**t which used to be discovered to be noticeably significant at one per cent stage of significance. Association was once located to be statistically huge at 0.05% of significance. In all the chosen markets, maximum degree of association for prices used to be determined between one market with that of some different market and all the affiliation have been decided to be statistically large at 0.05% degree of significance.

The degree of association between Gondiya and Amgaon markets would possible also be due the factors that they are the shut via Tomato markets. Hence the price signals are except challenge transferred between Gondiya and Amgaon markets.

Table 4.33(a): Descriptive Statistic of Prices of data of major Tomato

Market	N	Mean	STDEV	CV(%)	Minimum (Rs/q)	Maximum (Rs/q)
Gondiya	180	16033.33	6963.44	43.43	2800	26000
Amgaon	180	15436.60	6591.93	42.70	4900	25990

N= No of Observation, CV=Coefficient of variation, STDEV = Standard Deviation

Table 4.33(b): Estimation of Correlation Coefficient for Price of Tomato between pairs of selected market in Maharashtra

Market		Gondiya	Amgaon
Gondiya	Pearson Correlation	1.000	0.894**
	Sig.(2tailed)	0.000	0.000
	N	180	180
Amgaon	Pearson Correlation		1.000
	Sig.(2tailed)	0.000	0.000
	N	180	180

** Correlation is significant at the 0.01 level (2-tailed)

CHAPTER – V

SUMMARY AND CONCLUSIONS

CHAPTER-V

SUMMARY AND CONCLUSIONS

5.1 Introduction

India is the second largest producer of vegetables, next only to china. India accounts for 14% of world production of vegetables with an annual production of 189 million tones during the year 2019-2020. India ranks first in the world production of okra, second production of brinjal, cabbage, cauliflower, onion, potato and third in production of tomato. The major vegetable producing states in India are Uttar Pradesh, west- Bengal, Bihar, Orissa and Tamil Nadu, accounting for 17%, 16%, 10%, 7%, and 6% respectively of total vegetables production in India. Vegetable crop are grown in India under various agro climatic-ecological conditions. The commercial cultivation of Vegetables has resulted into improved socio- economic and nutritional status of the masses. Vegetables are essential constituents of nutritional security and Indian agriculture due to their economic viability, nutritional Effluence, high yield, and ability to bring forth on- farm as well as off- farm employment. It is one of the most important and fastgrowing sub - sectors of the food processing sector. The huge geographical area and innumerable agro- climatic niches in India exert a substantial influence. On the supply of most of the agricultural commodities. This is especially true for the vegetable crops due to wide ecological amplitude and the shorter growth periods as compared to many other crops, Incremental per capita income, urbanization, health awareness, transformation of farmers preference to high value crops is the important element for fuelling the vegetables growth in the country. Marketing of horticultural crop is complex especially because of perishability, seasonality and bulkiness within horticulture, Vegetables growing is considered more important as it generates more income and employment, promotes equity, improves nutrition and protects and conserve environment. As far as production is concerned India has emerged as the second largest producer of vegetables with the production of 189 Million metric tons. In the year (2019-20) and area covered under vegetables is 10.1 Million hectares and in Maharashtra the production of vegetables is 50.96 lakh MT per year, whereas the area is covered under vegetables is 4.04 lakh ha). **(Source: www.statista.com).**

OBJECTIVES

The objectives for the present investigation are

1. To study trends in arrival and prices of major vegetables.
2. To know seasonal fluctuation of arrival and prices of major vegetables.
3. To study market integration in different major vegetables market of Gondiya district.

5.2 Methodology

In Indian markets, fluctuation in market arrivals and prices are the general feature of Agriculture marketing. Indian farmers generally sell their produce in market immediately after the harvesting of crop, which leads to fall in the prices due to full of arrivals in market. It is seen that, seasonal fluctuation in prices of agricultural products are more and the benefits of these fluctuation have been reaped by the middle men only. In addition to this, those who are involved in the marketing, would take decision favorably to the cultivators if they supply such information, keeping this view in mind the present work was undertaken with following methodology. It felt necessary that this study would help the farmers, organisers and market committees for taking appropriate decisions regarding marketing of vegetables.

Gondiya district is selected purposively for present studies. In Gondiya district arrival of different agricultural product are in good quantity as compared to other APMCs(Agricultural Produce Market Committees). Gondiya district was selected due to the availability of continuous time series data for the research period.To study the trends of market arrivals and prices of 10 major vegetables as will be selected because of their importance in their present situation.The present study is based on secondary time series data compiled from the arrival and prices. Data were collected from the record of the selected market committee.

5.3 Result and discussion

5.3.1 Trend in arrival and prices

Compound Growth Rate of Vegetables.

i) Yearly growth rates (compound) of arrival were calculated with respect to Onion in Gondiya market and the growth rate was calculated for four periods. Highest

growth rate was in period IV is (11.21 per cent). And in case of prices the highest compound growth rate was in period III (29.89 per cent).

ii) Yearly growth rates (compound) of arrival were calculated with respect to Potato in Gondiya market. Highest growth rate was in period IV is (15.06 per cent) among all four periods. In case of prices the highest compound growth rate was in period II (28.49 per cent). CGR for period I, III, and IV was 8.82, 11.58 and 9.017 respectively.

iii) Yearly growth rates (compound) of arrival were calculated with respect to Cauliflower in Gondiya market growth rate was calculated for four periods. Highest growth rate was in period IV is (11.79 per cent) among all four periods.. In case of prices the highest compound growth rate was in period II (17.35 per cent).

iv) Yearly growth rates (compound) of arrival were calculated with respect to Cabbage in Gondiya market and the growth rate was calculated for four periods. Highest growth rates was in period IV is (13.77 per cent) among all four periods. In case of prices the highest compound growth rate was in period II (16.73 per cent).

v) Yearly growth rates (compound) of arrival were calculated with respect to Brinjal in Gondiya market and the growth rate was calculated for four periods. Highest growth rate was in period IV is (13.44 per cent) among all four periods. In case of prices the highest compound growth rate was in period I (12.65 per cent).

vi) Yearly growth rates (compound) of arrival were calculated with respect to Tomato in Gondiya market and the growth rate was calculated for four periods. Highest growth rate was in period IV is (25.50 per cent) among all four periods. In case of prices the highest compound growth rate was in period II (16.56 per cent).

vii) Yearly growth rates (compound) of arrival were calculated with respect to Chilli in Gondiya market and the growth rate was calculated for four periods. Highest growth rate was in period I is (20.56 per cent) among all four periods. In case of prices the highest compound growth rate was in period II (25.06 per cent).

viii) Yearly growth rates (compound) of arrival were calculated with respect to Ladies Finger in Gondiya market and the growth rate was calculated for four periods. Highest growth rate was in period IV is (32.81 per cent) among all four periods. In case of prices the highest compound growth rate was in period II (20.66 per cent). CGR for period I, III and IV was 0.294, 8.122, 19.06 respectively.

ix) Yearly growth rates (compound) of arrival were calculated with respect to Ginger in Gondiya market and the growth rate was calculated for four periods.

Highest growth rate was in period IV is (7.90 per cent) among all four periods. In case of prices the highest compound growth rate was in period I (46.00 per cent).

x) Yearly growth rates (compound) of arrival were calculated with respect to Garlic in Gondiya market and the growth rate was calculated for four periods. Highest growth rate was in period I is (37.84 per cent) among all four periods. In case of prices the highest compound growth rate was in period I (14.92 per cent).

Mean, Standard Deviation and Coefficient of variation

The mean arrival of Onion Crop was computed that monthly mean was highest in the month of May (1332.87 qtl). The highest Standard Deviation was in the month of August (843.09) and lowest is in the month of December (496.33). The highest Coefficient of Variation is in the month of August (96.45 per cent) and lowest is in the month of May (53.02 per cent). The mean prices of Onion Crop was computed that monthly mean was highest in the month of November (2326.67 qtl) and lowest mean is in the month of April (940 qtl). The monthly highest Standard Deviation is in month of November(2137.91) and lowest is in the month of April (495.40). The highest Coefficient of Variation is in the month of November (91.88 per cent) and lowest is in the month of April (52.70 per cent).

The mean arrival Potato Crop was computed that monthly mean was highest in the month of May (893.34 qtl) and lowest mean was in the month of August (682.6 qtl). The highest Standard Deviation was in the month of May (624.34) and lowest is in the month of March (415.12). The highest Coefficient of Variation is in the month of July (78.09 per cent) and lowest is in the month of March (54.62 per cent).The mean prices of Potato Crop was computed that monthly mean was highest in the month of November (1640 qtl) and lowest mean is in the month of April (1000 qtl). The monthly highest Standard Deviation is in month of November (824.44) and lowest is in the month of April (502.84). The highest Coefficient of Variation is in the month of February (56.04 per cent) and is in the month of October (37.34 per cent).

The mean arrival of Tomato Crop was computed that monthly mean was highest in the month of March (2442.6 qtl) and lowest mean was is in the month of July (1245.73 qtl). The highest Standard Deviation was in the month of March (1718.93) and lowest is in the month of June (1094.79). The highest Coefficient of Variation is in the month of April (95.28 per cent) and lowest is in the month of December (69.01per cent).The mean of prices of Tomato Crop was computed that monthly mean was highest in the month of June (2153.33 qtl) and lowest mean is in

the month of March (700 qtl). The monthly highest Standard Deviation is in month of June (1308.69) and lowest is in month of February (304.41). The highest Coefficient of Variation is in month of October (74.63 per cent) and lowest is in the month of January (44.04 per cent).

5.3.2 Seasonal fluctuation of Vegetables

i) The seasonal indices of arrival of Onion was computed and it is observed from the monthly indices of arrival were highest in the month of September (129.85 per cent) followed by October (129.23 per cent) and lowest is in the month of May (65.46 per cent). The seasonal indices of prices of Onion was computed. The monthly indices of prices were highest in the month of April (168.22 per cent) and the lowest in the month of November (67.97 per cent). So the prices is high automatic the arrival become low.

ii) The seasonal indices of arrival of Potato was that the monthly indices were highest in month of August (114.19 per cent) and lowest is in the month of May (87.25 per cent). And seasonal indices of prices of Potato was that monthly indices were highest in month of April (135.34 per cent) and the lowest in the month of November (82.52 per cent).

iii) The seasonal indices of arrival of Cauliflower was that monthly indices were highest in month of July (163.23 per cent) and the lowest in the month of January (72.18 per cent). And seasonal indices of prices of Cauliflower was computed that monthly indices were highest in month of February (171.98 per cent) and the lowest in the month of July (63.80 per cent).

iv) The seasonal indices of arrival of Cabbage was presented that monthly indices were highest in month of July (163.23 per cent) followed by August (141.17 per cent) and the lowest in the month of January (73.18 per cent). And seasonal indices of prices of Cabbage was computed that monthly indices were highest in month of February (165.19 per cent) and the lowest in the month of July (71.32 per cent).

v) The seasonal indices of arrival of Brinjal was computed that monthly indices were highest in month of August (129.75 per cent) and lowest is in the month of December (83.01 per cent). And seasonal indices of prices of Brinjal was computed that monthly indices were highest in month of February (139.59 per cent) and the lowest in the month of September (85.76 per cent).

vi) The seasonal indices of arrival of Tomato are computed that monthly indices were highest in month of July (143.51 per cent) and the lowest in the month of March (73.19 per cent). And seasonal indices of prices of Tomato was computed that monthly indices were highest in month of February (204.50 per cent) and the lowest in the month of June (62.04 per cent).

vii) The seasonal indices of arrival of Chilli was computed that monthly indices were highest in month of July (125.95 per cent) and lowest is in the month of January (78.59 per cent). And seasonal indices of prices of Chilli was that monthly indices were highest in month of January (128.55 per cent) and the lowest in the month of August (73.42 per cent).

viii) The seasonal indices of arrival of Lady Finger was computed that monthly indices were highest in month of February (174.14 per cent) and lowest is in the month of September (65.25 per cent). And seasonal indices of prices of Lady Finger was computed that monthly indices were highest in month of September (124.88 per cent) and the lowest in the month of January (82.52 per cent).

ix) The seasonal indices of arrival of Ginger was computed that monthly indices were highest in month of July (128.08 per cent) and lowest is in the month of September (79.71 per cent). And seasonal indices of prices of Ginger was observed that monthly indices were highest in month of April (122.75 per cent) and the lowest in the month of February (64.08 per cent).

x) The seasonal indices of arrival of Garlic was computed that monthly indices were highest in month of December (125.33 per cent) and lowest is in the month of March (85.82 per cent). And seasonal indices of prices of Garlic was computed. It is observed that monthly indices were highest in month of April (143.14 per cent) and the lowest in the month of January (75.28 per cent).

5.3.3 Market Integration of Vegetables.

1) In Onion crop the cease end result published that, the degree of association used to be located between Gondiya and Amgaon markets. i.e. about at 0.798** which used to be discovered to be noticeably significant at one per cent stage of significance. Association was once located to be statistically huge at 0.05% of significance.

2) In Potato crop the cease end result published that, the degree of association used to be located between Gondiya and Amgaon markets. i.e. about at 0.899**

which used to be discovered to be noticeably significant at one per cent stage of significance.

3) In Tomato crop the cease end result published that, the degree of association used to be located between Gondiya and Amgaon markets. i.e. about at 0.894** which used to be discovered to be noticeably significant at one per cent stage of significance.

CONCLUSION

- 1) The price index for the month of September was the highest in Gondiya market. Hence, those who have good retention capacity should be sell their produce in the month of September, while it is advised that Potato and cauliflower should be in between August and September months to get maximum prices.
- 2) As regards to vegetables, it is advised that Ginger, Garlic, Chilli, Tomato, Brinjal produce should be sold in the months of May to July, July to September, October to December, respectively to get higher prices for their produce.
- 3) The results indicated that the correlation co-efficients in monthly wholesale prices for onion, potato and tomato between all the selected market pairs were positive and significantly different from zero.
- 4) The results of the analysis of the Market Movement in Arrival and Prices of Major Vegetables in Gondiya Market, it found that the Growth in prices is positive and significant in whole period. Instability Indices of the Prices of the Vegetables were more unstable as compared to Arrivals during the selected period. The increase in Arrival of Vegetables in market led to decline in Prices.

POLICY IMPLICATIONS

A careful study of the findings and the connected causes would suggest that the farmer suffer from various handicaps, which must be removed if their financial position is to be strengthened. Some of the measures that could be adopted to achieve this result are indicated below.

- 1) The impact of market arrivals on prices has been found negative in the market and in set of the data for most of the vegetables. Hence, proper storage facilities are to be created and reduce the risk of fluctuation in price.
- 2) Seasonal fluctuation in vegetables presented that the arrivals are high in August and September months and low in May and June months in

general. Hence, the producer needs plan their planting of vegetables which comes yield in the months where the prices are high.

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LITERATURE CITED

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APPENDIX

APPENDIX : I

TITLE: TRENDS IN ARRIVAL AND PRICES OF MAJOR VEGETABLES IN GONDIYA DISTRICT OF MAHARASHTRA

Total Arrival (Quintal) and Prices (Rs/q) of Onion and Potato in Gondiya Market

Crops	Onion		Potato	
	Total Arrival	Total Prices	TotalArrival	TotalPrices
January	11540	23100	11970	20000
February	11814	21400	11650	18100
March	13825	16045	11399	19800
April	15599	14100	12567	15000
May	19993	14200	13400	17100
June	16489	19300	11893	20100
July	12800	19900	10943	20500
August	13111	31400	10239	21500
September	10079	28000	11049	21600
October	10127	32500	10458	24300
November	10887	34900	11498	24600
December	10793	29800	13251	21000

Total Arrival (Quintal) and Prices (Rs/q) of Cauliflower and Cabbage in Gondiya Market

Crops	Cauliflower		Cabbage	
	Total Arrival	Total Prices	TotalArrival	Total Prices
January	17455	20800	19015	16000
February	16245	17400	17238	13600
March	15771	23800	17452	18800
April	12475	24100	13377	19400
May	13230	24700	14315	19200
June	11145	38300	11668	29800
July	8115	46900	8525	31500
August	7905	40400	9857	29800
September	9830	37200	11831	24700
October	9980	34100	11093	26500
November	14714	26900	15741	22100
December	16008	24500	16876	18200

Total Arrival (Quintal)and Prices (Rs/q) of Brinjal and Tomato in Gondiya Market

Crops	Brinjal		Tomato	
	TotalArrival	Total Prices	Total Arrival	Total Prices
January	35390	15200	32534	12800
February	31509	13700	33219	9800
March	31484	15900	36639	10500
April	24795	17800	26211	18700
May	32805	16500	23149	21600
June	27939	20900	19346	32300
July	28661	21700	18686	29300
August	23100	24800	25032	23600
September	28110	22300	25997	19200
October	26240	22300	25565	23100
November	33543	18900	27011	22000
December	36105	19500	28421	17600

Total Arrival (Quintal)and Prices (Rs/q)of Chilli and Lady Finger in Gondiya Market

Crops	Chilli		Ladies Finger	
	Total Arrival	Total Prices	Total Arrival	Total Prices
January	2000	34500	2890	33900
February	1545	35600	2885	27600
March	1690	39000	3290	27600
April	1289	35700	4252	30500
May	1255	44100	6388	25100
June	1583	53700	5732	27400
July	1248	58400	6040	26900
August	1467	60400	7014	24100
September	1393	51800	7713	22400
October	1631	44600	5926	27600
November	1860	39800	4664	32700
December	1902	34600	3600	29900

Total Arrival (Quintal) and Prices (Rs/q) of Ginger and Garlic in Gondiya Market

Crops	Ginger		Garlic	
	Total Arrival	Total Prices	Total Arrival	Total Prices
January	575	95100	367	144500
February	522	154400	435	122800
March	621	88900	530	99000
April	515	80600	410	76000
May	559	95900	480	79800
June	461	96900	465	83800
July	440	97100	425	92000
August	548	89700	522	104000
September	707	98800	487	110500
October	669	96700	450	112700
November	683	100500	527	140000
December	464	92700	363	140300

CURRICULUM VITAE


CURRICULUM VITAE

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