

## **Seasonal Behaviour of Arrivals and Prices of Major Crops in Krishi Upaj Mandis of Chhattisgarh, India**

1. **ABSTRACT:** Chhattisgarh state is famous for its forest wealth and mineral resources and there is abundant production of crops. According to total area of crops, Paddy (77.47 percent) and Chickpea (5.43 percent) are major crops of Chhattisgarh state. Arrivals and price data (Year 2014-15 to 2023-24) of major crops were collected from website of Chhattisgarh state Mandi Board. The study was observed that the peak arrivals & price of paddy were started in the same months November to January in both market (KUM, Bemetra & KUM, Bhatapara) except peak price season starts in August to October with narrow difference in KUM, Bhatapara. In case of Chickpea, the peak arrivals and price started in the month of March to May & September to November, respectively. The Price stability of both crops (paddy & Chickpea) was higher in KUM, Bhatapara as compared to KUM, Bemetra. The less price fluctuation of paddy as compared to chickpea in Chhattisgarh state due to purchasing directly to farmers by the Government with Minimum Support Price (MSP) and also provided the Bonus. The study was suggested that the economic development of farmers in state, the government should purchase agricultural products other than paddy and cooperate in setting up dal mills & processing units. Necessary steps should be taken to increase of marketable surplus and development of community level threshing floor. The study was importance in knowing the market behaviour and price fluctuation during the peak season and the major reason behind. The study also throw light on the aspect how to enrich the economic condition of the farmers.

**Keyword:** Seasonal Indices, Price & Arrivals Pattern, Price stability of Paddy and Chickpea.

**JEL Code:** C10, C53, D78

2. **INTRODUCTION:** Chhattisgarh is an inland state whose border neither touches any sea coast nor any country's border. Chhattisgarh state is part of the Peninsular Plateau of

India. This state is classified into three parts based on the agro-climatic zone, which are the Chhattisgarh plains, Bastar plateau and Northern hills. This state is famous for its forest wealth and mineral resources and there is abundant production of crops. The climate here is dry and humid, with an average annual rainfall of 1200 mm. and mainly from the southwest monsoon. Agriculture is the main source of livelihood in Chhattisgarh; agricultural land is divided into small fields. Kharif or Rabi and both crops are grown here. In Chhattisgarh, paddy is the foremost crop which is grown in about 36 lakh ha. area in KharifSeason. Next to Rice, Pulses are grown in most parts of Chhattisagrh (Gupta *et al.*, 2018). According to the data, the main crops are paddy (77.47 percent) and Chickpea (5.43 percent), which comprise the total area of crops in Chhattisgarh. Chhattisgarh has so far received a total of 6 *Krishi Karman Awards* from the Ministry of Agriculture, Government of India for record production through successful implementation of agricultural schemes. Still, here some agricultural products are purchased by the government in limited quantities at support price. The remaining produce is sold to small traders due to which farmers are not able to get fair prices for their produce. The level of many no. of the regulated market is also falling due to which one has to go through many problems which are as follows still lack of market facilities, the victim of exploitation, force sold to village traders, payment delay, lack of information, etc. therefore, the study here was chosen to know about the behavior of price and arrivals in the markets. This study will help farmers and traders to take decisions like where to sell and when to sell which product so that farmers can get the right price for their crop.

### 3. METHODOLOGY:

#### 3.1 Selection of Crops

Paddy and Chickpea were selected based on the maximum area of total crops area in the Chhattisgarh state. Both crops (Paddy and Chickpea) are major sources of livelihoods in the state. Paddy is very famous in Chhattisgarh; hence it is known as Paddy Bowl.

Table 1: Area under major crops in Chhattisgarh(Year-2023-24)

S.N.	Name of Crops	Area (ha.)	Percentages share in total crop area
1.	Paddy	43,35,202	77.47
2.	Chickpea	3,03,625	5.43

3.	Lathyrus	162446	2.90
4.	Wheat	1,42,685	2.55
5.	Maize	1,34,228	2.40
6.	Total crop area (edible + non edible)	55,95,505	100.00

*Sources: Agriculture Statistical Table, Commissioner of Land Revenue, Raipur, Chhattisgarh.*

### 3.2 Selection of Krishi Upaj Mandi

Bemetra and Bhatapara mandis were selected based on the maximum arrivals of major crops produced in Chhattisgarh state. Both the markets are situated in the plain area of the state, the soil of the surrounding district is suitable for paddy and pulses crops. Bemetra district is famous in the whole country for production and productivity. KUM, Bhatapara is popular for arrival of good quality and aromatic rice.

Table 2: Arrivals of major crops (Paddy + Chickpea) in Krishi Upaj Mandis of Chhattisgarh (Year 2023-24)

S.N.	Name of Mandi	Arrivals (qtl.)	Percentages share in total arrivals of major crops in Chhattisgarh
1.	KUM, Bemetra	93,76,539	5.68
2.	KUM, Bhatapara	84,70,308	5.13
3.	KUM, Kurud	64,85,616	3.93
4.	KUM, Kawardha	43,71,364	2.65
5.	KUM, Mungeli	38,31,870	2.32
6.	All mandis of C.G.	16,51,07,284	100.00

*Sources: Chhattisgarh Rajya Krishi Vipdan (Mandi) Board, Raipur, Chhattisgarh.*

### 3.3 Data collection

The time-series data on arrivals (in quintals) and price (in Rs./quintal) of Paddy and Chickpea in Chhattisgarh for a period of 10 years from 2014-15 to 2023-24 was obtained from the Chhattisgarh Rajya Krishi Vipdan (Mandi) Board (<https://agriportal.cg.nic.in>>RptDate...) for conducting the present study.

### 3.4 Analytical tools

A Seasonal Index is a measurement of how much a specific period is higher or lower than a typical period during the year. Seasonal indices can be used to compare a specific

season to the average season of a cycle. The importance of the calculation of Seasonal Index are can be used to forecast of data set, identify of fluctuations of data, plan operations, optimize inventory management, balanced the farm etc.

The seasonal indices were calculated by adopting the following steps:

1. Firstly, generate a series of twelve months data along with year-wise in specific column.
2. Find the average for each month.
3. To find the average of average for the year.
4. The average is divided by the average of average for the each month.
5. Generated new average data multiplied by 100 to get the seasonal index in percentages.

$$\text{Seasonal Indices} = \frac{\text{Average}}{\text{Average of Average}} \times 100$$

#### 4. RESULTS AND DISCUSSION

**4.1 Actual arrival and price of paddy in Chhattisgarh-** The actual arrival and price of paddy in Krishi Upaj Mandi, Bemetra & Krishi Upaj Mandi, Bhatapara are shown in Table 3 and Fig.1. The collected data reported that the price ranges of paddy were Rs.1150-2191/ qtl.in KUM, Bemetra and Rs. 1497-2699 / qtl. KUM, Bhatapara during the last 10 years. The study noticed that on average per annual more arrivals of paddy was 93 percent in KUM, Bemetra as compared to KUM, Bhatapara due to the shift of chickpea area into summer paddy cultivation and improved marketing system. The study was reported that the arrivals of paddy continues increases due to development of heat tolerance crop varieties and government policy in Chhattisgarh. KUM, Bhatapara has a higher mean price (Rs. 541.59) as compared to KUM, Bemetra means earn more price per quintal by farmers in KUM, Bhatapara. KUM, Bhatapara, and also KUM, Bemetra is famous for the paddy market in Chhattisgarh state due to many no. of established Rice mills and other value-added units near mandis, arrivals of aromatic rice, fine rice & good quality products, infrastructure development, transportation and marketing system, the shift of pulses area into paddy area, improved market information system, *etc.*

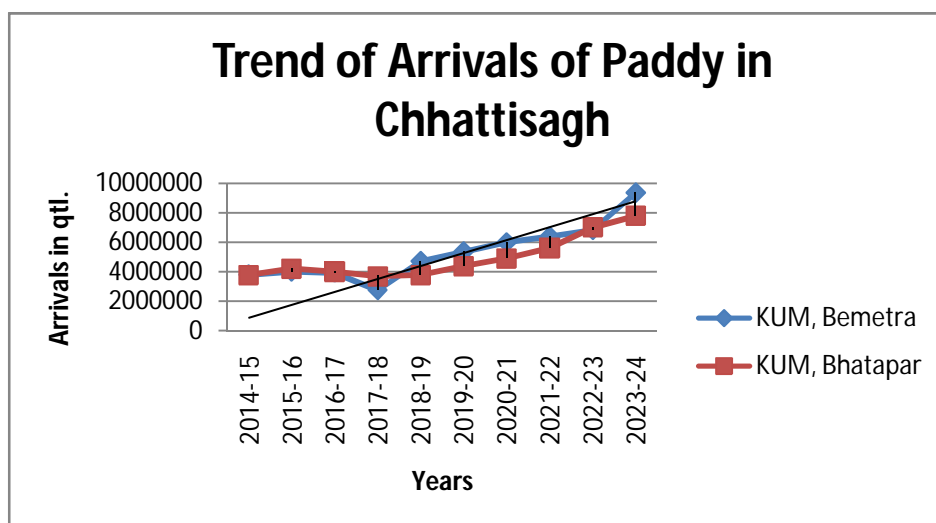


Fig.1: Trend of Arrivals of Paddy in Chhattisgarh.

**4.2 Seasonal Indices (SI) of arrivals & price of paddy in Chhattisgarh** - The seasonal pattern of arrival & price of paddy in Chhattisgarh shown in Table 5 & 6 and Fig. 2 &3.

Sahu *et al.*(2020) calculated that the highest paddy price in Ambikapur market will be Rs. 2028.49 per quintal in month of February, 2021 while least Rs. 1876.92 in July, 2020 by SARIMA.

Ahmed et al. (2023) noticed that the extent of variability in arrivals of paddy in APMC yard of Bangarpet was shown highest during the month of December followed by May. Whereas lowest arrivals were recorded during October.

Savitha and Kunal (2016) showed that the market arrival were high in the months of December to April and in case of price, indices values more or less the same during both peak and lean arrival month in the Sindhanur and Sirguppa markets of Karnataka.

**Table 3: Actual arrival and price of paddy in Chhattisgarh (2014-15 to 2023-24)**

Months/Year/ Mandi	2014-15				2015-16				2016-17				2017-18			
	Bemetra		Bhatapara		Bemetra		Bhatapara		Bemetra		Bhatapara		Bemetra		Bhatapara	
	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl
April	0	0	38284	1793	810	1267	96448	1591	1439	1259	166775	1826	4226	1388	156861	2003
May	40	1400	208113	1869	693	1172	214171	1497	2848	1377	332219	1940	8300	1335	300517	2018
June	110	1400	188739	1881	1210	1172	221608	1550	2740	1369	229804	2053	7223	1389	266212	2091
July	304	1280	186646	1944	975	1156	200904	1611	983	1375	165705	2063	1260	1362	170938	2099
August	641	1320	122901	1994	485	1150	141634	1654	1195	1400	116913	2097	384	1399	132066	2137
September	3550	1336	149828	2129	1206	1190	181664	1710	472	1407	155771	2097	1678	1419	223519	2187
October	5105	1330	93145	2067	2016	1193	212435	1730	1880	1331	216697	2109	2535	1521	142406	2135
November	753	1187	241591	1875	764569	1235	503347	1732	880427	1394	382886	1558	594738	1514	452143	2083
December	1444247	1182	1133755	1687	2051189	1353	1176875	1650	2082341	1404	1118614	1644	1321899	1524	848921	2015
January	2320239	1297	1054248	1556	1175323	1335	867937	1632	943540	1404	609044	1805	795588	1538	649109	2063
February	6774	1331	211271	1615	3114	1224	172373	1761	14256	1305	267261	1957	3183	1521	211528	2170
March	3821	1251	156268	1571	2017	1293	214889	1690	5043	1342	258912	1942	10087	1529	144229	2161
Months/Year/ Mandi	2018-19				2019-20				2020-21				2021-22			
	Bemetra		Bhatapara		Bemetra		Bhatapara		Bemetra		Bhatapara		Bemetra		Bhatapara	
	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl
April	532	1514	150102	2180	3194	1522	110665	1955	12434	1476	138251	2092	1625	1358	20540	1978
May	1280	1535	242113	2200	2734	1412	280405	1962	20472	1558	348524	2126	9487	1347	194361	2019
June	969	1540	329405	2203	10515	1447	304386	1941	9374	1459	240177	2064	7200	1327	500861	2054
July	910	1481	136737	2191	1443	1472	230854	1973	1314	1425	215620	1991	10857	1299	373970	2030
August	1912	1492	126899	2264	2004	1469	169287	1997	5510	1405	270591	2026	9748	1310	392265	2096
September	3518	1547	152129	2257	10572	1524	200220	2095	1948	1417	245181	2053	6452	1457	284174	2054
October	8194	1504	233621	2163	10297	1578	200452	2050	4589	1450	346936	2091	3752	1507	392009	2056
November	1089852	1682	538591	2122	18444	1574	238493	2195	10908	1434	304407	2066	11083	1445	314569	2079
December	1631457	1660	785434	2143	1853949	1693	979771	2005	3447466	1740	1248995	2000	3872470	1803	1187494	1992
January	1961765	1661	569014	2172	2257565	1687	999122	2032	2463744	1581	1149201	1989	2321606	1766	1242537	1920
February	3641	1538	432277	2120	888395	1647	577801	2081	9509	1419	222449	2004	139136	1751	465502	1873

March 6733 1539 85904 2121 303033 1615 104496 2054 4857 1436 193105 1982 1366 1433 262114 1963

Months/Year/Mandi	2022-23				2023-24			
	Bemetra		Bhatapara		Bemetra		Bhatapara	
	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl
April	1374	1580	136610	2058	700	1500	283082	2225
May	13556	1525	302813	2093	8343	1653	737042	2316
June	78568	1547	469969	2079	1613	1880	746457	2538
July	9495	1594	436686	2195	40	1600	353205	2493
August	18540	1909	414283	2366	60	1600	368152	2354
September	23406	1503	327144	2360	30	1600	244681	2376
October	29110	1444	184149	2267	316	1740	371396	2293
November	2089634	1986	1397230	2208	1555692	2133	251187	2443
December	3345460	1931	1758223	2089	3307576	2176	1708431	2614
January	1211331	1938	1091949	2108	4433841	2190	2035638	2555
February	2196	1568	320688	2191	51319	2191	492000	2699
March	15256	1710	191150	2167	1940	2088	221991	2569

Sources: Chhattisgarh Rajya Krishi Vipdan (Mandi) Board (<https://agriportal.cg.nic.in>RptDate...>)

Parameters	KUM, Bemetra (Price data)	KUM, Bhatapara (Price data)
Mean	1498.18	2039.77
Variance	48369.53	54582.52
Observations	120.00	120.00
Df	119.00	119.00
F	0.89	
P(F<=f) one-tail	0.26	
F Critical one-tail	0.74	

Table 5: Seasonal indices (SI) of arrivals and price of paddy crop in Chhattisgarh

Name of Mandi	Months	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March
Bemetra	SI of Arrivals (%)	0.66	1.53	2.70	0.62	0.91	1.19	1.53	158.44*	550.05*	449.03*	25.33	8.00
	SI of Price (%)	95.39	95.55	97.00	93.75	96.49	96.13	97.45	104.03*	109.92*	109.46*	103.44	101.71
Bhatapara	SI of Arrivals (%)	31.60	76.95	85.16	60.17	54.91	52.70	58.27	112.6*	290.88*	250.01*	82.13	44.63
	SI of Price(%)	96.58	98.25	100.28	100.94*	102.88*	104.51*	102.76	99.82	97.26	97.23	100.36	99.13

Note: \*sign represented the peak arrival & price

Table 6: Descriptive statistic of generated seasonal index data series

Name of Mandi	Parameter/ Arrivals/Price	Mean	Standard Error	Standard Deviation	Kurtosis	Skewness	Largest	Smallest	Confidence Level(95.0%)	CV
Bemetra	Arrivals	100.00	55.73	193.06	2.39	1.91	550.05	0.62	122.67	<b>193.06</b>
	Price	100.00	1.61	5.57	-0.63	0.84	109.92	93.75	3.54	<b>5.57</b>
Bhatapara	Arrivals	100.00	23.92	82.85	2.25	1.82	290.88	31.60	52.64	<b>82.85</b>
	Price	100.00	0.72	2.49	-0.73	0.35	104.51	96.58	1.58	<b>2.49</b>

Meera and Sharma (2020) reported that the price of rice was found to be highest during off season (October) and lowest during harvesting season. Rice grown in mainly Kharif season but also grown in summer season, the arrival was high during November to January in selected market of Utter Pradesh.

Kumare et al. (2022) calculated the seasonal indices for paddy was found to be highest arrival in the month of January and lowest in months of August in Chamorshi and Gadchiroli markets. Highest & lowest seasonal indices of price were noticed in the month of July & March respectively. .

The study was reported that the peak arrivals & price were started in November to January and December month has the highest arrivals and price of paddy in KUM, Bemetra. The study noticed a positive relationship between arrival and price.

In the case of KUM, Bhatapara has the peak arrival season starting in November to January & peak price season starts in August to October. The study showed that the lower difference in the seasonal index to peak arrival months means the majority of a positive relationship between arrival & price of paddy in KUM,

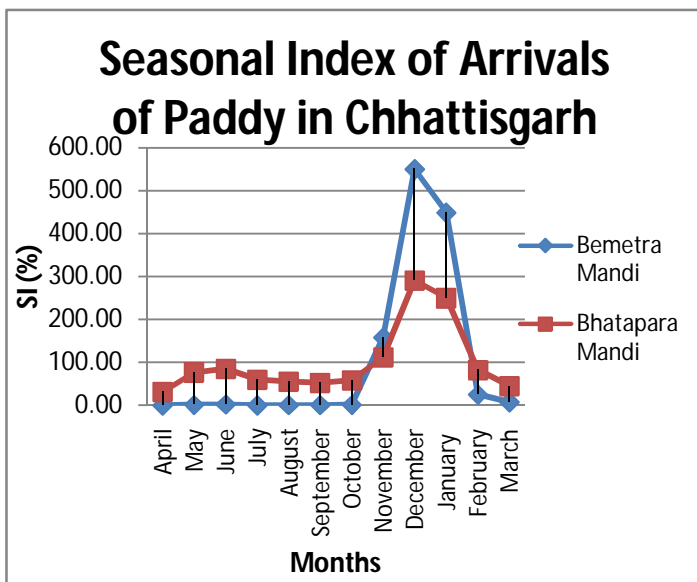


Fig.2: Seasonal index of arrivals of paddy in Chhattisgarh

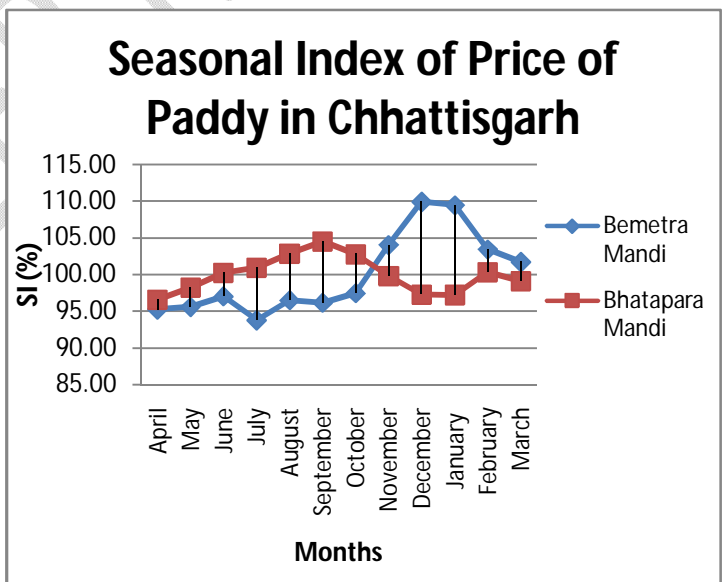


Fig.3: Seasonal index of price of paddy in Chhattisgarh

Bhatapara.

Price stability was higher in KUM, Bhatapara with a Coefficient of Variation (2.49 percent) in as compared to KUM, Bemetra (5.57 percent). The price of paddy was significantly different between KUM, Bhatapara, and KUM, Bemetra with the *F-value* (0.89). The study was noticed that the less price fluctuation of

paddy in Chhattisgarh state due to purchasing directly to farmers by the Government with Minimum Support Price (MSP) and provided the Bonus.

**4.3 Actual arrival and price of Chickpea in Chhattisgarh-** The actual arrival and price of Chickpea in Chhattisgarh were shown in Table 7 and Fig. 4. Kurmi et al. (2018) observed that the maximum arrivals of chickpea was found to be 30.30 per cent in peak season. In case of price, highest found to be lean season with 104 per cent (Rs. 2937/qtl.) followed by peak period (94 per cent) in State of Madhya Pradesh.

Sonvane and Koshta observed that the three peak arrivals of chickpea, which was during the month of April (6326.90), March (3594.18) and May (2639.87) and three peak price was noticed in month of October (222.89), September (186.07) and August (97.04).

Gupta *et al.* (2018) reported that the predicated highest arrival in the month of April, 2018 (1.34 lakh qtl.) and April, 2019 (1.34 lakh qtl.) and the price of the chickpea was almost same (Rs. 4380-4400/qtl.) for the two year.

The Study was revealed that the, In case of chickpea, price ranges were Rs. 2097-8767/ qtl. in KUM, Bemetra and 2197-8339/ qtl. in KUM, Bhatapar and on an average per annual arrivals of chickpeas was less with 72 percent in KUM, Bemetra as compared to KUM, Bhatapar. The study noticed that the lower mean (11.67) difference in price between the two mandis (KUM, Bemetra & KUM, Bhatapar). The study was reported that the arrivals of chickpea continues decreases due to climate change, lack of heat tolerance crop varieties and government policy in Chhattisgarh.

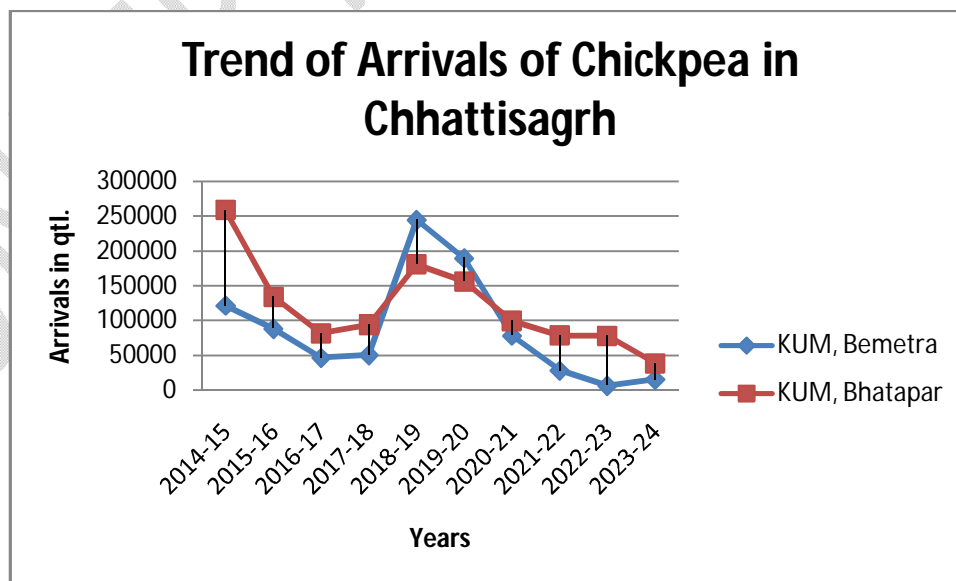


Fig.4: Trend of Arrivals of Chickpea in Chhattisgarh

KUM, Bhatapara is famous for arrival & price of chickpea. Earn more prices per qtl. of chickpea by farmers in KUM, Bhatapara due to the established of Dal mills and other value-added units, infrastructure development, improved transportation and marketing system and improved market information system, etc. Bemetra district (3.90 lakh ha.) is a leading district for total area of major crops in Chhattisgarh state. Now, increasing arrivals and price of chickpea in KUM, Bemetra due to increasing no. of processing units, transportation facility, increasing area & production, and marketing system, etc.

**4.4 Seasonal pattern of arrivals & price of Chickpea in Chhattisgarh-** The seasonal pattern of arrival & price of chickpea in Chhattisgarh shown in Table 9 & 10 and Fig. 5 & 6.

Satishkumar *et al.* (2020) observed that the mean monthly arrival of Bengal gram was highest in the month of February and lowest in the month of November. The result of the study showed the negative correlation between market arrival and price across month in Kalaburagi, district of Karnataka.

Sonvane and Pankaj(2024) observed that the tomato is highly price fluctuation agri. product and there were three peak arrivals was found in month August (3084), July (2277) and October (1767) while the lowest arrivals were observed that during the month of April (-6590), March (- 3536) and February (-1674). However, seasonal indices of price of tomato. It indicates that there were three peak prices that is during the month July (1164), August (593) and Jun (585), while the lowest prices indices were observed that during the month of March (-1066), February (-977) and January (-824).

Sonvane and Koshta (2019) reported that the predicated arrivals of lathyrus in the selected market was ranging from the minimum 832.55 tonnes in September, 2018 to the maximum 4299.91 tonnes in March, 2021. It was noticed that the line of actual and forecasted arrivals of lathyrus was similar trend. The forecasted arrivals of chickpea in Chhattisgarh plains would be ranging from the minimum 1054.85 tonnes in October, 2018 to the maximum 5459.60 tonnes in March, 2021 and in case of price of chickpea would be ranging from Rs./qtl 2859.08/- to Rs./qtl 3878.50/- for the months from October 2018 to April 2020. The study was reported that the maximum price is near to minimum arrivals month. It is noticed that the inversely relationship between price and arrivals of chickpea in selected market of Chhattisgarh plains

The study was reported that the peak arrivals started in the month of March to May and April month has the highest arrivals of chickpea in KUM, Bemetra and KUM, Bhatapara. The three peak prices was observed in the months of September, October, and November. The maximum price was recorded in October in KUM, Bemetra and September month for KUM, Bhatapara. The study noticed that the arrivals pattern was based on forces sold by farmer's means near to harvesting time and marketable surplus was low in the study area.

The Price stability was higher in KUM, Bhatapara with a Coefficient of Variation (4.67 percent) in as compared to KUM, Bemetra (6.84 percent). The price of chickpea was significantly different between KUM, Bhatapara and KUM, Bemetra with the *F-value* (1.07). The study noticed that the more price fluctuation of chickpea in Chhattisgarh state due to products purchased by traders, irregular supply of products, quality variation in products, lack of storage facility at farm level, low marketable surplus, *etc.*

Table 7: Actual arrivals and price of chickpea in Chhattisgarh (2014-15 to 2023-24)

Months/Year /Mandi	2014-15				2015-16				2016-17				2017-18			
	Bemetra		Bhatapara		Bemetra		Bhatapara		Bemetra		Bhatapara		Bemetra		Bhatapara	
	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl
<b>April</b>	20509	2734	40867	2768	38172	3585	39303	3612	18041	5047	32995	5039	4735	5647	8886	5699
<b>May</b>	12706	2655	33455	2528	11181	4251	18154	4263	6811	5537	19399	5517	6185	5435	10791	5392
<b>June</b>	18887	2097	45103	2197	2958	4244	10338	4226	1599	6190	5615	6382	5764	4881	9556	4904
<b>July</b>	14843	2339	27914	2335	2210	3986	10691	4168	300	6000	1608	7587	4576	4897	7539	4946
<b>August</b>	7389	2544	17156	2558	2595	4693	5585	4338	0	6000	2044	6858	893	5195	6953	5245
<b>September</b>	2135	2631	15388	2560	840	4458	3641	4354	210	8000	3064	7804	409	5433	5499	5744
<b>October</b>	3894	2733	11121	2533	1413	4891	4524	4626	255	8767	3367	7784	397	4950	5510	5063
<b>November</b>	3574	2548	12186	2486	92	4522	3325	4435	861	8295	1162	7226	901	4361	8346	4490
<b>December</b>	3981	2576	13151	2471	2576	4667	6088	4362	318	7599	2775	8339	1961	3729	6536	3833
<b>January</b>	4102	2934	8717	2640	1245	4369	3822	4250	118	5738	1069	5861	2010	3351	6531	3643
<b>February</b>	5522	3066	5436	2902	3815	4018	3571	4053	3265	4918	1181	4602	3226	3417	8712	3593
<b>March</b>	23969	3175	28443	3193	21197	4186	25413	4182	14565	5054	7876	5204	19357	3442	9286	3480
Months/Year /Mandi	2018-19				2019-20				2020-21				2021-22			
	Bemetra		Bhatapara		Bemetra		Bhatapara		Bemetra		Bhatapara		Bemetra		Bhatapara	
	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl
<b>April</b>	38562	3334	26992	3396	50791	4009	37157	4000	30454	4013	2342	3786	3203	5055	2475	4932
<b>May</b>	89317	3182	38545	3296	45225	4162	29366	4046	18725	3858	3067	3623	8015	4984	16613	4954
<b>June</b>	47394	3097	22528	3122	16543	4111	18543	3917	2998	3938	6976	3731	1289	4511	5467	4593
<b>July</b>	16042	3671	22014	3754	9262	3989	14303	3811	938	3991	3690	3798	903	4650	20637	4558
<b>August</b>	4552	3914	11318	3753	4930	4164	10150	4142	1921	3911	4410	4240	881	4880	4277	4649
<b>September</b>	3107	3795	9584	3655	13531	4121	8975	4022	1340	4750	4404	4621	3067	5030	4548	4875
<b>October</b>	7826	3977	13383	3828	15436	4208	8921	4062	6525	4986	4885	4699	8563	5025	4791	4674
<b>November</b>	7547	4120	8819	4083	7811	4200	8937	4098	646	5125	3620	4383	1206	5025	3741	4505
<b>December</b>	2290	4200	9532	4085	5553	3922	9140	4013	416	4300	6637	4116	0	5025	4232	4277
<b>January</b>	1182	3920	4810	4099	2064	4001	5565	3954	385	4065	2829	4081	617	3700	6490	4464
<b>February</b>	774	4067	4321	4012	892	3970	4608	3815	3310	4600	51618	4268	0	3700	2366	4287
<b>March</b>	26331	3827	9135	3859	17969	3950	748	3825	10719	4914	5257	4661	365	4202	3215	4415

Months/Year/Mandi	2022-23				2023-24			
	Bemetra		Bhatapara		Bemetra		Bhatapara	
	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl	Arrivals (qtl)	Price/qtl
April	1664	4746	10303	4419	2021	4641	7230	4534
May	289	4400	4308	4205	856	4396	5558	4573
June	447	4429	2899	4282	100	4850	3013	4751
July	237	4400	2188	4564	11311	5037	3496	4778
August	150	4575	5654	4588	0	5037	4249	5211
September	0	4575	1170	4417	0	5037	2368	5400
October	0	4575	1803	4242	56	5275	641	5164
November	0	4575	4562	4268	0	5275	1550	5324
December	36	4000	1064	4273	0	5275	2858	5244
January	0	4000	3081	4380	0	5275	2081	5126
February	0	4000	1411	4419	0	5275	2453	5182
March	3342	4720	39843	4560	642	5763	3288	5166

Sources: Chhattisgarh Rajya Krishi Vipdan (Mandi) Board (<https://agriportal.cg.nic.in>RptDate...>)

Table 8: F-Test Two-Sample for Variances

Parameters	KUM, Bemetra (Price data)	KUM, Bhatapara (Price data)
Mean	4381.509	4393.183
Variance	1248946	1162784
Observations	106	120
Df	105	119
F	1.0741	
P(F<=f) one-tail	0.351653	
F Critical one-tail	1.364819	

Table 9: Seasonal indices (SI) of arrivals and price of chickpea crop in Chhattisgarh

Name of Mandi	Months	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March
Bemetra	SI of Arrivals (%)	275.15*	263.46*	129.52	80.13	38.52	40.71	65.16	37.41	28.30	19.37	39.29	183.03*
	SI of Price (%)	97.34	97.45	96.29	97.68	100.75	108.62*	113.21*	108.57*	99.45	91.18	91.13	98.29
Bhatapara	SI of Arrivals (%)	208.07*	178.84*	129.74	113.82	71.63	58.51	58.81	56.12	61.87	44.89	85.48	132.20*
	SI of Price (%)	96.03	96.51	95.85	100.84	103.76	108.02*	106.25*	103.11*	102.47	96.74	93.63	96.85

Note: \* sign represent the peak arrivals and price.

Table 10: Descriptive statistic of generated seasonal indices data series

Name of Mandi	Parameter/ Arrivals/Price	Mean	Standard Error	Standard Deviation	Kurtosis	Skewness	Largest	Smallest	Confidence Level(95.0%)	CV
Bemetra	Arrivals	100.00	26.59	<b>92.10</b>	-0.03	1.18	275.15	19.37	58.52	<b>92.10</b>
	Price	100.00	1.98	<b>6.84</b>	-0.16	0.71	113.21	91.13	4.35	<b>6.84</b>
Bhatapara	Arrivals	100.00	15.29	<b>52.97</b>	-0.06	0.98	208.07	44.89	33.65	<b>52.97</b>
	Price	100.00	1.35	<b>4.67</b>	-1.22	0.38	108.02	93.63	2.97	<b>4.67</b>

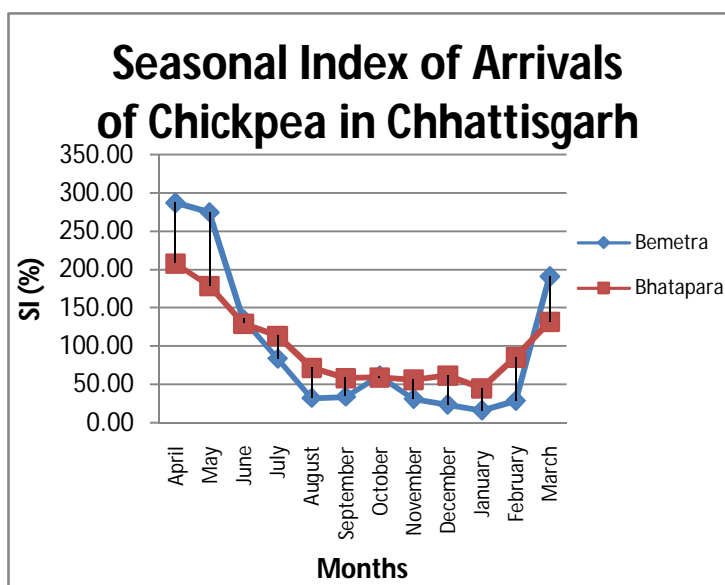


Fig.5: Seasonal index of arrivals of chickpea in Chhattisgarh

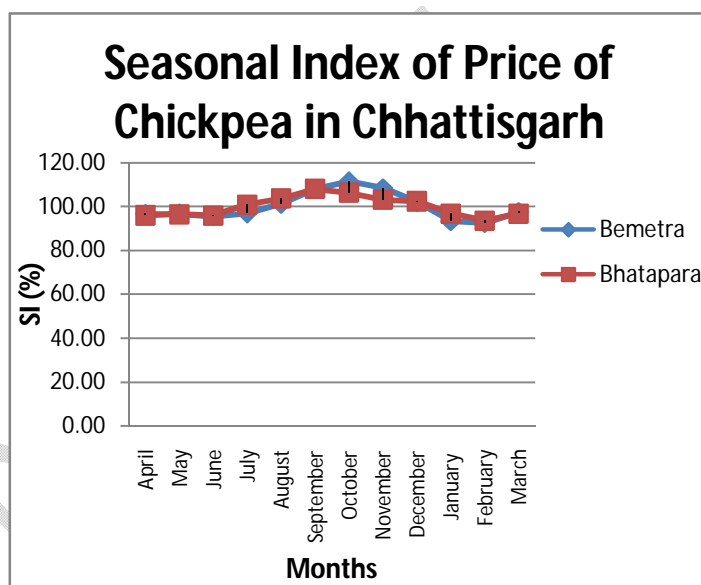


Fig.6: Seasonal index of arrivals of chickpea in Chhattisgarh

**4.5 Relationship between arrivals and price of paddy in Chhattisgarh-** The relationship between arrivals and the price of paddy in Chhattisgarh are shown in Fig 6 and 7. The study observed that the price of paddy has stability and minimum fluctuation around the year in both markets Bemetra and Bhatapara. Peak arrivals and prices were observed from November to January means the peak price of paddy was recorded in the same and near months of peak arrivals of paddy. Some fluctuation in the price of paddy was observed due to harvesting time and trader's interest. In this duration (Nov. –Jan.) traders were interested in purchasing because of access the good quality products for milling and an excess amount of product sold by farmers in mandi after meeting the sold to govt. The study noticed the positive impact of government policy (Purchased of paddy by govt. in MSP) on relationship between arrivals and price of paddy in Chhattisgarh.

**4.6 Relationship between arrivals and price of chickpea in Chhattisgarh-** The relationship between arrivals and price of chickpea in Chhattisgarh are shown in Fig 8 and 9. Wasnik *et al.* (2022) reported that the correlation between arrival and price of major oilseed were positive and significant means variable of arrival

and price were significantly associated with each other over the time in all selected mandis except Bemetra and Rajnandgaonmandis of Chhattisgarh.

The study found that where there are fewer arrivals of chickpea, the price of highest, which means that there is an inverse relationship between the arrivals and price of chickpea in the state of Chhattisgarh. It was also observed that there is less fluctuation in its price throughout the year, and the slight fluctuations observed are due to seasonal effects.

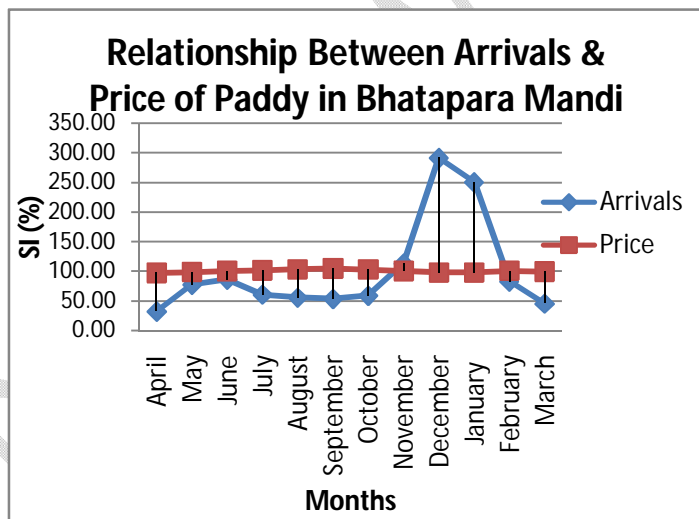
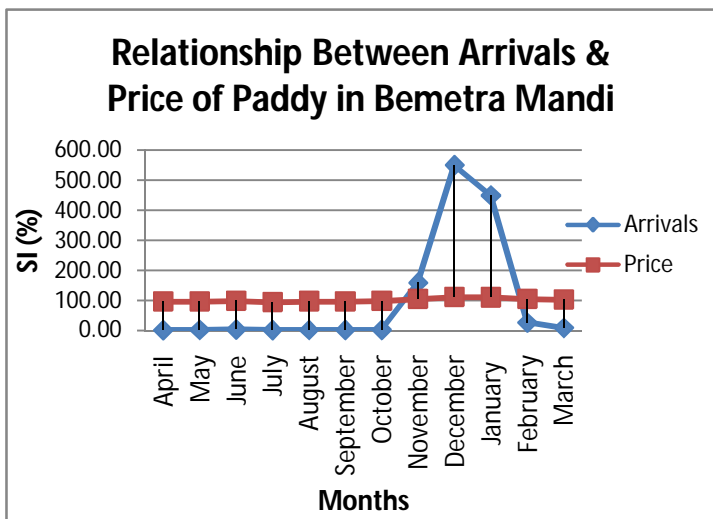


Fig. 6: Relationship between arrivals & price of paddy in Bemetramandi

Fig. 7: Relationship between arrivals & price of paddy in Bhataparamandi

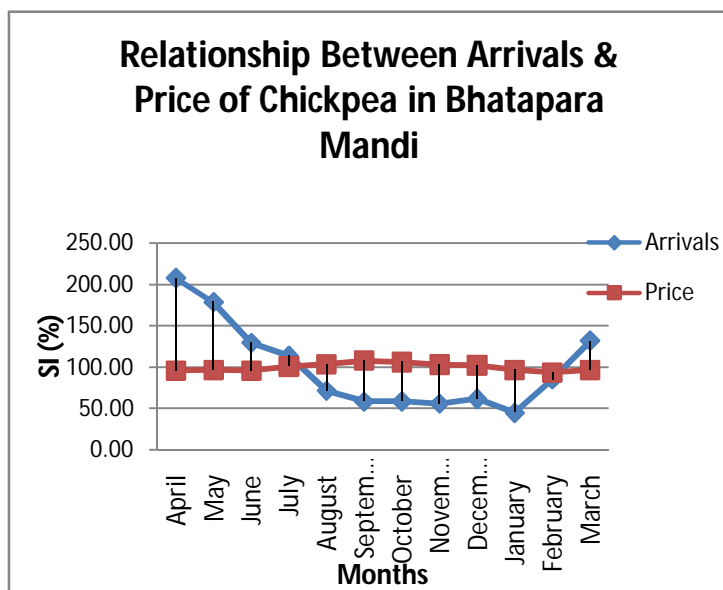
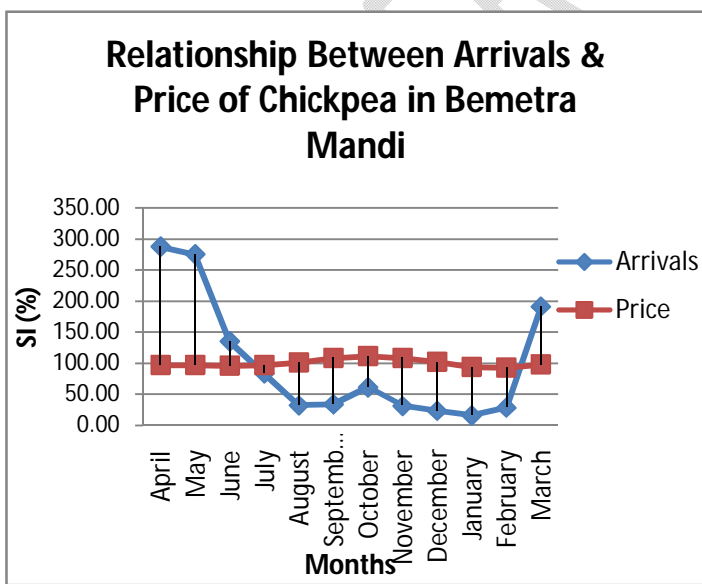


Fig. 8: Relationship between arrivals & price of Chickpea in Bemetramandi

Fig. 9: Relationship between arrivals & price of Chickpea in Bemetramandi

**5. Conclusion:** The study was observed that the peak arrivals & price of paddy were started in November to January means a majority of positive relationship between arrival and price in Chhattisgarh. In case of Chickpea, the peak price started in the month of September to November and lean price observed in the peak arrival months, means negative relationship between price and arrival. The Price stability of both crops (paddy & Chickpea) was higher in KUM, Bhatapara as compared to KUM, Bemetra due to availability of better infrastructure, communication and mills. The less price fluctuation of paddy as compared to chickpea in Chhattisgarh state due to purchasing directly to farmers by the Government with Minimum Support Price (MSP) and also provided the Bonus. If the farmers and traders increase the capacity of marketable surplus, link to communication sources and have information related to seasonal behavior then he can get good price for the crop other than paddy in the state.

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## References:

1. Gupta, A.K., Rao, V.S., Singh, A.K. 2018. Forecasting of arrivals and prices of chickpea in Chhattisgarh. *International Journal of Agricultural Statistic Science*. 14(1):421-426.
2. Kumare, S.T., Perke, D.S. and Rede, G.D. 2022. Market integration and seasonal prices of paddy : an economic analysis. *Economic Affairs*. 67(04):407-413.
3. Kurmi, H.S., Thakur, S.S. and Chouhan, R.S. 2018. Patterns of arrivals & price and constraints in marketing of chickpea in Madhya Pradesh. *Journal of Pharmacognosy and Phytochemistry* 2018; SP1: 2186-2188.
4. Maddala GS. *Introduction to Econometrics*. New York.. Macmillan Publication Company. 1992. Available from: <https://jigjids.files.wordpress.com/2011/05/introduction-to-econometric-2nd.pdf>.
5. Meera and Sharma, H..2020. Seasonality and exponential smoothing models for price forecasting of rice in selected market of Uttar Pradesh. *Agricultural Situation in India*. <https://www.researchgate.net/publication/347307205>
6. Sahu, C.R., Lakhera, M.L. and Walke, S.S. 2020. Forecasting Paddy Prices in Ambikapur Market of Chhattisgarh Stateusing SARIMA Approach .*International Journal of Current Microbiology and Applied Sciences*. 9(4): 1366-1372.
7. Satishkumar, M., Pujari, R. and Amresh. 2020. Behaviour of market arrivals and price of Bengal Gram in Kalaburagi district of Karnataka: an economic analysis. *International Journal of Current Microbiology and Applied Science*. 9(9):79-83. <https://doi.org/10.20546/ijemas.2020.909.009>
8. Savitha, M.G. and Kunal, L.B. 2016. Pace and pattern of market arrivals and price of paddy in Sindhanur and Sirguppa markets of Karnataka. *International Research Journal of Agricultural Economics and Statistics*. 7(2):143-148.
9. Sonvane, O.P. and Koshta, A.2019. A study on arrivals and price behavior & forecasting of chickpea in KrishiUpajMandi of Chhattisgarh plain. *Plant Archive*. 19(2):3231-3237.
10. Sonvane, O.P. and Koshta, A.K. Koshta .2019. Pattern of market arrival and price of major pulses in KrishiUpajMandi of Chhattisgarh Plain. Phd. Thesis submitted in Indira Gandhi KrishiVishwavidalaya, Raipur.
11. Syed RizwanAhmed,S.R., Reddy,T. N. V., Ganapathy, M. S. And Irfan, S.M. 2023. A Study on Market Arrivals, Price Behavior and Forecasting of Paddy inBangarpet APMC of Kolar District, Karnataka. *Mysore J. Agric. Sci.*, 57 (4) : 372-382.
12. Wasnik, S., Patel, M., Patel, P.K., Pandey, S., and Jain, B.C. 2022. Trend and Relationship of Market Arrival and Price of major oilseeds in KrishiUpajMandies in Chhattisgarh. *Asian Journal of Agricultural Extension, Economics and Sociology*. DOI:10.9734/ajaees/2022/v40i930999
13. <https://agriportal.cg.nic.in>RptDate....>