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Decomposition analysis and acreage response of pigeon pea in Amravati division

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Abstract
The present study entitled "Decomposition analysis and Acreage Response of Pigeon pea in Amravati division" was undertaken to study the growth rate and instability of area, production and productivity, decomposition of output growth, acreage response and price elasticity of selected crop i.e. Pigeon pea in Amravati division and data pertained for the year 1988-89 to 2017-18 for the districts *viz*., Buldhana, Akola, Amravati, Yavatmal and Amravati Division as a whole. The study was based on time series secondary data on area, production, productivity, farm harvest prices, rainfall and other relevant data of selected crops were collected from the various Government publications.
The study revealed that the compound growth rates for area were positive indicating increase in area of all the Pigeon pea growing districts during all three sub periods i.e. period-I and period-II, period-III and overall period in Amravati division. The instability in the area, production and productivity of pigeon pea was observed in almost all districts in the Amravati division. It may be because the crop largely depends on vagaries of nature which causes heavy losses. Percent contribution of area effect was more responsible for pigeon pea. Therefore it is necessary to increase the sustainable pigeon pea production in state and to take up productivity enhancing measures in pigeon pea crop like varietal improvement, appropriate technologies. The lagged acreage variable was found significant in all the districts of Amravati Division mostly with one percent level of significance. The current year acreage was less influenced by farm harvest prices of pigeon pea in all the districts. While, one year lagged yield had not at all showed impact to area allocation of pigeon pea. Most of the long run price elasticities were greater than short run elasticities in pigeon pea indicating that farmers were relatively market oriented in their decisions in long run than in short run.

Keywords: Acreage response, decomposition, growth rate, pigeon pea

Introduction
Pigeon pea is a very important kharif pulse crop in world named *Cajanus cajan* in the leguminacae family. It is also known as red gram, Tur and Arhar. This crop is widely grown in India. It is a protein rich staple food. It contains about 22 per cent protein, which is almost three times that of cereals. It supplies a major share of protein requirement of vegetarian population of the country. It is mainly consumed as dal, which is an essential supplement of cereal based diet. It is rich in lysine, riboflavin, thiamine, niacin and iron. In addition to being an important source of human food and animal feed, it also plays an important role in sustaining soil fertility by improving physical properties of soil and fixing atmospheric nitrogen. Being a drought resistant crop, it is suitable for dryland farming and predominantly used as an intercrop with other crops.
In India, area under pigeon pea was 5337.87 (00 ha) with production of 4873.24 (00 tonnes) and productivity of 913 kg/ha in 2016-17. Major states growing Pigeon pea in India are Maharashtra, Madhya Pradesh, Uttar Pradesh, Karnataka and Gujarat etc. Among these states Maharashtra ranks first in acreage under Pigeon pea. In Maharashtra it constitute 14.36 lakh hectares area with the productivity of 1455 kg/ha in 2016-17 and 12.29 lakh hectares area with the productivity of 873 kg/ha in 2017-18. The area under Pigeon pea in Maharashtra contributes about 26.90 per cent of total area under Pigeon pea in India and production of Pigeon pea has share of 42.86 per cent in the total production in Pigeon pea in India (economic survey of Maharashtra 2016-17). In Amravati division area under Pigeon pea was 4895.07 (00 ha) with production of 6199.81 (00 tonnes) and productivity of 1267 kg/ha in 2016-17.

Methodology
The study has been undertaken to examine the various price and non-price factors for their roles in cultivators decision making about cropping pattern. The study further attempts to assess the direction and magnitudes of influences of contributory factors and also find out extent of deviation from planned acreage while making ultimate acreage allocation.

The statistical tools and techniques employed in this study are also highlighted.

Study area

The study was confined to five districts of Amravati revenue division of Maharashtra state, namely Amravati, Akola, Buldhana, Yavatmal, Washim. The five districts constituted more or less in the middle of peninsular India and formed to be a part of Deccan plateau, named as Western Vidarbha region.

Selection of period

Based on the objective of the study, for the analysis of growth rate, instability, acreage response, decomposition, Short run and long run elasticity for the selected crops, the period was divided into breakup of 10 years and overall as shown below.
Period I - 1988-89 to 1997-98
Period II - 1998-99 to 2007-08
Period III - 2008-09 to 2017-18
Overall period - 1988-89 to 2017-18

Nature and source of data

Data used for the present study was collected from various published sources. Time series secondary data on the area, production and productivity of selected crops, rainfall, farm harvest price and other data were obtained from various published sources.

1. Socio-economic review and district abstract of Maharashtra
2. Agricultural situation in India
3. Season and crop report Government of Maharashtra State
4. Area and Production of Principal Crops in Maharashtra.

Analytical techniques employed for analyzing the data

The present study was based on time series secondary data of selected crop i.e., Pigeon pea in Amravati division. The study was conducted on the following aspects

Growth rate analysis

The compound growth rate of area, production and yield for pigeon pea was estimated for three sub periods.
The district-wise compound growth rates was estimated to study the growth. It was estimated with the following exponential model.

$Y = ab^t$

$\text{Log } Y = \log a + t \log b$

$\text{CGR} = (\text{Antilog } (\log b) - 1) \times 100$

Where,
CGR = Compound growth rate
t = time period in year
y = area/ production / productivity
a & b = Regression parameters

Instability Analysis

To measure the instability in area, production and productivity, an index of instability was used as a measure of variability. The coefficient of variation (CV) was calculated by the formula

$$CV\ (\%) = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

The simple coefficient of variation (CV) often contains the trend component and thus overestimates the level of instability in time series data characterized by long-term trends. To overcome this problems, we used the instability index (II) given by Coppock's instability index of variation. Coppock's instability index is a close approximation of the average year to year per cent variation adjusted for trend.
The algebraic form of equation is –

$$CII = [\ (\text{Antilog } \sqrt{V \log} - 1 \times 100)]$$

$$V \log = \sum \frac{[\log \frac{X_t+1}{X_t} - m]^2}{N-1}$$

Where,
X_t = Area/ production/ productivity in the year `t'
N = Number of year
m = Arithmetic mean of difference
V log = Logarithmic variation of the series

Decomposition of output growth

To measure the relative contribution of area, yield to the total output change for the pigeon pea crop, Minhas (1964). The decomposition analysis model as given below was used. Sharma (1977) redeveloped the model and several research workers (Kalamkar *et al*., 2002) used this model and studied growth performance of crops on state. The method states that A_0, P_0 and Y_0 respectively area, production and productivity in base year and A_n, P_n and Y_n are values of the respective variable in n^{th} year item.

$Po = Ao \times Yo$ and

$Pn = A_n \times Y_n$…….. (1)

Where,
Ao and A_n represent the area and Yo and Y_n represents the yield in the base year and n^{th} year respectively.

$P_n - Po = \Delta P$,

$A_n - Ao = \Delta A$

$Y_n - Yo = \Delta Y$ ……. (2)

From equation (1) and (2) we can write

$Po + \Delta P = (Ao + \Delta A)(Yo + \Delta Y)$

Hence,

$$P = \frac{A_0 \Delta Y}{\Delta P} \times 100 + \frac{Y_0 \Delta A}{\Delta P} \times 100 + \frac{\Delta Y \Delta A}{\Delta P} \times 10$$

Production = Yield effect + area effect + interaction effect
Thus, the total change in production can be decomposed into three components *viz*. yield effect, area effect and the interaction effect due to change in yield and area.

Acreage response analysis

The model which generally used in supply response analysis based on time series data has been used adaptive expectations or Distributed Lagged model. In the present study the Regression model of the Nerlovian lagged adjustment model (1958) was used. The acreage response means the change in acreage with the unit change in the variables affecting on during the period of study.

$$\text{At } a = a + b_1 A_{t-1} + b_2 FHP_{t-1} + b_3 Y_{t-1} + b_4 W_t + b_5 P_R + b_6 Y_R$$

Where,
a = Area
A_t= Area under crop at time `t' (`00' ha)
A_{t-1} = One year lagged area under the crop (`00' ha)

FHP_{t-1} = Lagged year farm harvest price of the crop (kg/ha)
Y_{t-1} = One year lagged yield
W_t = Weather variable as rainfall data per year.
P_R =Price risk (coefficient of variation of last three years)
Y_R = Yield Risk (coefficient of variation of last three years)
b_1... b_6 = Parameters of multiple linear regression

The two models *viz*., Linear Regression Model and Cobb-Douglas Model were tested and out of these two Models finally Linear Regression Model was selected on the basis of Number of significant variables, desired signs of estimated regression coefficient and highest R^2 values.

Short run and long run elasticity
The elasticity's of variables show that the influence of unit change in variable on acreage decisions of crop. In the present study, variable elasticity's were estimated for short run as well as for long run period.
Moreover, the short run and long run elasticity were estimated as –

$$\text{Short run} = \text{Regression coefficient of price} \times \frac{\text{Mean of price}}{\text{Mean of area}} \text{Elasticity (SRE)}$$

$$\text{Long run elasticity (LRE)} = \frac{\text{SRE}}{\text{Coefficient of area adjustment (r)}}$$

Where,
r = 1 – (coefficient of lagged area)

Results and Discussion

Growth performance of Pigeon pea

In this study, the growth in area, production and productivity of Pigeon pea were estimated using compound growth rates as indicated in the methodology chapter. In this analysis, the general growth performance of pigeon pea in Western Vidarbha zone (i.e., Amravati division) were examined by fitting exponential growth function with time normalization on area, production and productivity. The growth performance of Pigeon pea pertaining to three periods and overall is discussed separately for each district as under.

Table 1: District wise compound growth rates for Pigeon pea

Particulars		Buldhana	Akola	Amravati	Yavatmal	Amravati Division
Period I	Area	4.20***	1.54**	1.6**	4.74***	3.03***
	Production	1.52	6.48	1.44	4.32	4.18
	Yield	-2.56	0.54	-0.15	-0.36	-0.63
Period II	Area	0.47	3.66**	-0.37	0.19	0.95**
	Production	7.46**	5.27***	2.11*	-0.76	2.44***
	Yield	-2.94	5.95**	2.4	-0.36	3.73**
Period III	Area	9.29*	3.67**	6.52**	15.23**	8.28**
	Production	-1.83	2.85	1.4	4.94	2.44
	Yield	-2.94	2.4	0.5	1.23	0.62
Overall Period	Area	0.1**	1.69**	2.00***	2.39***	2.60***
	Production	-0.03	1.16	1.44**	0.45	0.73
	yield	-2.9	3.49***	0.1	-0.54	0.81

Note: *,** & * denotes significant at 1%, 5% & 10% level of significance)

The growth performance of pigeon pea pertaining to three periods and overall was presented in the Table 1, the results indicated that during the period I, almost all districts in Amravati division including Amravati division as a whole registered positive growth rates in area, and production but productivity of mostly district of Amravati division recorded as negative growth rate except Akola i.e. 0.54 per cent per annum. The highest trend in area and production was recorded in Yavatmal i.e. 4.74 and 4.32 per cent per annum respectively. While the productivity of Akola district only recorded positive growth rate i.e. 0.54 per cent per annum.
From table 1 it is shown that during period II, the area under pigeon pea in Buldhana, Akola, Yavatmal and Amravati Division as whole increased by 0.47 per cent, 3.66 per cent, 0.19 per cent, 0.95 per cent per annum respectively while in production of pegion pea was increased by 7.46 per cent, 5.27 per cent, 2.11 per cent and 2.44 per cent per annum in Buldhana, Akola, Amravati, and Amravati Division as a whole except Yavatmal. In case of productivity of pegion pea all the district of Amravati division and Amravati division as a whole shows stagnant growth rate except Buldhana and Yavatmal which shows decline growth rate.
The result of period III reveals that the area of pigeon pea in all the dstrict of Amravati division as a whole increased by 9.29 per cent, 3.67 per cent, 8.28 per cent per annum respectively
Highest growth rate increase in area, production and productivity in pigeon pea was recorded in Amravati division as a whole.

Instability in Pigeon pea

In order to know the instability in area, production and yield of Pigeon pea, the fluctuation measured with the help of coefficient of variation as well as Coppock's index as a coefficient of instability. The results are presented and discussed as under for the period with ten years breakage and overall also. Fluctuation in area, production and productivity due to the uncontrollable factors like climatic conditions can cause upward bias in coefficient of variation.
The Table 2 revealed that during period I, coefficient of variation for the area and productivity was less when compared to the production. Highest coefficient of variation for area was found in Buldhana district i.e. 14.60 per cent per annum. In case of production and productivity Akola district has got the highest coefficient of variation i.e. 114.83 per cent and in case of productivity Buldhana district got a highest coefficient of variation i.e. 32.87 per cent per annum respectively. Amravati Division as a whole has got coefficient of variation of 9.8 per cent, 42.42 per cent and 24.48 per cent per annum respectively for the area, production and Productivity. In the same way CII was found highest for area in the Yavatmal district i.e.6.54 per cent per annum and for

production Akola district recorded as highest i.e. 110.25 per cent per annum and for yield Buldhana district recorded highest as 32.09 per cent per annum respectively.

During period II also coefficient of variation for the area, productivity was less when compared to production. The highest coefficient of variation for area was found in Akola district i.e. 13.63 per cent per annum. In case of production and productivity Buldhana district has shown the highest coefficient of variation i.e. 32.52 per cent per annum and 30.16 per cent per annum respectively. In the same way, CII was found highest for area in Akola district i.e., 9.18 per cent per annum and it has been increased as compared to Period I i.e. 4.17 per cent per annum. For production and yield, Buldhana district has recorded highest instability i.e. 33.77 and 32.09 per cent per annum respectively.

Table 2: District wise instability indices in Pigeon pea

Name of District	Particulars	Period I		Period II		Period III		Overall	Period
		CV	CII	CV	CII	CV	CII	CV	CII
Buldhana	Area	14.603	8.20	4.12	8.20	38.07	49.30	10.46	4.62
	Production	33.99	33.77	32.52	33.77	44.64	46.19	37.16	0.91
	Yield	32.87	32.09	30.16	32.09	49.82	40.69	35.24	40.69
Akola	Area	6.80	4.17	13.63	9.18	42.5	15.08	24.41	10.08
	Production	114.83	110.25	20.89	12.97	50.01	48.80	74.47	15.37
	Yield	28.36	28.32	23.21	18.27	43.38	45.74	47.07	27.88
Amravati	Area	6.96	5.10	4.60	4.55	42.53	23.79	30.01	22.65
	Production	24.99	24.66	11.70	9.85	41.91	37.72	31.90	12.56
	Yield	25.11	25.11	13.79	11.68	46.94	37.09	26.56	25.52
Yavatmal	Area	15.32	6.54	6.57	6.54	40.38	54.47	64.42	35.63
	Production	25.30	21.86	18.6	18.45	49.75	55.73	38.26	99.44
	Yield	18.78	18.74	20.26	20.23	52.93	39.45	27.36	122.13
Amravati Division	Area	9.80	4.30	4.30	3.25	41.15	28.81	38.87	30.63
	Production	42.42	40.21	13.81	11.68	45.72	11.68	34.5	6.52
	Yield	24.48	24.41	17.67	13.96	46.97	36.76	28.52	6.78

The instability in the area, production, and productivity was found to be increased in period III in all the district of Amravati division and Amravati division as a whole. The highest CV and CII was recorded for area, production, and productivity in Yavatmal distict of Amravati division.

During the overall period i.e. 30 years as a whole, Buldhana district recorded the lowest degree of instability (CV) in area i.e.10.46 per cent per annum. Similarly, in production Amravati district was recorded with the lowest instability (CV) 30.01 per cent per annum whereas, Akola district recorded the highest instability (CV) in production and productivity i.e. 74.47 per cent and 47.07 per cent per annum respectively. The highest CII in area was noticed in Amravati division as a whole. The lowest CII for area, production was recorded in Buldhana and Akola districts in the 30 years overall period. These values indicate least consistency in terms of area, production and productivity during overall period of 30 years. The pulses are generally grown under dry farming, mostly as an inter-crop in rainfed area. Therefore, the production and productivity of pulses are highly affected by the amount and distribution of rainfall.

Decomposition analysis of Pigeon pea

A quantitative assessment of contribution of the various factors to growth of crop at districts and Amravati division level is helpful in reorienting the programmes and setting priorities of agricultural development so as to achieve higher growth rates in agricultural production. There are many factors which affect the growth of crop output. These factors believed to affect the production of crop *viz*., area, yield and their interaction have been considered in present study. The result of decomposition scheme was worked for three sub periods and overall period.

The decomposition of Pigeon pea production in area, yield and interaction effect presented in Table 3 The results demonstrate that, per cent contribution of area, yield and their interaction in increasing production of pigeon pea in Western Vidarbha (i.e. Amravati division).

Table 3: Percent contribution of area, yield and their interaction for increasing production of Pigeon pea

Period	Particulars	Buldhana	Akola	Amravati	Yavatmal	Amravati Division
Period I	Area Effect	-89.72	335.89	-41.79	830.97	-190.23
	Yield Effect	139.13	-181.57	126.32	-517.88	224.15
	Interaction	50.59	-54.33	15.47	-213.09	66.09
Period II	Area Effect	4.34	17.46	-13.96	-37.15	10.08
	Yield Effect	90.18	51.22	118.39	143.13	80.96
	Interaction	5.48	31.32	-4.43	-5.98	8.96
Period III	Area Effect	74.48	35.47	71.56	84.07	60.72
	Yield Effect	8.69	44.66	12.94	3.52	16.15
	Interaction	16.83	19.87	15.50	12.41	23.13
Overall Period	Area Effect	234.56	58.07	124.01	105.17	109.25
	Yield Effect	-35.52	18.30	-8.60	-0.88	-2.53
	Interaction	-99.04	23.63	-15.41	-4.29	-6.73

During period I, the result clearly indicates that the yield effect i.e. 224.15 per cent was most responsible for increasing production of pigeon pea in Amravati division as a whole with respect to area effect -190.23 per cent and interaction effect 66.09 per cent. Yavatmal district recorded highest area

effect i.e. 830.97 per cent was most responsible for production.

During period II, it was noticed that yield effect has got domination over the area effect in all the district of Amravati division and Amravati division as a whole i.e. 90.18, 51.22, 118.39, 143.13, and 80.96 per cent respectively. The highest yield effect was recorded in Yavatmal district i.e. 143.13 per cent with area effect -37.15 per cent and interaction effect -5.98 per cent. The lowest area effect was found in Yavatmal district i.e. -37.15 per cent. The lowest yield effect was found in Akola district i.e. 51.22 per cent with area effect 17.46 per cent and interaction effect was noticed negative i.e. -4.43 and -5.98 per cent in Amravati and Yavatmal district respectively.

Opposite picture was found in period III, where area effect has been shown increased with compare to period II. In whole Amravati division area effect, yield effect and interaction effect were observed 60.72 per cent, 16.15 per cent and 23.16 per cent respectively. All the effect of all district in Amravati division shown were positive. Highest area effect was shown in Yavatmal district 84.07 per cent, and highest yield and interaction effect was shown in Akola and Amravati division as a whole i.e. 44.66 and 23.13 per cent respectively. So, we can conclude that in this period area effect was responsible for increasing production of pigeon pea in western vidarbha region of Maharashtra.

During overall period, in whole Amravati Division area effect, yield effect and interaction effect recorded were 109.25 per cent, -2.53, -6.73 per cent respectively. So, area effect was found most responsible factor for increasing pigeon pea production in Amravati division. Highest area effect was found in Buldhana district i.e. 234.56 per cent with negative yield and interaction effect i.e. -35.52 and -99.04 per cent. Highest yield and interaction effect were found in Amravati district i.e. 18.30 per cent and 23.63 per cent. Thus, overall area effect has played a driving force in the differential production of pigeon pea in Amravati division during overall 30-year period.

Acreage response of Pigeon pea

Acreage response functions were fitted to examine the effect of price and non-price factors on farmer's decision in allocating the area pigeon pea in Western Vidarbha (i.e. Amravati division). The results obtained are presented and discussed in this section. Table 4 presents the district wise estimated hectareage response functions of pigeon pea grown in most of the part of the western Vidarbha zone of Maharashtra which act as the protein requirement and the nitrogen fixation crop to the farmers. Out of two, linear regression model and Cobb-Douglas model, on the basis of number of significant variables, desired signs of estimated regression coefficient and higher R^2 values Linear model was selected with the price and non-price variables. With a view of estimating the response of producers in terms of pigeon pea area towards price and non-price factors the actual area in the current year was expressed as a log-linear function of one year lagged area, one year lagged farm harvest prices, one year lagged yield, average annual rainfall, yield risk and price risk. The regression coefficient of these explanatory variables is presented in Table 4 revealed that the lagged area was found to be positively influential factors in the farmer's decision regarding area allocation to Pigeon pea was found significant at 1 per cent level of significance in all the district and Amravati division as a whole except Akola district.

Table 4: Coefficients for acreage response function Pigeon pea

Particulars	Variables	Coefficients				
		Buldhana	**Akola**	**Amravati**	**Yavatmal**	**Amravati Division**
	Intercepts	-128.89	503.71	164.19	-421.65	727.2
One year lagged area	A_{t-1}	0.88***	0.2	0.59***	0.95***	0.67***
One year lagged farm harvest price	FHP_{t-1}	-0.03	0.11***	0.09***	0.29***	0.56***
One year lagged yield	Y_{t-1}	-0.04	0.03	-0.01	-0.33	-0.03
Annual rainfall	W_t	0.28	0.01	0.03	0.65	-0.36
Yield risk	Y_r	1.48	-1.35	-1.23	-12.25	-13.43
Price risk	P_r	2.99	-1.16	3.87	-1.83	9.44
Coefficient of determination	R^2	0.94	0.84	0.84	0.86	0.81

Note: ***,** & * denotes significant at 1%, 5% & 10% level of significance

The coefficient of farm harvest price was very less i.e.-0.03, 0.11, 0.09 and 0.29 in Amravati, Akola, Buldhana and Yavatmal districts respectively. It was also significant at 1 per cent level of significance in all the district of Amravati division and Amravati division as a whole except Buldhana district. It implied that prices shown less impact in the increase on area of pigeon pea in the study period.

One year lagged yield was also included in the function but the coefficient turned out to be very small and negligible and non-significant which implies that one year lagged yield had no impact or very less impact to area allocation of Pigeon pea in all the districts of Amravati division.

The annual rainfall was employed as a proxy for combating the weather influence on the pigeon pea hectarage allocation decisions. The coefficient of annual rainfall variable showed positive relationship in Buldhana, Akola, Amravati, and Yavatmal districts and negative relations to Amravati division as a whole and statistically insignificant in all districts which showed annual rainfall favorably didn't influence the area allocation decision of the farmers.

The yield risk variable was incorporated in the model to gauge the impact of risk over the variation in the hectareage under Pigeon pea. The coefficient of variable had an insignificant positive relationship in Buldhana district and an insignificant negative relationship in Akola, Amravati and Yavatmal districts which shows farmers are relatively less risk bearers.

It was also recorded that regression coefficient of price risk variable or factors were negative in Akola, Yavatmal, and factor were positive in Buldhana and Amravati district and Amravati division as a whole. Negative relationship testified to the farmers risk aversion behaviour in pigeon pea production.

The value of R^2 i.e. the coefficient of multiple determinations ranged from 0.81 to 0.94 for all the districts of Amravati Division. 0.0.94 was found in Buldhana district and it was

0.84, 0.84, 0.86 and 0.81 found in Akola, Amravati and Yavatmal districts and Amravati division as a whole respectively, which indicates that variables included in the model explained most of the variations in area under pigeon pea in the study period.

Short run and long run elasticity of Pigeon pea

The price elasticities show the influence of unit change in price on acreage allocation of the crop. In the present study price elasticity were estimated for short run as well as for long run period. The variations in the magnitude of short run and long run price elasticity factors between different districts of western Vidarbha zone were evident from the Table 5 the short run and long run price elasticities of pigeon pea showed positive price responsiveness of farmers in Akola, Amravati, and Yavatmal districts, and negative price responsiveness of farmers in Buldhana districts of Amravati Division.

The short run price elasticities for different districts are -0.27, 0.24, 0.19 and 0.64 for Buldhana, Akola, Amravati and Yavatmal districts respectively. The highest short run price elasticity was found in the Yavatmal district i.e., 0.64 and lowest short run price elasticity was found in the Buldhana district i.e., -0.27.

Table 5: District wise price elasticity of Pigeon pea in Western Vidarbha

Sr. No	Name of Districts	SRE	LRE
1	Buldhana	-0.27	-2.38
2	Akola	0.24	0.30
3	Amravati	0.19	0.47
4	Yavatmal	0.64	1.23
5	Amravati division	0.31	0.99

The short run price elasticities for different districts are -0.27, 0.24, 0.19 and 0.64 for Buldhana, Akola, Amravati and Yavatmal districts respectively. The highest short run price elasticity was found in the Yavatmal district i.e., 0.64 and lowest short run price elasticity was found in the Buldhana district i.e., -0.27.

The long run elasticity for Buldhana, Akola, Amravati and Yavatmal districts are -2.38, 0.30, 0.47 and 1.23 respectively. It is also recorded from the table 5 that, long run price elasticities are comparatively higher than the short run price elasticity indicating that area adjustment would take place in the long run than in the short run in respect to the pigeon pea in the western Vidarbha region of the Maharashtra.

Conclusion

The study revealed that the compound growth rates for area were positive indicating increase in area of all the Pigeon pea growing districts during all three sub periods i.e. period-I and period-II, period-III and overall period in Amravati division. The instability in the area, production and productivity of pigeon pea was observed in almost all districts in the Amravati division. It may be because the crop largely depends on vagaries of nature which causes heavy losses. Percent contribution of area effect was more responsible for pigeon pea. Therefore it is necessary to increase the sustainable pigeon pea production in state and to take up productivity enhancing measures in pigeon pea crop like varietal improvement, appropriate technologies. The lagged acreage variable was found significant in all the districts of Amravati Division mostly with one percent level of significance. The current year acreage was less influenced by farm harvest prices of pigeon pea in all the districts. While, one year lagged yield had not at all showed impact to area allocation of pigeon pea. Most of the long run price elasticities were greater than short run elasticities in pigeon pea indicating that farmers were relatively market oriented in their decisions in long run than in short run.

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