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Growth and Instability of Mung Crop in Nagpur Division

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Abstract

It was found that the growth rates in area, production and productivity of selected pulses have remained stagnant. District wise analysis show that the district of Nagpur and Chandrapur registered a significant positive growth rate in the area productivity and production of total pulses. In respect of mung Wardha district registered positive significant growth rate in area productivity and production. The result indicate that the compound growth rate of area under crop was more over the entire district of all the district and also the Nagpur division as whole during overall period it was proof of the fact that the selected mung crop was a traditional crop in region as well as the division hence there is a very big need to concentrate on this crop for policy maker and researcher. The production and productivity highest instability in selected mung crop were observed in Gadchiroli and Chandrapur district of the Nagpur division. It may be because the crop largely depends on vagaries of nature and selected pulses production is subject to fluctuation from year to year and thus, causing heavy losses. Farmer cannot bear risk due to scare resource and small holding. A crop failure means not only the loss of farmer's income but also the loss of investment in the next crop season. This leads farmer to indebtedness. In order to maintain stability in production of crop concerned efforts should be made in the Nagpur division. In almost all the studied district the yield effect was found to be most responsible factor for increasing production in the Nagpur division. But till there is a scope to increase yield in rain fed farming by introducing new development programme and increasing the technical efficiency at farm level.

Keywords: Growth Rate, Instability, Production, Productivity, Nagpur Division.

Introduction

Mung crop is the most important pulse crop, Pulses are the main source of protein for the predominantly vegetarian population of India. They are also used as fodder and concentrate for the cattle. The vital role of pulses in fixation of atmospheric nitrogen needs no emphasis, which in fact, is very crucial in the face of sky rocketing nitrogenous fertilizer prices in our country .In comparison with the growth in production of food grains with the advent of Green Revolution, the growth in production of pulses is rather disappointing and has led to a consequential rise in the price of pulses.

The growth in production of pulses like any other crops is largely determined by the growth in area under cultivation or an improvement in the productivity levels or a combination of both. The area and productivity of pulses during the last decade have been fluctuating and hence, the production has remained almost stagnant.

In a developing country like India, agricultural growth leads to a rising demand for products. The process is accelerated by a rapid growth of population accompanied by rising level of income does supply of agricultural products respond to rising demand for them? This question becomes critical and assumes central important and hence calls for the efficient utilization of resource.

Materials and Methods

Selection of Crops

For the present study, the pulse crops was selected crop *viz*., Mung.

Selection of Period

Based on the objective of the study for the analysis of growth rates, and decomposition, the period was divided into breakup of 15 years and overall as shown below.

Period I	-	1983-84 to 1997-98
Period II	-	1998-99 to 2012-13
Overall Period	-	1983-84 to 2012-13

Nature and Source of Data

Data used for the present study were collected from various published sources. Time series secondary data on the area, production and productivity of mung crop, and other data were collected from various government published sources.

Analytical Techniques Employed for Analyzing the Data

The present study was based on time series secondary data of Mung in Nagpur district. The study was conducted on the following aspects.

Growth Rate Analysis

The compound growth rate of area, production and productivity of Mung was estimated for two sub periods as Period I-1983-84 to 1997-98, Period II -1998-99 to 2012-13

The district-wise compound growth rates of area, production and productivity were estimated by using following exponential model.

$Y = ab^t$

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

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

Where,

CGR = Compound growth rate

t = time period in year

Y = Area/production/productivity

a&b = Regression parameters.

The t test will applied to test of significance of 'b'

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 using the formula.

$$C.V\,(\%) = \frac{Standard\ Deviation}{Mean} \times 100$$

Decomposition of Output Growth

To measure the relative contribution of area, yield to the total output change for the major crops, 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 crop in the state. A_o, P_o and Y_o are area, production and productivity in base year and A_n, P_n and Y_n are values of the respective variable in nth year item respectively.

$P_o = A_o \times Y_o$ and

$P_n = A_n \times Y_n$ ---------- (1)

Where,

A_o and A_n represent the area and Y_o and Y_n represents the yield in the base year and n^{th} year respectively.

$P_n - P_o = \Delta P$

$A_n - A_o = \Delta A$

$Y_n - Y_o = \Delta Y$ ---------- (2)

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

$P_o + \Delta P = (A_o + \Delta A)(Y_o + \Delta Y)$

Hence,

$$P = \frac{Ao\Delta Y}{\Delta P} \times 100 + \frac{Yo\Delta A}{\Delta P} \times 100 + \frac{\Delta Y\,\Delta A}{\Delta P} \times 100$$

Production = Yield effect + area effect + interaction effect

Thus, the total change in production can be decomposed into area effect and the interaction effect due to change in yield and area.

Result and Discussion

The result obtained from the present investigation have been presented in the following sub heads:

Growth Performance of Crop

In this study, the growth in area, production and productivity of mung was estimated using compound growth rates as indicated in the methodology chapter. In this analysis, the general growth performances of the crop in Nagpur division were examined by fitting exponential growth function with time normalization on area, production and productivity. The growth performance of the crop pertaining to three periods and overall is discussed separately for each district as under.

Growth Rates of Mung

The perusal of the Table No.1, revealed that, during period-I. The compound growth rates were positive for all the district and Nagpur division for mung under cultivation. The highest growth in area was registered in Wardha district 7.30 per cent per annum followed by Chandrapur (5.06) district and it also found statistically significant. Whereas, the growth rates were estimated less in period-II as compare to period-I in all cases in Nagpur division expect Gadchiroli (5.14) district.

Table - 1

District Wise Compound Growth Rate for Mung

Particular		Wardha	Nagpur	Bhandara	Chandrapur	Gadchiroli	Nagpur Division
Period-I	Area	7.30**	-1.34	-6.46	5.06**	-2.70	24.04
	Production	6.79**	2.55*	-8.42	4.21**	-3.88	-20.42
	Yield	5.10**	3.15**	0.83	2.34*	6.70**	55.00
Period-II	Area	-12.31	-6.08	-8.79	-9.63	5.14**	-75.64
	Production	13.07**	-5.90	-5.42	-13.00	-0.25	-48.29
	Yield	1.21	1.59	2.69*	-3.41	0.46	39.00
Overall Pooled	Area	-2.17	1.28	-4.48	-5.64	-1.65	-20.77
	Production	-1.74	-2.76	-4.04	-3.00	-1.21	-19.28
	Yield	2.66*	1.95	1.42	1.85	2.66*	10.00

Note: ** Significant at 1% level,
* Significant at 5% level

The result further revealed that the growth rates of productivity was found to be positive in all cases in period-I of Nagpur division. It reflects to growth rates of production. However the growth in productivity recover in period-II i.e. growth rates decreased in the period-II. it shows the effects in

overall period. The growth rates for pooled data of production in mung were negative in all the district. The highest growth in productivity was estimated in Wardha (2.66) and Gadchiroli (2.66) followed by Nagpur (1.95) Chandrapur (1.85) Bhandara (1.42) district respectively,

Instability of Crop

One should not obvious of instability by taking the growth rates only. Because the growth rates will explain only the rate of growth over the period. Whereas, instability will Judge, whether the growth performance is stable or unstable for the period for the pertinent variable.

Instability on Mung

In terms of Mung the Table No. 2, revealed that coefficient instability for area under mung in Wardha district found to be lowest i.e.13.00 per cent followed by Gadchiroli (13.91) district, Chandrapur (15.53) district. The coefficient of instability for area under mung were high in period-II in most of the district, However, in overall period of thirty years the coefficient instability for area under mung was estimated in between 19.37 to 54.78 except Gadchiroli (58.51) district. Further, the area instability for the Nagpur division as whole was higher in period-II (38.58) as compaired to period-I (14.32). It reflected in pooled data which estimated 28.16 per cent, the instability in area in the Nagpur division was the effected on production during both the period and also in the pooled data.

Table - 2

District wise Instability Indices in Mung

Particular		Wardha	Nagpur	Bhandara	Chandrapur	Gadchiroli	Nagpur Division
		C.V.	C.V.	C.V.	C.V.	C.V.	C.V.
Period-I	Area	13.00	35.90	18.93	15.53	13.91	14.32
	Production	65.13	41.55	32.10	40.25	60.79	20.55
	Yield	47.60	32.98	66.85	38.05	37.40	22.16
Period-II	Area	26.73	39.48	40.32	41.60	52.32	38.58
	Production	16.53	56.94	58.46	66.57	65.92	43.79
	Yield	60.00	20.16	42.41	21.82	20.68	24.19
Overall pooled	Area	19.37	54.78	38.85	58.51	35.88	28.16
	Production	11.33	81.25	45.31	87.49	63.17	34.38
	Yield	53.80	31.97	56.12	31.95	30.90	28.51

CV = Coefficient of variation

All the district of the Nagpur division had shown highest yield instability than area instability and likewise they contribute toward production fluctuation.

Decomposition Analysis

A quantitative assessment of contribution of the various factors to production in the districts of Nagpur division is helpful in reorienting the programmes and setting priorities of agricultural development so as to achieve higher growth rates of 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 the present study. The result of decomposition scheme was worked for two equally divided sub period and overall period as pooled of 30 years data.

Decomposition Rate of Mung

Table No.3, In terms of mung during period-I, result that area effect 45.11 per cent per annum was responsible for decreasing the production of mung, In Wardha district with yield effect 24.58 per cent per annum and Interaction effect 29.30 per cent per annum during Bhandara and Gadchiroli was not existence yield effect 37.88 and -04.68 per cent per annum respectively. Nagpur, Bhandara yield effect and area effect 94.48 per cent and 172.58 per cent per annum.

Table - 3

Per cent Contribution of Area, Yield and Their Interaction for Increasing production of Mung

Particular		Wardha	Nagpur	Bhandara	Chandrapur	Gadchiroli	Nagpur Division
Period - I	Area effect	45.11	3.89	172.58	64.07	-313.54	34.93
	Yield effect	24.58	94.48	-130.65	19.13	827.08	53.07
	Interaction effect	29.30	1.43	58.06	17.13	-413.54	12.76
Period- II	Area effect	110.55	138.47	111.84	83.18	108.42	-2.78
	Yield effect	-24.54	-67.07	-37.88	53.42	-4.68	103.68
	Interaction effect	14.62	29.03	26.04	-36.60	-3.74	0.95
Overall pooled	Area effect	596.38	-2172.46	135.06	-61.48	7.04	762.47
	Yield effect	-957.31	1430.88	-112.97	196.08	85.81	-374.60
	Interaction effect	460.93	841.58	77.95	-34.60	7.15	-287.30

Conclusions

This is Conclude of above study that the Compound growth rate for area and production under mung has increased in all the districts of In Nagpur division of Maharashtra for the study period. The area, production and productivity instability in pulses was observed in almost all districts in the state. 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 mung production in the initial period but later yield effect was more pronounced.Among the pulses crops, mung generally grown as intercrop with cotton, jowar, soyabean and other crops. It is very rarely taken a sole crop, mostly on inferior land. Thus cultivation of mung crop is not major activity: rather it is complementary with other crop production.

Implications

The production and productivity instability in Mung crop was observed in all most entire district in the Nagpur division: It may be because the crop largely depend on vagaries of nature and production is subject to fluctuation from year to year and thus, causing heavy losses. farmer cannot bear risk due to scare resource and small holding. In order to maintain stability in production of tur concerned efforts should be made in the Nagpur division.

1. Mung appeared to be the important ace in the cropping pattern of Nagpur division Hence there is a very big need to concentrate on this crops for policy maker and researcher.
2. In almost all the studied district the area effect was found to be most responsible factor for increasing production in the overall period. But till there is a scope to increase yield in rain fed farming by introducing new development programme and increase the technical efficiency at farm level.
3. Farmer's need to be protected by crop insurance coverage against yield availability of pulses.

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