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Research Paper

An economic study of growth trend in area, production and productivity of garlic in U.P.

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ABSTRACT : In the present study, an attempt has been made to know the trends in area, production and productivity of Garlic crop in different agro-economic regions of Uttar Pradesh for the period 1995-96 to 2009-10, The study data period has been divided into three periods *viz.*, phase I, II and III. The estimation of growth rate was done by Compound Growth Rate method. It has been observed that the overall growth rate in area, production and productivity of Garlic in the State showed an increasing trend, which was recorded 16.17, 18.11 and 1.67 per cent per annum, respectively. The projected area under Garlic would be estimated around 91.848 thousand hectares, production 535.494 thousand tones and productivity 63.33 quintal per hectares, respectively for the 2020-21 A.D.

KEY WORDS : Garlic, Area, Production, Productivity, Growth trend, Projected growth rate

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INTRODUCTION

Agriculture sector is vital for the food and nutritional security of the nation. The sector remains the principal source of livelihood for more than 58 per cent of the population though its contribution to the national GDP has declined to 14.2 per cent due to high growth experienced in industries and services sectors. Compared to other countries, India faces a greater challenge, with only 2.3 per cent share in world's total land area, it has to ensure food security of its population which is about 17.5 per cent of world population.

Garlic (*Allium sativum*) is one of the important bulb crops grown and used as a spice or condiment throughout India. It is rich in proteins, phosphorous, potassium, calcium, magnesium, carbohydrates and other sulphur compounds. Ascorbic acid content is very high in green garlic. Ground garlic has been produced to be used in food industry as well as in pharmaceuticals. It can also be sliced. Garlic oil that is produced through steam distillation, is quite useful as antiseptic, it also has anti-bacterial properties. It has been proved that garlic inhibits the formation of cholesterol, suppresses blood-clotting, eases asthma, prevents heart attacks and strokes, and inhibits the growth of cancerous tumours.

China is the world's largest producer of garlic with 56.85 per cent of the total global production followed by India (15%), Bangladesh (2.50%), Myanmar (2.19%), Korea (2.19%) and Russia (1.98%). Being a net importer of garlic, India has turned into a big supplier of garlic in the global market due to shortfall in the Chinese crop and good domestic production during 2009-10. Apart from its traditional market of Bangladesh, Indian garlic is now exported to Pakistan, Thailand and Malaysia. According to Spices Board data, garlic exports increased during 2010-11 by 62.14 per cent in volume terms and 43.60 per cent in value terms to 17300 tonnes and Rs.6977.31 lakhs, respectively. India produces the small cloved varieties, with a high number of cloves, which the domestic market consumes. However, for export, bigger clove garlic with lesser number of cloves is preferred (Spices Board of India, 2012).

India ranks second in area under garlic cultivation with 2.09 lakh hectares and also second position in production with 12.64 lakh tonnes as on 2010-11. Madhya Pradesh is the leading garlic-producing state accounting for 26 per cent of total area followed by Gujarat (19.11%), Uttar Pradesh (16.77%), Rajasthan (11%), Orissa (5.25%) and Bihar (2.03%). Garlic is sown in September to October and is harvested from February to March.

Keeping the above-mentioned facts and to see the importance and utility of garlic the present study was under taken with following specific objectives.

– To examine the relative performance of growth in area, production and productivity of garlic in different regions of U.P.

– To project the growth in area, production and productivity of garlic in U.P.

MATERIALS AND METHODS

The present study is based on secondary data for the 15 years from the period of 1995-96 to 2009-10. The study examines growth rates of area, production and productivity of Garlic. The study period has been divided in three phases *viz.* phase I from 1995-96 to 1999-2000, phase-II from 2000-01 to 2004-05 and from 2005-06-to 2009-10. The analysis was also conducted for the entire study period of 15 years. The estimation of growth rate was done by Compound Growth Rate (CGR) method.

The compound growth rate (CGR) is estimated by fitting a semi-log trend equation of the following formula :

CGR = [Anti log b – 1] * 100

The equation has been estimated by applying ordinary Least Square (OLS) method. The t- test was applied to test the significance of 'b'. This equation presumes that a change in output in a given year would depend upon the output in the preceding year (Deosthali and Chandrasekhar, 2004).

RESULTS AND DATA ANALYSIS

The findings of the present study as well as relevant discussion have been presented under the following heads :

Compound growth rate in area of garlic :

Region-wise compound growth rate in area of garlic have been worked out in Table 1.

Table1 indicates that the compound growth rate in area of garlic in the state was found positive growth rate of 0.38 per cent per annum during phase-I and it was found positive growth of 27.79 per cent per annum during phase-II, but there has been decreasing trend in area of garlic during phase-III, which was recorded negative growth rate of -0.76 per cent per annum. However, the overall compound growth rate was found significantly positive growth rate of 16.17 per cent per annum, which showed increasing trend in area of garlic. The overall situation of compound growth rate in area of garlic in different region of the state showed the increasing trend in western region and central region, which was recorded significantly positive of 18.30 per cent per annum and 10.86 per cent per annum, respectively. There has been decreasing trend in area of garlic was found in bundelkhand region and eastern region, which was negative growth of -0.19 per cent per annum and -3.93 per cent per annum, respectively (Barakade and Lokhande, 2011).

Compound growth rate in production of garlic :

Region-wise compound growth rate in production of garlic have been worked out in Table 2.

Table 2 indicates that there has been decreasing trend in

Table 1 : Compound growth rate in area of garlic

Phase	Particulars	Regions				State
		Western	Central	Bundelkhand	Eastern	
Phase-I	b	0.0031	-0.0033	0.0565*	-0.0014	0.00171
	S.E. (b)	0.0020	0.0038	0.0153	0.0087	0.0013
	r (%)	0.71	-0.76	13.89	-0.33	0.38
Phase-II	b	0.1117**	0.118**	-0.0823	-0.0553	0.106**
	S.E. (b)	0.0179	0.0234	0.0321	0.0709	0.0184
	r (%)	29.35	31.41	-17.27	-11.96	27.79
Phase-III	b	-0.0054	0.0231*	0.1531	0.0091	-0.0033
	S.E. (b)	0.0133	0.0074	0.0767	0.0085	0.0125
	r (%)	-1.24	5.46	42.29	2.11	-0.76
Overall	b	0.073***	0.044**	-0.0008	-0.0174	0.065***
	S.E. (b)	0.0093	0.0053	0.0157	0.0098	0.0079
	r (%)	18.30	10.86	-0.19	-3.93	16.17

Note : b=Regression co-efficient, r = Compound growth rate in per cent, SE(b) = Standard error of regression co-efficient,
***, ** And * indicates of significance of values at p=0.01, 0.05 and 0.1, respectively

production of garlic during phase I in the state, which was recorded negative growth rate of -2.46 per cent per annum, but there has been increasing trend was found during phase II and phase-III, it was 28.83 per cent per annum during phase II and 5.58 per cent per annum during phase III. However, the overall compound growth rate was found significantly positive growth of 18.11 per cent per annum, which showed increasing trend in production of garlic. The overall situation of compound growth rate in production of garlic in different regions of the state showed the increasing trend in western region, central region and bundelkhand region, which was recorded significantly positive of 16.17 per cent per annum in western region and 12.71 per cent per annum in central region and 1.48 per cent per annum in bundlekhand region, respectively. The production of garlic in eastern region showed a decreasing trend and which was found negative growth rate of -5.10 per cent per annum. (Krishnadas *et al.* , 2011)

Compound growth rate in productivity of garlic :

Compound growth rate in productivity of garlic in different region have been worked out in Table 3.

Table 3 indicates that the compound growth rate in productivity of garlic in the state was found negative growth of -2.84 per cent per annum during phase-I but it was found positive growth of 0.0035 per cent per annum during phase-II and significantly positive growth of 6.38 per cent per annum during phase-III. However, the overall compound growth rate was found significantly positive growth of 1.67 per cent per annum, which showed increasing trend in productivity of garlic.

The overall situation of compound growth rate in productivity of garlic in different regions of the state showed the increasing trend in all the regions of the state, which was

Table 2 : Compound growth rate in production of garlic

Phase	Particulars	Regions				State
		Western	Central	Bundelkhand	Eastern	
Phase-I	b	-0.0092	-0.0159	0.0433	-0.0157	-0.0108
	S.E. (b)	0.0066	0.0060	0.0157	0.0089	0.0060
	r (%)	-2.10	-3.60	10.48	-3.56	-2.46
Phase-II	b	0.1158**	0.12***	-0.1085	-0.0578	0.11***
	S.E. (b)	0.0138	0.0131	0.0919	0.0637	0.0114
	r (%)	30.58	31.96	-22.11	-12.47	28.83
Phase-III	b	0.0215	0.0502*	0.1785	0.0384*	0.0236
	S.E. (b)	0.0166	0.0148	0.0829	0.0126	0.0161
	r (%)	5.07	12.25	50.84	9.24	5.58
Overall	b	0.065***	0.05***	0.0064	-0.0110	0.072***
	S.E. (b)	0.0079	0.0055	0.0165	0.0098	0.0077
	r (%)	16.17	12.71	1.48	-5.10	18.11

Note : b=Regression co-efficient, r = Compound growth rate in per cent, SE(b) = Standard error of regression co-efficient
***, ** And * indicates of significance of values at p=0.01, 0.05 and 0.1, respectively

Table 3 : Compound growth rate in productivity of garlic

Phase	Particulars	Regions				State
		Western	Central	Bundelkhand	Eastern	
Phase-I	b	-0.0134	-0.0125	-0.0132	-0.0126	-0.0125
	S.E. (b)	0.0054	0.0053	0.0051	0.0053	0.0053
	r (%)	-3.04	-2.84	-3.00	-2.86	-2.84
Phase-II	b	0.0041	0.0018	0.0016	-0.0025	0.0035
	S.E. (b)	0.0146	0.0135	0.0125	0.01175	0.0144
	r (%)	0.94	0.41	0.036	-0.58	0.80
Phase-III	B	0.027	0.027	.025	0.029	0.026
	S.E. (b)	0.0096	0.0096	0.0099	0.0153	0.096
	r (%)	6.41	6.43	5.99	6.97	6.38
Overall	B	0.0071**	0.007**	0.0073**	0.0066**	0.0072**
	S.E. (b)	0.0022	0.0021	0.0021	0.0022	0.0022
	r (%)	1.64	1.64	1.69	1.53	1.67

Note : b = Regression co-efficient, r = Compound growth rate in per cent, SE(b) = Standard error of regression co-efficient,
***, ** And * indicates of significance of values at p=0.01, 0.05 and 0.1, respectively

Table 4 : Projected growth in area, production and productivity of Garlic

Years	Area (000ha)	Production (000mt)	Productivity (Qt/ha)
1995-96	6.855	31.109	45.38
2000-01	14.743	59.369	40.26
2005-06	30.748	133.975	43.57
2010-11	35.10	190.50	54.27
2015-16*	63.473	362.997	58.80
2020-21*	91.848	535.494	63.33

Note: * estimated value

recorded significantly positive growth of 1.64 per cent per annum in western region, 1.64 per cent per annum in central region, 1.69 per cent per annum in bundelkhand region and 1.53 per cent per annum in eastern region, respectively. Similar results were obtained by Premchand and Sharma (2007) and Saraswati *et al.* (2012).

Projection of growth in area, production and productivity of garlic in Uttar Pradesh

In this section of the study, an attempt has been made to project the growth in area, production and productivity of garlic in Uttar Pradesh for 2020-21 A.D. The compound growth rate method has been adopted for the projection.

Data trend of growth in area, production and productivity have been estimated for 2020-21 A.D. in the Table 4. The growth rate has been worked out for an interval of 5 years.

It is obvious from the table, that the area of garlic has been increasing trend during the 1995-96 to 2009-10. Area of garlic increased from 6.855 thousand hectares during 1995-96 to 35.10 thousand hectares during 2010-11. The compound growth rate in area of garlic was positive growth rate of 16.17 per cent per annum during the 1995-96 to 2009-10. If the above rate of growth is maintained in area of garlic, the projected area under garlic would be around 91.848 thousand hectares in the 2020-21 A.D. The production of garlic also depicted an increasing trend during the 1995-96 to 2009-10. The compound growth rate in production was calculated at 18.11 per cent per annum during the 1995-96 to 2009-10. As per above rate of growth the projected production of garlic would be 535.494 thousand tones during 2020-21 A.D. The productivity of garlic registered positive growth rate of 1.67 per cent per annum during the 1995-96 to 2009-10. At this rate of growth, the projected growth of productivity of garlic would be 63.33 quintal/hectare during 2020-21 A.D. Supporting findings were made by Acharya and Agarwal (1987), Bathla (2008), Patil *et al.* (2009) and Srivastava *et al.* (2012).

Conclusion :

The growth in area, production and productivity of Garlic was found significantly positive growth rate in the state. Which showed increasing trends. The projected area under Garlic would be estimated around 91.848 thousand hectares, production would be estimated around 535.494 thousand tones and productivity would be estimated around 63.33 quintal per hectares for the 2020-21 A.D.

Suggestions :

The encouragement and incentives through Govt. to the garlic crop can fetch a higher return to the garlic growers of Uttar Pradesh as well as Govt. too by achieving foreign currency through exportable surplus. This high value crop can improve the standard of garlic growers. It is suggested that govt. should manage the efficient marketing and price support system to garlic crop which will go a long way in increasing the production, productivity and return from garlic in U.P.

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