ORIGINAL RESEARCH PAPER

Economics

Volume - 7 | Issue - 4 | April-2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 79.96

TRENDS IN AREA, PRODUCTION AND PRODUCTIVITY OF PRINCIPAL CROPS IN RAJASTHAN

KEYWORDS

DR. RAJESH KUMAR JANGIR

LECTURER OF ECONOMICS , DEPARTMENT OF ECONOMICS, GOVT. LBS P.G COLLEGE KOTHPUTLI .

ANKITA GUPTA

RESEARCH SCHOLAR, DEPARTMENT OF ECONOMICS, UNIVERSITY OF RAJASTHAN.

INTRODUCTION:

Agriculture is a critical sector of the Indian & Rajasthan economy. Agriculture is providing growth a source of livelihood and foods security to a vast section of the society. Agriculture plays an important role in food security and generates marketable surplus. Rajasthan being a predominantly agrarian state, 77 percent of the population is living in rural areas and about 77 percent depends on agriculture as a source of livelihood.

Rajasthan is a leading state of India in respect of food grain production. In terms of production of bajra, Rajasthan state occupied first rank and in India's total bajra production, share of Rajasthan was almost 48.20 percent in 2008-09. It is also a major producer of gram, wheat, maize, rape & mustered, ground nut, soya bean, guar seed, cotton and onion.

In Rajasthan out of the total geographical area of 342.70 lac hectares, forests occupied only 7.96 percent. The net sown area, gross cropped area and crop productivity in the state are highly dependent on the monsoon condition. State is seriously handicapped in terms of availability of water resources. The ground water resources are inadequate. Large area in the state are now declared as the 'dark zone' from the point of view of the availability of ground water.

Rajasthan, the largest state of India, is endowed with diverse soil and weather conditions comprising of several agro-climatic situations that helps the state to adopt a diversified cropping pattern. The state is India's largest producer of mustard, pearl millet (bajra), and three spices (coriander, cumin, and fenugreek), cluster beans, isabgol and it is the second largest producer of maize. The state has a substantial area under vegetable crops. It is also having the second largest herd of livestock amongst Indian states contributing about 10 percent of the country's milk and 30 percent of mutton production. The diversified cropping pattern and the presence of livestock as a major livelihood source has helped the state in managing the wide range of risks associated with dry land agriculture.

The growth performance of the agriculture in Rajasthan during last two decades has been fluctuating. The compound annual growth rate of gross cropped area, total agricultural production and yield has exhibited wide fluctuations during plan periods. There has been very dismal growth in crop area, yield and production during annual plan 1990-91 and eight five year plan. However, thereafter, significant growth has been recorded in area, yield and production, particularly during tenth five year plan and eleventh five year plan in Rajasthan. The rate of growth in gross cropped area, total agricultural production and yield during tenth five year plan has dramatically increased at 12.98 percent, 20.43 percent and 6.60 percent per annum respectively.

Table1.1-: Compound growth rate in (%) crop area, production and yield in Rajasthan

S. No.	Plan period	Area	Production	Yield
1.	Annual plan(1991-92)	-6.64	-20.42	-5.76
2.	8th five year plan(1992-97)	0.65	4.11	3.44
3.	9th five year plan(1997-2002)	-1.76	-0.83	0.94
4.	10th five year plan(2002-2007)	12.98	20.43	6.60
5.	11th five year plan(2007-2012)	3.27	12.92	9.34

Source: - agricultural statistics at a glance, ministry of agriculture, government of Rajasthan

The major crops grown in different parts of Rajasthan are bajra, wheat, jowar, maize, cotton, rapeseed and mustard, groundnut and horticultural crops. Among the cereals, bajra(50.5%), wheat(27.9%), maize(10.5%) and jowar(6.7%) are the major crops, while rapeseed and mustard(45.4%), taramira(21.7%), soyabean(14%), sesamum(10%) and groundnut(6.3%) are the major oilseeds grown in the state. Among total pulses gram, moth and moong are the major crops. The share of total cereals has declined drastically by percent points (from 52% in 1990-91 to 42% in 2010-11), while the share of oilseeds has increased by 6% (from 15% in 1990-91 to 21% in 2010-11) thus, it can be assumed that there is shift in area from cereals to oilseeds. In Rajasthan area under cotton 3.36 lac hector.

Table 1.2:- In 2010-11 during 11th plan compound annual growth rate in area, production and yield (%) of major crops in Rajasthan

	BAJRA	MAIZE	WHEAT	COTTON	SUGARCANE	CONDIMENTS & SPICES	FRUITS	VAGITABLE
AREA	2.42	2.69	5.41	-3.10	-19.08	-0.72	1.56	-0.78
PRODUCTION	12.83	1.53	13.52	80.15	-14.76	8.12	-18.51	-3.82
YIELD	10.16	-1.13	7.69	85.92	5.33	8.90	-19.76	-3.06

Source: Department of Agriculture, Government of Rajasthan, Jaipur.

Cropping Pattern:

The cropping pattern is a function of several variables like climatic conditions, nature of soil, availability of irrigation facilities, agricultural technology, development of transportation, marketing and agro-based industries. A change in some or all of these variables leads to a change in the cropping pattern. The study of cropping pattern constitutes a significant aspect within the spatial dimension of agricultural geography as it provides a good based for regional planning (Ali, 1985). Thus to draw a comprehensive picture of cropping pattern in Rajasthan it is worthwhile to study the area, production and productivity of major crops. It helps in planning future strategies for more production it also helps to compare actual present performance. Cropping pattern is generally understood as the proportion of area under different crops during a particular period. A change in cropping pattern implies a change in the proportion of area under different crops, which generally brings about an increase in agricultural output.

The structural changes in Rajasthan agriculture have been in favor of more growing of oil seeds, pulses and horticultural crops. As per the cropping pattern in the state the crop group such as total cereals, oil seeds, pulses and fodder crops account for about 42 percent, 21 percent, 18 percent and 15 percent of gross cropped area repetitively

Volume - 7 | Issue - 4 | April-2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 79.96

during the year 2010-11.

Objective of the study:
The important objective of this paper is to analyses the trends in area, production, and productivity of major crops of Rajasthan.

Methodology:
Agricultural development is a complex problem, therefore, reliable collection and sources of data are necessary for decision making and for future planning. The study is based on secondary data. To analyze the changes in cropping pattern in area, production and yield of principal crops in Rajasthan, data were collected for the period from 2006-07 to 2014-15. For the present problem data have been collected from the various publications of directorate of economics and statistics, department of agriculture and cooperation, different years of agricultural statistics Rajasthan, directorate of agriculture, government of Rajasthan, directorate of horticulture, Jaipur 2013-14. Vital Agricultural Statistics various issues, Directorate Agriculture, Government of Rajasthan, Jaipur, An analysis of performance of guar crop in India.

Agricultural statistic 2006-07 to 2014-15, AERC report 145 state of Rajasthan agricultural 2011-12, Guar industry outlook 2015, Some facts about Rajasthan 2006 to 2015, Directorate of economics and statistics Rajasthan.

Trends in Cropping Pattern in Rajasthan
For the rational use of land and increasing the productivity per unit of time by changing the subsistence farming into market-oriented, change in cropping pattern is necessary to solve the food problems and provide raw-material to the agro-industries (Sethi, 1989).

Table 1.3 Cropping Patterns in Rajasthan

Table1.3:- Show the gross cropped area under different crops.
(Per cent of TCA)

Years	Food Grain	Pulses	Gram	Cotton	Guar Seeds	Rape & Mustered	Coriander	Methi	Cumin
2008-09	58.41	16.12	5.53	1.33	14.57	12.02	1.08	0.28	0.74
2009-10	60.86	15.65	4.07	2.04	11.90	10.17	1.07	0.27	0.94
2010-11	60.22	18.27	6.86	1.29	11.46	9.58	0.76	0.31	1.27
2011-12	58.93	18.16	5.85	2.32	12.63	9.96	1.09	0.34	1.91
2012-13	51.82	13.55	5.23	2.18	18.93	11.38	0.66	0.27	2.07
2013-14	52.93	16.07	7.36	1.50	19.41	10.65	0.70	0.21	1.87

Source: Agricultural statistics of Rajasthan 2008-09 to 2013-14

Table 1.3:- showing the area under food grains in gross cropped area (GCA) significant decline during the 2006-07 to 2014-15. The gross cropped area under rape and mustered came down around 4 percent during the same period. However, the GCA under Pulses, cotton, spices almost remained constant. The GCA under commercial crop like guar seeds has increased during the same period.

Table 1.4:- Crop Productivity .... A comparison between Rajasthan and

Crops	Productivity Kg/ Ha. (Year 2011-12)	
	RAJASTHAN	NATION
Bajra	1290	1156
Maize	1583	2476
Cotton	518	491
Wheat	3461	3140
Mustard	1209	1145
Gram	690	912
Guar	616	478

Source:
1. Department of Agriculture (DoA), Government of Rajasthan
2. Ministry of Agriculture, GOI

Table 1.5.1: Total Area and Production under All Crops in Rajasthan
(Area in lac Hectares and Production in'000' M.T.)

Year	All Oil Seeds*		All Pulses**		All Foodgrains***	
	Area	Production	Area	Production	Area	Production
2006-07	45.27	5166	32.07	1479	127.46	14928
2007-08	40.17	4229	38.68	1552	136.44	16084
2008-09	46.64	5200	36.71	1826	132.39	16693
2009-10	41.58	4436	34.03	702	132.32	12359
2010-11	55.18	6641	47.51	3251	156.58	23574
2011-12	46.26	5765	44.49	2352	144.40	21925
2012-13	49.16	6371	32.45	1955	124.11	20060
2013-14	52.14	6033	41.97	2470	138.25	20719
2014-15	24.72	2898	15.75	1292	127.82	20166

2014-1524.72289815.751292127.8220166Source: - Vital Agricultural Statistics various issues, Directorate of Agriculture, Government of Rajasthan, Jaipur.

Table shows the area and production under oil seeds, pulses steady increase until 2013-14 and declined thereafter area under food grain remained constant and production has increased during the study period. The total area under all **oil seeds** increased from 45 ha. to 52 ha. Between (2006-07 to 2013-14) but there is a considerable decrease in the area under oil seeds in 2014-15. It decreased from 52. ha. to 24 ha. In 2014-15 similarly production of oil seeds has same situation for this time period. Production of oilseeds increased from 5166 m.t. to 6033 m.t in (2006-07 to 2013-14) but it decreased in 2014-15 2898m.t.during 2006-07 to 2013-14, there was significant increase in the area and production under all pulses.

The area under **pulses** jumped from 32 ha. in 2006-07 to 41 ha. 2013-14. the production of all pulses has grown up from 1479 m.t. in 2006-07 to 2470 m.t. in 2013-14. However, a distressing fact is that since 2014-15 the area and production of pulses has been stagnating at 15 ha. And 1292 m. t. Area under food grains remain constant from 2006-07 to 2014-15 but increase in production of food grain was most significant. It is increased from 14 m.t. to 20 m.t. during the same period.

Table 1.5.2: Total Area and Production under All Crops in Rajasthan
(Area in lac Hectares and Production in000 M.T.)

Year	Fibers*		Guar Seeds**		Spices***	
	Area	Production	Area	Production	Area	Production
2006-07	3.56	127	28.07	658	3.83	356
2007-08	3.79	147	29.09	1243	5.74	528
2008-09	3.16	387	33.18	1261	5.46	560
2009-10	4.54	154	25.86	202	5.62	556
2010-11	3.42	146	30.01	1540	7.19	668
2011-12	5.86	294	30.04	1846	9.75	954
2012-13	5.44	261	45.33	2026	8.03	705
2013-14	4.20	219	50.70	2861	8.08	668
2014-15			46.25	2795	8.51	608

Source: Vital Agricultural Statistics various issues, Directorate of Agriculture, Government of Rajasthan, Jaipur.

Table shows the area and production under commercial crop like fibers, guar seeds and spices continuously increasing during the study period. The area of **fibers** increases is small but increase in production was most significant in the same period. In case of guar seeds area, production and yield increased with the passage of time. Total area of spices increased from 3 ha. In 2006-07 to 8 ha. In 2014-15 and the production of spices increased from 356 m.t. to 608 m.t. respectively for the same period.

Trend in area, production and yield of major crops in

Volume - 7 | Issue - 4 | April-2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 79.96

Rajasthan:-
In pulses gram, moong and moth are the major pulses grown in the state. In Rajasthan under pulses the total area of gram and moong has increased and moth area came down during the study period. Production of all and yield of moong and moth pulses has been increased and gram yield has been decreased during the study period.

In cotton highest area recorded year in 2012-13, highest production year in 2014-15 and highest yield recorded in 2013-14.In Rajasthan all oil seeds rape and mustard seeds and ground nut are the major grown. Ground nut area, production and yield continuously increasing highest area, production and yield were recorded in the year 2014-15. In rape and mustered highest area was recorded in 2006-07 and production and yield was recorded in 2010-11. In guar seeds highest area and production was recorded in 2013-14 and yield was recorded in 2011-12. In spices coriander highest area, production and yield was recorded year in 2011-12. In cumin highest area recorded year in 2012-13 and production year 2013-14 and yield year in 2009-10 during the study period. In methi highest area was recorded year in 2011-12 and production year 2010-11 and yield year 2009-10 during the study period in food grains wheat highest area and yield was recorded year in 2012-13 and production year was 2013-14. In bajra highest production and yield was recorded year in 2011-12 and area was recorded in 2010-11. In maize highest area and production was recorded year in 2010-11 and yield highest in 2007-08. In jowar highest area, production and yield was recorded year in 2010-11 during the study period. In barley highest area and production was recorded year in 2014-15 and highest yield was recorded year in 2012-13.

In **all district** of Rajasthan the highest area under **wheat** was recorded by Ganganagar district (1.92 lac ha.) in the year 2006-07 and also in 2014-15(2.56 lac ha.) as the area under wheat was highest in the district, so there was highest production in Ganganagar district (686 m.t.) in the year 2006-07 and (937 m.t.) in 2014-15. The per hectare yield of wheat in kilograms was highest in Chittorgarh (3825) in 2006-07 and in Jhunjhunu (4032) in 2014-15. The lowest area, production and yield in 2006-07 and 2014-15 were recorded by Jaisalmer district. The highest area and production under **rape and musterd** seeds was recorded by Ganganagar district (2.78ha.) & (398m.t.) and yield by Chittorgarh district (1550) in 2006-07. The highest area under rape and mustard seeds was recorded by Tonk (2.99 ha.) and production by Alwar district (318m.t.) in 2014-15. The lowest area and production was recorded in 2006-07 by Dungarpur (0.0007 ha.) & (0.008m.t) and in 2014-15 by Banswara (0.0005 ha.) & (0.007m.t.) and yield by Churu district (787kg). In the year 2010-11 highest area (2.52ha) and production (426M.T.) was recorded by Alwar district and yield (2055kg) was recorded by Hanumangarh district. During the study period Hanumangarh district have always highest area, production and yield. The highest area and production under **cotton** was recorded by Hanumangarh district (0.014ha.) & (56m.t.) and yield by Jodhpur district (1599) in 2006-07. The highest area and production under cotton was recorded by Bhilwara district (0.04ha.) & (141m.t.) in 2014-15. The lowest area and production was recorded in 2006-07 by Bundi (0.000007 ha.) & (0.003 m.t.) and in 2014-15 by Jhalawar district (0.0000001ha.) & (0.003 m.t.).

The highest area and production under **guar seed** was recorded by Bikaner district (0.51 ha.) & (107 m.t.) in the year 2006-07 and 2014-15 (1.05 lac ha.) & (514 m.t.). The lowest area and production under guar seed was recorded by Bundi district (0.00017ha.) & (0.153 m.t.) in the year 2006-07 and 2014-15 was recorded by Jhalawar district (0.00035ha.) & (0.021 m.t.). In the year 2010-11 highest area (0.87ha) and production (403M.T.) was recorded by Bikaner district. The highest area and production under **gram** was recorded in 2006-07 by Churu (2.64ha.) (156m.t.) and 2014-15 by Bikaner district (2.20ha.) & (170m.t.) and yield was highest in Kota district (1387kg) and lowest area and production was recorded by Jodhpur district (0.00006 ha. &0.052 m.t.) and yield in Churu district (590kg). In the year 2010-11 highest area (3.58ha), production (22M.T.) was recorded by Churu district and yield (1755kg) was recorded by Bharatpur district.

According to **district wise** the growth of area, production and yield in wheat were positive and significant in Ganganagar, Hnumangarh, Jaipur, Jhunjhunu, Kroli districts during the study period. The growth of area production and yield in wheat were found negative in Badmar Chittorgarh, Jasilmar, Rajsamand, Sirohi districts during over all study period. The growth of area production and yield in maize was found positive and significant in Bundi district during the study period. The growth in maize was found negative in Ajmer and Jaipur district. Positive growth in area production and yield of gram was found in Bharatpur, Dausa, Jhunjhunu, Swayi madhopur, Tonk district. The growth of area production and yield in gram negative in Baswara, Bundi, Churu, Dholpur, Jalore, Jhalalwad, Kota, Sirohi, Udaipur district.

The area production and yield under moong was observed to increase positively in Churu, Ganganagar, Jaipur, Jaislmar, Jalore, Jodhpur, Nagaur and Sikar districts. Bhilwada district was found negative in area production and yield of moong. The growth of area production and yield in moth was found positive in Ganganagar and negative in Jalore district during the study period. The growth in area production and yield of cotton was found positive in Chittorgarh. Negative growth was not found any district in cotton. Positive growth in area production and yield rape & mustard was found in Churu, Karoli ,Swai Madhopur, Tonk district. The growth of area production and yield in rape & mustard negative in Barmer, Bikaner, Bundi, Chittorgarh, Ganganagar, Kota, Nagaur, Pali, Rajsamand district. The growth of area production and yield in ground nut was found positive in Bikanar, Jodhpur and Sirohi district and negative in Rasamand district during the study period. The growth in area production and yield of coriander was found up and down in all districts. The growth of area production and yield in cumin was found positive in Barmer, Jaisalmer, Jalore,Jodhpur,Nagaur, Pali and Sirohi districts during the study period. Negative growth was not found any district in cumin. The growth of area production and yield in methi was found positive in Jhunjunu, Pratapgarh and Sikar district and negative in Baran,Chittorgarh, Jhalawar,and Kota district during the study period. In guar seeds only two districts Banswara and Rajsamand have negative growth and all districts have positive growth. The growth of area production and yield in barley was found positive in Bikanar, Churu, Dausa,Ganganagar, Hanumangarh, Jaipur, Jhunjhunu and Sikar district and negative in Alwar and Bharatpur district during the study period. . The growth of area, production and yield in jowar was found positive and significant in Barmer, Chittorgarh, Jaipur, Jalore, Jodhpur, Nagaur, Pali and Sirohi districts during the study period. The growth in jowar was found negative in Ajmer, Baran, Jaisalmer and Jhalawar district. The growth performance of agriculture in the state has been satisfactory during study period.

Conclusion:
The presented study evaluates the performance of agriculture in the state of Rajasthan in recent years. Also presents what could be the future options for accelerated growth. In this paper an attempt is made to understand the changing share of major crops in agricultural area, production, and yield in Rajasthan during 2006-07 to 2014-15.

The structural changes in Rajasthan agriculture have been in favor of more growing of oil seeds, pulses and horticultural crops. Rajasthan, with its diverse agro- climatic conditions is richly endowed in the cultivations of verity of crops. The state is largest producer of guar and seeds spices like coriander, cumin, methi etc. The state is largest producer of mustard, second largest producer of oil seeds. It is also largest producer of gram and second largest producer of moth bean, for ground nut Rajasthan stands at 4th position in country.

Rajasthan is a major guar producing state in India. Three- fourth of

Volume - 7 | Issue - 4 | April-2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 79.96

the guar been production in India is coming from Rajasthan state. Guar crops grown for food, animal feed and to a crop with various industrial usages ranging from food, cosmetics, printing, pharma textile etc. The unique binding, thickening and emulsifying property of guar gum powder obtained from guar seed has made it a much sought after product in international market. The united state of America is the largest exporter of guar from India. Guar crop is enhancing production with limited input so as to widen the economic returns. In spite of fluctuation in the area and production of guar and increasing trend has been observed during study period. The demand of edible oil is increasing due to different contributing factors like rising income growing population and expanding urbanization. As a result, there is increase in area of rape & mustard seed and ground nut. Due to increase in area, then production and yield are also increasing. Rape & mustard is the major source of income especially for the marginal and small famers in the rain- fed area. Because of its low water requirement, Rape & mustard crop fit well in the rain-fed cropping system.

The **analysis shows** that Rajasthan in the case of area and production under food grain, fibers, guar seeds & spices there is a considerable increase during the 2006-07 to 2014-15. Area & production under oil seeds, pulses and food grains increase marginally during same periods. In pulses area production under gram, moong & moth increased considerably and yield variability has increased. Area production and yield of guar seeds shows a rising trend throughout the period, though some fluctuations are noticeable in yield of guar seeds. In cotton crops area, production and yield variability has increased during the study period. In spices area and production of methi shows a positive trend during 2006-2007 to 2011-2012. After 2011-2012 area and production of methi shows a negative trend. During the entire period yield a methi has variability. During the entire period area, production of coriander and cumin variability has increased. Area production & yield of rape & mustard seeds shows a positive trend during the entire period. Ground nut has variability during the study period. If area increasing production and yield also increasing and area decreasing production and yield also decreasing.

Wheat has variability during the study period. if changes in production is greater than changes in area than yield increases. During the entire period bajra shows positive and significant changes. Maize, jowar and barley have variability during the study period.

The area and the production under **gram** have positive trend and yield of gram shows a negative trend during the2006-07 to 2014-15.area ,production and yield of moong and moth shows a rising for the trend respectively same period in spices, cumin seeds also shows a rising trend in area, production and yield respectively for the same period. Coriander and methi shows a positive trend in area and production and negative trend in yield during the same period in fibers, cotton have positive trend in area and production and negative trend in yield in the same time period respectively. In all oil seeds, **ground nut** shows a positive trend in area, production and yield and rape and mustard seeds shows a negative trend in area and production and positive trend in yield respectively same period in all food grain and cereals wheat and barley shows a positive trend and area under jowar remained constant, area under bajra and maize came down and considerable increase in the production and yield respectively same period.

Low productivity, unfavorable prices and rising cost of cultivation are major challenges for agriculture sector in Rajasthan. In order to make these crops economically superior and cost effective, yield-boosting technology need to be developed. Policy change is likely is to play key role in achieving the desired growth. There is a need to increase crop production, productivity and income through improve seed management and cultivation practices.

REFERENCES:-

1. Aloka Kumar Goyal and Sandeep Kumar (2013) "Agricultural Production Trends and Cropping Pattern in Uttar Pradesh: An Overview". International Journal of Agriculture Innovations and Research Volume 2, Issue 2, D. D. U. Gorakhpur University, Gorakhpur.
2. Gholam abbas darvishi and m. Indira (2013). "An analysis of changing pattern in area, production and productivity of coffee and tea in India". International Journal of Marketing, Financial Services & Management Research. Vol.2, No. 9, ISSN 2277- 3622, University of Mysore.
3. H S Singh (1962). "Changes in Cropping Pattern". The Economic weekly.
4. Lopamudra Lenka Samantaray(2015). "A Study on the Current Trend of Agricultural Productivity in India and its Future Prospects". International Journal of Humanities Social Sciences and Education (IJHSSE). Volume 2, Issue 4, April 2015, PP 16-21 ISSN 2349-0373 (Print) & ISSN 2349-0381 (Online)Symbiosis International University
5. Madhu g.r and uma. Hr(2014). "A study on the changing cropping pattern and internal migration issues and challenges". Indian journal of applied research. Volume : 4 | Issue : 6 ISSN - 2249-555X ,University of Mysore.
6. Mohammad Maqbool Bhat(2011). "Changing cropping patterns: Food grains and non- food grains in Uzbekistan". Journal of Agricultural Extension and Rural Development Vol. 3(3), pp. 64-67, ISSN 2141-2154,Centre of Central Asian Studies, University of Kashmir, New Delhi.
7. Saraswati Poudel Acharya, H. Basavaraja, L. B.Kunnal, S.B. Mahajanashetti And A. R. S. Bhat(2012) "Growth in area, production and productivity of major crops in Karnataka". Karnataka J. Agric. Sci. Sci.,25 (4) : (431-436) University of Agricultural Sciences, Dharwad.
8. Satinder Kumar and Surender Singh (2014). "Trends In Growth Rates In Area, Production And Productivity Of Sugarcane In Haryana". International Journal of Advanced Research in Management and Social Sciences. ISSN: 2278-6236 , M.D.U Rohtak (Haryana).
9. V.Kalaiselvi(2012). "Patterns of crop diversification in the Indian scenario". Elixir Agriculture 52A (2012) 11547-11550, Annamalai University, Annamalai nagar.
10. V. K. Boyal, D.C.Pant, S. S. Burark and J. Mehra(2015). "Growth and instability in area, production and productivity of fenugreek in Rajasthan". International J. Seed Spices 6(2), Maharana Pratap University of Agriculture and Technology, Udaipur (Rajasthan).
11. V. K. Boyal and J. Mehra (2016). "Growth rates of major seed spices in Rajasthan and export performance from India". International J. Seed Spices. 5(1), Department of Horticulture, Government of Rajasthan, Kota (Rajasthan).