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Input variations in Rajasthan Agriculture Since Privatisation: An Inter District Study

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Abstract:- Agriculture Sector is very important for the development of economy of any country. There is a positive relationship between agriculture and Economic development. Rajasthan's economy is not exception in this regard, Agriculture Sector is also very important for its economy as it provides employment opportunity and food to the majority of the population. So, it is very important to know the input variations in agriculture sector in Rajasthan. Many researchers have been studied different aspects of the India agriculture and found very important results about the problems of it. In add to them, this research of work examine the input variations in Rajasthan Agriculture since privatisation.

I. INTRODUCTION

In this research paper analysis of inter district variation in use of modern agriculture inputs in Rajasthan. The development of agriculture was depend on modern agriculture technique because India is large populated country in world and achieving national food security for poor and deprived people it is necessary to increased yield potential of agriculture crops with modern technique. This was also mandatory for India and as well as state that most of farmers still cultivating crops with traditional methods and resulted they produced less and most of the time this was not sufficient for his families. This chapter discuss following drivers of growth of agriculture in state.

❖ *Part-1*

- Fertilizer consumption
- Irrigation potential
- Farm Mechanization – Tractor and Electrified wells and tube wells

II. FERTILIZER CONSUMPTION IN RAJASTHAN

Fertilizer consumption was important agriculture input for crops growth and development. Table 6.1 and figure 1 presents fertilizer consumption in India and Rajasthan during 1950-51 to 2012-13. The consumption of fertilizers in terms of N, P, K nutrients was increased in India and Rajasthan both from 2177 and 53.7 thousands tones in 1970-71 to 25536.1 and 1331.6 thousands tones in 2012-13 with compound annual growth rate (2012-13 over 1970-71) 6.0 and 7.9 per annum respectively. Fertilizer consumption per hectares was increased India and state with compound annual growth rate (2012-13 over 1970-71) 5.6 and 7.0 percent respectively. The consumption of fertilizers in the state was always lowest as compare to country for example 13.1 and 3.2 kg/ha in 1970-71 and 131.4 and 55.6 kg/ha in 2012-13.

Fig. 1 : Fertilizer consumption in India and Rajasthan.

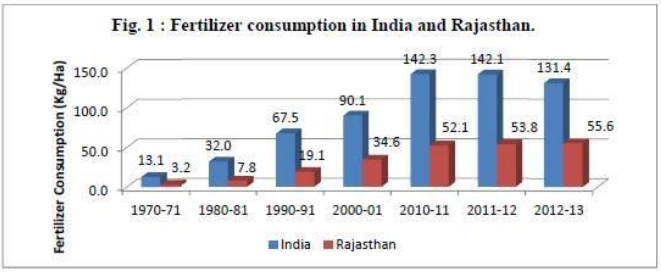

Table 1 : Fertilizer consumption in Rajasthan and India in terms of Nutrients (N,P,K)

Year	Fertilizer consumption (Th. Tonnes)		Fertilizer consumption (Kg/hectare)	
	India	Rajasthan	India	Rajasthan
1950-51	65.6	-	0.5	-
1960-61	292.1	-	1.9	-
1970-71	2177.0	53.7	13.1	3.2
1980-81	5515.6	135.1	32.0	7.8
1990-91	12546.2	370.7	67.5	19.1
2000-01	16702.3	664.8	90.1	34.6
2010-11	28122.2	1355.8	142.3	52.1
2011-12	27790.0	1318.6	142.1	53.8
2012-13	25536.1	1331.6	131.4	55.6
CAGR (2012-13 over 1970-71)	6.0	7.9	5.6	7.0

Source: Agricultural Statistics at a glance, various issues, GOI

A. Inter District Variation in Fertilizer Consumption in Rajasthan:

Table 1 (A) reveals district wise fertilizers consumption during the 1964-65 to the 2012- 13. This table shows that the fertilizer consumption in terms of nutrients (N, P, K) in state was increased from 0.5 kg/ha in the 1964-65 to 53.6 kg/hac in the 2012-13 with 10.2 % CAGR per annum. However, CAGR of fertilizer consumption during period IV in state was higher (14.5 percent per annum) than all period while it is also noticeable that CAGR of period III was lowest with 3.6 percent per annum in state. Total 22 district out of 33 district's have fertilizers consumption was higher than state average whereas only 14 districts out of 30 district's fertilizer consumption was higher than state average (22.3 kg/ha) during earlier period the 1992-93. The Churu district's fertilizer consumption was lowest (5.2 kg/ha) in the 2012-13 whereas Kota district's fertilizer consumption (153.9 kg/ha) was not only highest across district and state average but also country average (131.4 kg/ha) in same period. The striking feature shown in table that Bikaner, Churu and Jaisalmer districts fertilizer consumption was increased with higher rate during period II by 23.0, 23.3 and 28.2 percent CAGR per annum in state as a result of increasing gross irrigated area with 6.8, 15.6 and 23.6 percent per annum respectively (see table 2.9) in state.

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It clearly indicates that gross irrigated area and consumption of fertilizers increased simultaneously in districts as well as state. The co-efficient of variation (CV) about consumption of fertilizers between districts was declined over the period from 64.4 percent in the 1964-65 to 56.9 percent in the 2012-13 and same picture was seen in CAGR data between districts of state. Figure 2 and 3 presents district wise fertilizers consumption in the 2012-13 and the 1992-93.

Table 1 (A): District wise fertilizer consumption in terms of Nutrients (N,P,K) and Compound annual growth rate in Rajasthan.

Districts	Fertilizer consumption (kg/ha.)						CAGR (in %)			
	TE 2012-13	TE 2002-03	TE 1992-93	TE 1982-83	TE 1972-73	TE 1964-65	TE 2012-13 over TE 1964-65 (Pr. I)	TE 2012-13 over TE 1992-93(Pr. II)	TE 2012-13 over 2002-03 (Pr. III)	TE 1992-93 over 1964-65 (Pr. IV)
Ajmer	31.3	24.4	16.4	3.7	1.3	0.3	10.2	3.3	2.5	15.5
Alwar	83.3	52.9	24.1	8.6	5.5	0.5	11.2	6.4	4.6	14.7
Banswara	117.2	71.1	44.4	8.0	3.2	0.6	11.7	5.0	5.1	16.8
Baran	111.8	92.3	23.7	-	-	-	-	8.1	1.9	-
Barmer	7.1	3.2	0.6	0.2	0.1	0.0	13.6	13.4	8.5	13.7
Bharatpur	109.3	62.8	34.3	8.7	4.0	0.6	11.4	6.0	5.7	15.5
Bhilwara	67.2	45.3	38.0	12.4	8.1	0.8	9.6	2.9	4.0	14.6
Bikaner	18.1	11.2	0.3	4.1	0.0	0.0	15.5	23.0	5.0	10.5
Bundi	121.3	79.9	72.1	29.2	12.7	0.9	10.6	2.6	4.3	16.7
Chittorgarh	124.9	72.6	64.0	23.5	14.4	0.5	12.0	3.4	5.6	18.5
Churu	5.2	2.2	0.1	0.0	0.0	0.0	19.7	23.3	9.1	17.2
Dausa	98.8	64.0	41.1	-	-	-	-	4.5	4.4	-
Dholpur	120.7	88.9	45.3	-	-	-	-	5.0	3.1	-
Dungarpur	64.3	30.3	13.9	3.4	1.3	0.3	11.5	7.9	7.8	14.1
Ganganagar	96.3	77.3	58.7	22.8	10.7	2.1	8.3	2.5	2.2	12.6
Hanumangarh	67.7	49.0	-	-	-	-	-	-	3.3	-
Jaipur	51.4	46.7	13.7	9.1	3.2	0.7	9.5	6.8	1.0	11.4
Jaisalmer	17.4	8.1	0.1	0.0	0.3	0.5	7.9	28.2	8.0	-4.6
Jalore	32.3	22.4	8.2	2.2	0.4	0.1	12.2	7.1	3.7	16.1
Jhalawar	83.9	67.3	21.9	6.6	3.2	0.3	12.7	6.9	2.2	17.0
Jhunjhunu	24.5	15.2	7.9	3.9	0.8	0.1	13.0	5.8	4.9	18.4
Jodhpur	30.7	19.6	6.1	1.4	0.5	0.0	15.3	8.4	4.6	20.4
Karuli	83.4	67.6	-	-	-	-	-	-	2.1	-
Kota	153.9	125.8	87.9	25.5	17.5	1.1	10.8	2.8	2.0	16.8
Nagaur	26.9	18.8	7.2	1.0	0.2	0.0	15.7	6.8	3.6	22.5
Pali	27.3	21.6	19.3	7.6	1.8	0.7	7.9	1.7	2.3	12.6
Pratapgarh	106.5	-	-	-	-	-	-	-	-	-
Rajsamand	68.0	25.8	29.4	-	-	-	-	4.3	10.2	-
S.Madhopur	93.9	64.6	34.9	15.0	5.3	0.9	10.1	5.1	3.8	13.8
Sikar	32.9	17.9	7.4	2.7	0.8	0.1	12.4	7.7	6.2	15.8
Sirohi	78.1	37.0	24.8	7.5	3.2	0.7	10.4	5.9	7.8	13.7
Tonk	67.7	36.4	13.5	3.7	1.4	0.4	11.3	8.4	6.4	13.3
Udaipur	99.9	44.0	19.9	6.7	4.8	0.6	11.4	8.4	8.5	13.6
Rajasthan Total	53.8	37.7	22.3	8.0	3.7	0.5	10.2	4.5	3.6	14.5
CV(%)	56.9	65.6	71.3	66.9	64.0	64.4	106.2	173.2	48.9	79.2

Source : Agricultural Statistics at a glance, various issues, Dir. of Agriculture, Rajasthan, Jaipur

III. IRRIGATION POTENTIAL

A. District Wise Gross Irrigated Area Pattern:

Table 1.2 (A) present's district wise gross irrigated area (GIA) and compound annual growth rates (CAGR) during the 1964-65 to the 2012-13 in Rajasthan. This table shows GIA was increased from 19.34 lakh ha in the 1964-65 to 88.93 lakh ha in the 2012-13 in state. All district of state was record positive CAGR in period I except in Udaipur district (-0.4 percent). Bikaner, Churu and Jaisalmer district GIA was increased in all periods and Bikaner district's GIA was increased with all time highest CAGR with 32.2 percent in period IV due to expansion of command area in district. Bikaner, Churu and Jaisalmer districts situated in typical arid region in state however extension of GIA in these districts was remarkable achievement for agriculture development was noted in recently. The coefficient of variation (CV) was declined over the period across districts from 133.2 percent in the 1972-73 to 68.9 percent in the 2012-13. The co-efficient of variation (CV) of CAGR was highest record in period II but after period III this was declined very significantly.

Table 1.2(A) : District wise Gross irrigated area and Compound annual growth rate in Rajasthan.

Districts	Gross irrigated area (Lakh ha.)						CAGR (in %)			
	TE 2012-13	TE 2002-03	TE 1992-93	TE 1982-83	TE 1972-73	TE 1964-65	TE 2012-13 over TE 1964-65 (Pr. I)	TE 2012-13 over TE 1992-93(Pr. II)	TE 2012-13 over 2002-03 (Pr. III)	TE 1992-93 over 1964-65 (Pr. IV)
Ajmer	1.36	0.84	1.04	1.29	0.93	1.05	0.5	1.3	4.9	0.0
Alwar	4.89	4.56	2.77	2.22	1.06	0.72	4.1	2.9	0.7	4.9
Banswara	1.02	0.58	0.76	0.26	0.13	0.07	5.8	1.5	5.8	9.1
Baran	3.19	2.06	1.19	-	-	-	-	5.0	4.5	-
Barmer	2.75	1.65	0.92	0.38	0.15	0.11	6.9	5.6	5.2	7.9
Bharatpur	3.43	2.90	1.54	1.70	1.52	1.28	2.1	4.1	1.7	0.7
Bhilwara	2.16	1.19	2.01	1.80	1.59	1.44	0.9	0.4	6.1	1.2
Bikaner	5.15	2.29	1.39	1.01	0.04	0.00	20.9	6.8	8.5	32.2
Bundi	2.49	1.78	1.80	0.77	1.11	0.60	3.0	1.6	3.4	4.0
Chittorgarh	2.15	1.15	2.09	1.31	1.12	0.93	1.8	0.2	6.4	2.9
Churu	1.41	0.56	0.08	0.01	0.00	0.00	15.7	15.6	9.7	15.8
Dausa	1.69	1.54	1.19	-	-	-	-	1.8	0.9	-
Dholpur	1.18	0.82	0.76	-	-	-	-	2.2	3.8	-
Dungarpur	0.45	0.18	0.19	0.18	0.14	0.09	3.3	4.3	9.9	2.7
Ganganagar	9.26	7.52	11.84	9.53	6.55	4.69	1.4	-1.2	2.1	3.4
Hanumangarh	6.94	5.39	-	-	-	-	-	-	2.6	-
Jaipur	3.89	4.01	3.59	4.22	2.47	1.94	1.5	0.4	-0.3	2.2
Jaisalmer	2.68	0.94	0.04	0.00	0.00	0.00	16.7	23.6	11.1	11.9
Jalore	3.55	2.19	2.41	1.65	0.73	0.55	4.0	1.9	4.9	5.4
Jhalawar	2.65	1.21	1.13	0.47	0.37	0.26	4.9	4.3	8.1	5.4
Jhunjhunu	2.37	2.26	1.03	0.76	0.19	0.11	6.6	4.2	0.5	8.3
Jodhpur	4.40	1.80	1.00	0.72	0.33	0.24	6.2	7.7	9.4	5.2
Karuli	1.35	0.91	-	-	-	-	-	-	4.1	-
Kota	2.55	1.90	2.24	1.95	1.53	0.67	2.8	0.6	3.0	4.4
Nagaur	3.27	2.88	1.56	0.81	0.29	0.20	6.0	3.8	1.3	7.6
Pali	1.40	1.16	2.05	1.68	1.08	1.17	0.4	-1.9	1.8	2.0
Pratapgarh	0.97	-	-	-	-	-	-	-	-	-
Rajsamand	0.53	0.14	0.65	-	-	-	-	-1.1	14.0	-
S.Madhopur	2.17	1.23	1.91	1.44	1.04	0.75	2.2	0.7	5.8	3.4
Sikar	2.93	2.66	1.55	1.29	0.43	0.31	4.8	3.2	1.0	5.9
Sirohi	1.17	0.52	0.94	0.62	0.47	0.43	2.1	1.1	8.4	2.8
Tonk	2.62	1.33	1.24	0.97	0.73	0.62	3.1	3.8	7.1	2.5
Udaipur	0.93	0.36	1.36	1.45	1.25	1.11	-0.4	-1.9	9.8	0.7
Rajasthan Total	**88.93**	**60.50**	**51.34**	**38.52**	**25.25**	**19.34**	**3.2**	**2.7**	**3.9**	**3.6**
CV	**68.9**	**84.6**	**118.3**	**125.5**	**133.2**	**128.1**	**106.4**	**149.9**	**69.7**	**110.4**

Source : Agricultural Statistics at a glance, various issues, Dir. of Agriculture, Rajasthan, Jaipur.

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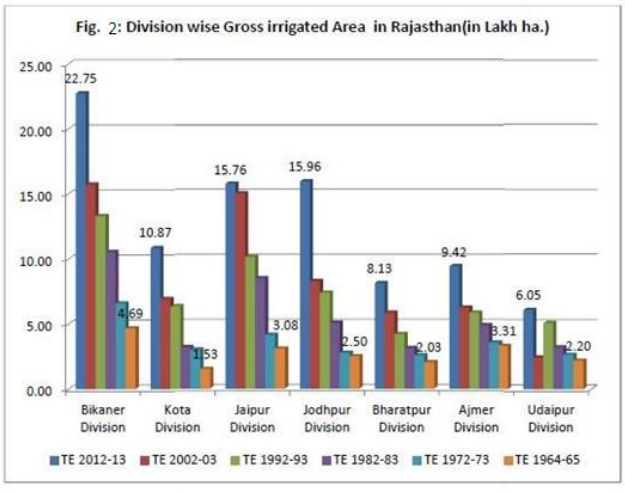
B. Division Wise Gross Irrigated Area Pattern:

Table 1.2 (B) and figure 2 presents division wise gross irrigated area and CAGR during the 1964-65 to the 2012-13 in Rajasthan. This table reveals that Bikaner division GIA was increased very significantly from 4.69 lakh ha in the 1964-65 to 22.75 lakh ha in the 2012-13. The surprising picture was shown in this table that Kota division was record highest CAGR growth (4.17 percent) per annum whereas Udaipur division was record lowest CAGR growth (2.14 percent) in same period. When we see period III this picture was completely changed and Udaipur division record highest CAGR growth (9.62 percent) per annum and Jaipur division was achieved lowest CAGR growth (0.48 percent) per annum in same period. The co-efficient of variation (CV) was increased from period I to Period III with 25.0 to 61.3 percent respectively. It was necessary condition for balanced agriculture development for any country or region that co-efficient of variation (CV) was declined over the period as well as across districts/divisions/regions.

Table 1.2(B) : Division wise Gross Irrigated area and Compound annual growth rate in Rajasthan.

Divisions	Gross irrigated area (Lakh ha.)						CAGR (in %)			
	TE 2012-13	TE 2002-03	TE 1992-93	TE 1982-83	TE 1972-73	TE 1964-65	TE 2012-13 over TE 1964-65 (Pr. I)	TE 2012-13 over TE 1992-93(Pr. II)	TE 2012-13 over 2002-03 (Pr. III)	TE 1992-93 over 1964-65 (Pr. IV)
Bikaner Division	22.75	15.75	13.31	10.55	6.60	4.69	3.34	2.72	3.74	3.79
Kota Division	10.87	6.95	6.36	3.19	3.00	1.53	4.17	2.71	4.57	5.22
Jaipur Division	15.76	15.03	10.13	8.50	4.14	3.08	3.46	2.23	0.48	4.34
Jodhpur Division	15.96	8.27	7.37	5.06	2.77	2.50	3.94	3.94	6.79	3.94
Bharatpur Division	8.13	5.85	4.21	3.14	2.56	2.03	2.93	3.35	3.34	2.64
Ajmer Division	9.42	6.24	5.85	4.87	3.54	3.31	2.20	2.41	4.20	2.05
Udaipur Division	6.05	2.42	5.06	3.20	2.64	2.20	2.14	0.90	9.62	3.03
Rajasthan Total	**88.93**	**60.50**	**52.29**	**38.52**	**25.25**	**19.34**	**3.23**	**2.69**	**3.93**	**3.62**
CV(%)	**45.5**	**57.2**	**42.9**	**53.1**	**39.7**	**37.9**	**25.0**	**36.5**	**61.3**	**30.2**

Source : Agricultural Statistics at a glance, varrious issues, Dir. of Agriculture, Rajasthan, Jaipur



C. *Irrigated Cropping Pattern of State:*

Table 1.2 C reveals irrigated cropping pattern in state during the 1964-65 to the 2012-13. This table shows that the irrigated area under cereals crops was increased from 1141.90 thousand ha in the 1964-65 to 3456.20 thousand ha in the 2012-13 and GIA in percent to GCA was increased from 14.08 percent to 34.58 percent in same period respectively . Wheat, Barley and Rice crop irrigated area was increased significantly whereas Maize, Jowar crop area under irrigation was declined significantly and Bajra crop showing fluctuating trend in irrigated area in same period in state. The irrigated area under total pulses crops was increased from 240.20 thousand ha in the 1964-65 to 2609.97 thousand ha in the 2002-03 with moderate rate and after that this area was increased quickly in last decade with 3456.20 thousands ha. This was possible due to central government promotional policy National Food Security Mission for pulses crop in state from 2007-08. The irrigated area under Moong crop was increased very significantly whereas Moth, Urad and Tur (Arhar) crops irrigated area was increased very marginally and Gram crop showing steady growth over the periods. The irrigated area under total foodgrains crops was increased from 12.17 percent to 28.86 percent in same period however 71.14 percent area under total foodgrains crop was still in rainfed which was very important standing issue of our policymakers that how can they triumph over the issue and achieved food security for poor people of country in future.

Table 1.2c : Crop wise gross irrigated area in Rajasthan during TE 1964-65 to TE 2012-13. (Area in '000 hectare)

Crops	TE 1964-65		TE 1972-73		TE 1982-83		TE 1992-93		TE 2002-03		TE 2012-13	
	Gross irrigated area	GIA % of GCA	Gross irrigated area	GIA % of GCA	Gross irrigated area	GIA % of GCA	Gross irrigated area	GIA % of GCA	Gross irrigated area	GIA % of GCA	Gross irrigated area	GIA % of GCA
Bajra	22.20	(0.50)	62.13	(1.20)	178.82	(3.63)	108.89	(2.16)	179.86	(4.17)	118.46	(2.45)
Jowar	24.83	(2.18)	8.17	(0.79)	14.53	(1.49)	3.43	(0.45)	3.54	(0.58)	1.45	(0.22)
Maize	79.90	(11.48)	83.97	(10.80)	192.05	(21.28)	73.97	(7.69)	50.16	(5.07)	3.05	(0.29)
Rice	14.67	(12.69)	40.10	(30.14)	50.30	(35.22)	38.01	(28.37)	72.93	(55.50)	73.40	(56.30)
Barley	333.10	(74.87)	352.90	(75.27)	276.22	(69.08)	209.88	(86.02)	190.37	(96.51)	281.87	(92.52)
Wheat	667.20	(56.22)	1013.97	(69.24)	1501.42	(82.30)	1607.98	(82.54)	2113.02	(99.08)	2976.80	(98.85)
Total Cereals	**1141.90**	**(14.08)**	**1561.23**	**(17.15)**	**2214.81**	**(24.07)**	**2210.27**	**(24.82)**	**2609.97**	**(31.11)**	**3456.20**	**(34.58)**
Moong	-	-	-	-	3.87	(1.84)	3.75	(1.03)	9.95	(1.78)	49.47	(4.77)
Moth	-	-	-	-	0.77	(0.06)	0.59	(0.05)	7.75	(0.86)	4.89	(0.39)
Arhar	0.10	(0.33)	4.27	(11.92)	1.10	(3.69)	0.22	(0.84)	0.88	(4.02)	2.17	(11.34)
Urad	-	-	-	-	0.96	(0.63)	0.67	(0.44)	0.72	(0.39)	0.50	(0.25)
Gram	232.00	(15.73)	269.17	(18.08)	372.31	(22.72)	261.97	(19.03)	380.52	(34.57)	529.78	(35.55)
Masur	-	-	-	-	5.17	(30.31)	7.46	(51.46)	7.47	(50.32)	27.42	(79.42)
Total Pulses	**240.20**	**(7.39)**	**279.70**	**(7.95)**	**393.68**	**(7.49)**	**295.60**	**(5.69)**	**430.13**	**(14.04)**	**625.55**	**(15.07)**
Total Foodgrains	**1382.10**	**(12.17)**	**1840.93**	**(14.58)**	**2608.50**	**(18.04)**	**2514.87**	**(17.79)**	**3040.10**	**(26.54)**	**4081.74**	**(28.86)**
Rapeseed & Mustard	40.13	(34.20)	93.77	(29.86)	305.08	(56.47)	1407.60	(66.36)	1246.41	(85.87)	2160.70	(84.67)
Taramira	-	-	-	-	14.78	(2.91)	9.30	(6.76)	9.36	(6.47)	8.80	(1.94)
Castorseed	-	-	-	-	1.51	(29.92)	7.73	(43.92)	38.83	(60.27)	174.50	(76.87)
Groundnut	1.10	(0.57)	3.47	(1.45)	19.63	(10.53)	57.67	(23.93)	100.55	(44.46)	300.66	(77.41)
Sesamum	0.77	(0.14)	0.80	(0.15)	3.09	(0.71)	2.34	(0.41)	7.84	(3.19)	4.47	(0.91)
Soybean	-	-	-	-	0.00	-	32.45	(16.76)	23.79	(3.99)	37.72	(4.19)
Total Oilseeds	**45.00**	**(3.91)**	**101.07**	**(8.69)**	**354.25**	**(28.73)**	**1522.68**	**(45.69)**	**1429.33**	**(52.30)**	**2687.45**	**(53.85)**
Coriander	-	-	-	-	46.22	(50.12)	91.68	(71.48)	144.03	(98.50)	203.36	(97.65)
Cumin	-	-	-	-	58.25	(99.43)	96.70	(99.39)	300.33	(99.83)	429.10	(99.46)
Garlic	-	-	-	-	2.37	(98.69)	7.23	(99.98)	15.82	(99.96)	44.82	(99.39)
Methi	-	-	-	-	28.28	(99.01)	26.54	(99.15)	60.32	(99.78)	76.02	(99.91)
Sonf	-	-	-	-	1.72	(89.71)	3.58	(95.06)	6.20	(99.40)	33.32	(99.14)
Ajwain	-	-	-	-	0.01	(0.15)	0.04	(0.29)	0.07	(0.52)	1.63	(8.83)
Chillies	-	-	-	-	34.39	(90.09)	39.48	(91.96)	26.16	(94.60)	10.07	(81.27)
TOTAL Condiments and spices	-	-	-	-	**172.34**	**(73.37)**	**267.10**	**(81.83)**	**555.91**	**(96.13)**	**798.61**	**(96.81)**
Isabgol	-	-	-	-	-	-	-	-	110.59	(99.99)	208.22	(99.64)
Guar	-	-	-	-	108.09	(5.76)	33.98	(1.86)	141.82	(7.06)	291.50	(8.25)
Cotton	168.47	(72.14)	202.37	(66.31)	334.60	(88.57)	450.47	(96.15)	452.56	(96.57)	442.25	(98.01)
Sugarcane	32.17	(84.65)	30.70	(82.53)	33.31	(95.48)	24.51	(93.83)	10.38	(95.78)	5.70	(98.05)
Onion	-	-	-	-	10.28	(99.02)	16.81	(98.31)	26.41	(99.65)	53.86	(98.11)
Potato	-	-	-	-	2.08	(95.57)	1.88	(98.86)	2.90	(99.76)	10.51	(99.80)
GCA	1934.00	(12.95)	2525.00	(15.27)	3851.73	(21.28)	5134.33	(26.35)	6050.41	(34.09)	8893.39	(35.83)

Source : Agricultural Statistics at a glance, varrious issues, Dir. of Agriculture, Rajasthan, Jaipur

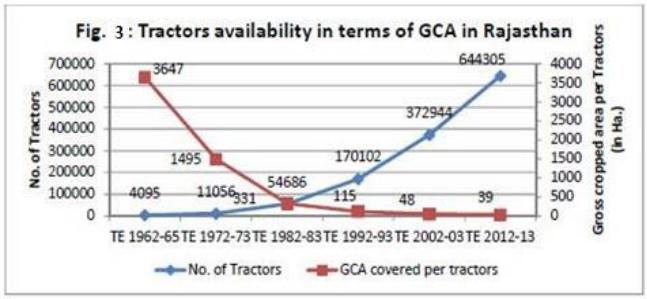
IV. FARM MECHANIZATION

A. Tractor and Electrified Wells and Tube Wells:

There is a strong correlation between the farm mechanization and agricultural productivity. The states with greater availability of farm power show higher productivity as compared to the others (GoI, 2012a). Among various types of farm machinery, tractors, power tillers and diesel engines and electric motors are the major ones. India is the largest manufacturer of tractors in the world, accounting for about one-third of the global production. Figure 3 presents district wise availability of tractors in terms of GCA covered in Rajasthan during the 1964-65 to the 2012-13. This data shows that only 4095 tractors available in state and average 3647 ha cultivated by each tractors in the 1964-65 whereas 644305 tractors available in state during the 2012-13 and average 39 ha cultivated by each tractors.

Top 10 districts viz. Nagaur, Ganganagar, Jodhpur, Bharatpur, Jaipur, Alwar, Bhilwara, Kota, Chittorgarh and Bikaner districts have jointly accounted 60.8 percent numbers of tractors in state and remaining 39.2 percent tractors hold by 23 districts.

The average gross cropped area cultivated by tractors in state was 39 hectares in the 2012-13 compared to 115 hectares in the 1992-93 and 3647 hectares in the 1964-65. The total 16 out of 33 districts have average less cultivated gross cropped area than state average (39 ha.) in the 2012-13 whereas compared to 10 districts in the 1992-93 and only 6 districts in the 1964-65 average less cultivated gross cropped area than state average. This feature was healthy for farm mechanisation in state and sustainable agricultural development.



B. Electrified Wells and Tube Wells in Rajasthan

However, there is easy access to the electricity network, converting from dieseldriven to electric pumps will improve pumping efficiency and reduce costs. Typical efficiencies for electrical centrifugal pumps range between 70 and 80 per cent, whereas diesel pumps have an efficiency of just 30 to 40 per cent. Other advantages of electric pumps include lower maintenance requirements, less environmental impact and more easily implemented pump controls (Pump & Systems March 2013). District wise numbers of well and tubewells were changed year on year based on rainfall occurrence in respective year in state that' why some times numbers of wells recharged when good rainfall coverage in districts and sometimes draught or less rainfall coverage in districts and wells was empty on particular year. Total 28 percent gross cropped area was irrigated by wells and 40 percent by tubewells (see table 2.12) in the 2012-13 hence, it was important for agricultural development to analyses district wise pattern of well and tubewells in state. Table 6.6 (B) presents district wise electrified wells and tubewells and availability in terms of GCA in state during the 2002-03 and the 2012-13.

This Agri Dept. data shows that total 16.09 lakh wells and tubewells available in the 2002-03 and 40.5 percent well and tubewells was electrified in state whereas 26.02 lakh wells and tubewells was available in state by 61.69 percent increases but marginally declined (-1.4 percent) in terms of electrification during the 2012-13. The highest numbers of well and tubewells in Jaipur (2.43 lakh) followed by Bhilwara (1.96 lakh), Alwar (1.74 lakh), Chittorgarh (1.37 lakh), Jhalawar (1.36 lakh) and Udaipur (1.12 lakh) whereas lowest in Churu (0.20 lakh) and Jaisalmer (0.088 lakh) in the 2012-13.

The highest electrified wells and tubewells in located in Jhunjhunu (91.5 percent) followed by Churu (85.5 percent) and Sikar (83.3 percent) whereas lowest in Dholpur (7.2 percent) and Tonk (14.3 percent) during the 2002-03 whereas we compared to the 2012-13 than highest in Jodhpur (84.0 percent) and Bikaner (77.1 percent) district and lowest in Dholpur (9.3 percent) and Tonk (11.0 percent).

The numbers of electrified wells and tubewells was 6.52 lakh in the 2002-03 was increased 55.91 percent in the 2012-13 in state. This situation was healthy for agricultural development because electrified wells and tubewells required lower maintenance and less harmful for environment than diesel operated and as well as incurred low cost of cultivation of crops and farmers were more benefited by cultivating crops. The average 27 hectare area was irrigated by electrified wells and tubewells in the 2002-03 while marginally improved by 24 hectares in the 2012-13. Jaisalmer, Bikaner and Ganganagar districts have less area irrigated through wells and tubewells in state because these district have acquired more area under cannel irrigation but area irrigated under wells and tubewells was increased significantly in the 2012-13 in these districts. Jaipur and Chittorgarh districts have irrigated less area (8 ha per wells and tubewells) than other districts during the 2012-13. The lowest electrified wells and tubewells district Dholpur have 91 hectare area irrigated through electrified wells and tubewells in the 2002-03 was declined in the 2012-13 by 55 hectares. The another district Tonk situation was vice versa than Dholpur district and 53 to 70 hectares area was irrigated through electrified wells and tubewells in same period respectively.

Table 1.3 A : District wise electrified wells & tubewells and availabily in terms of GCA in Rajasthan.

Distrits	TE 2002-03				TE 2012-13			
	Total well and Tubewells	Electrified wells & tubewells	Electrified wells & tubewells (%)	GCA per Electrified wells and tubewells (in ha.)	Total well and Tubewells	Electrified wells & tubewells	Electrified wells & tubewells (%)	GCA per Electrified wells and tubewells (in ha.)
Ajmer	77060	16434	21.3	25	110255	22927	20.8	30
Alwar	108553	44323	40.8	17	174052	82568	47.4	10
Banswara	25399	4592	18.1	61	30094	5989	19.9	56
Baran	43440	11174	25.7	33	73214	23486	32.1	25
Barmer	25411	13962	54.9	102	52813	31154	59.0	59
Bharatpur	60461	11189	18.5	49	68813	13924	20.2	42
Bhilwara	127557	26187	20.5	16	196349	23393	11.9	29
Bikaner	6226	4348	69.8	240	30940	23863	77.1	78
Bundi	36122	11515	31.9	27	57263	16629	29.0	27
Chittorgarh	115587	50890	44.0	10	136632	67678	49.5	8
Churu	9418	8002	85.0	119	20154	13064	64.8	114
Dausa	50500	19105	37.8	16	79376	33521	42.2	11
Dholpur	27199	1956	7.2	91	38090	3527	9.3	65
Dungarpur	29967	7009	23.4	19	40879	7107	17.4	28
Ganganagar	8147	4414	54.2	184	20796	8747	42.1	128
Hanumangarh	15538	8536	54.9	107	41488	16514	39.8	75
Jaipur	139561	91304	65.4	9	243070	135038	55.6	8
Jaisalmer	3572	1352	37.8	247	8804	4980	56.6	172
Jalore	60050	30682	51.1	23	97035	53334	55.0	18
Jhalawar	79090	21937	27.7	18	135789	26025	19.2	23
Jhunjhunu	43974	40215	91.5	14	85272	53135	62.3	13
Jodhpur	32376	21983	67.9	41	55757	46833	84.0	32
Karauli	38439	12710	33.1	19	56028	23851	42.6	14
Kota	27753	14022	50.5	25	44102	22032	50.0	21
Nagaur	54972	40121	73.0	29	79678	47859	60.1	33
Pali	52019	24258	46.6	22	72334	29461	40.7	26
Pratapgarh	0	-	-	-	63385	23423	37.0	12
Rajsamand	59561	10696	18.0	9	81712	12014	14.7	12
S. Madhopur	38977	8795	22.6	31	68502	18825	27.5	21
Sikar	57716	48084	83.3	13	103530	69421	67.1	11
Sirohi	20011	11280	56.4	14	35470	15997	45.1	15
Tonk	54956	8114	14.8	53	88686	9736	11.0	70
Udaipur	79737	23011	28.9	12	111751	30764	27.5	11
Total State	**1609346**	**652193**	**40.5**	**27**	**2602112**	**1016818**	**39.1**	**24**

Note : Total wells numbers was included out of used wells in state.
Source : Statistical Abstract, various issues,DES, Jaipur, Rajasthan.

V. CONCLUSION

This Work concludes inter district variation in use of modern agriculture inputs in Rajasthan especially in the Fertilizers uses to grow crops, irrigation methods and use of modern technology. The detailed variations have been shown in tables and comparison of inter-district variations is shown. The above data and work is useful in planning for development of agriculture by using more effective modern agriculture technique because Rajsathan is large state in India and achieving national food security for poor and deprived people it is necessary to increased yield potential of agriculture crops.

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