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Temporal changes in economics of pulses and their comparative advantage in Rajasthan

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ABSTRACT

The study aims to examine the temporal changes in economics of chickpea (gram), moong bean (green gram) and urd bean (black gram) production in western State of India i.e. Rajasthan. Study was entirely based on secondary data collected from publication of Ministry of Agriculture, Govt. of India, New Delhi. The structural changes in cost of cultivation were analyzed by working out the difference in cost at two points of time (i.e. 2001-02 and 2013-14), along with relative share to total cost. Study revealed that the average cost of cultivation of chickpea, moong bean and urd bean increased from Rs.9,941.66/ha, Rs.5,954.74/ha and Rs.7,849.31/ha in 2001-02 to Rs. 24,093.71/ha, Rs.17,793.53/ha and Rs. 21,346.36/ha in 2013-14.The net income over total cost was highest for chickpea which is a major pulse crop of Rajasthan. During 2001-02, both moong bean and urd bean remained unprofitable over total cost. During 2013-14, chickpea and moong bean became profitable over total cost. The level of profit was highest for chickpea followed by moong bean. Urd bean still remained unprofitable over total cost.

Key words: Economics, Pulses, Rajasthan, Temporal.

INTRODUCTION

Pulses are one of the important food commodities in India often referred to as 'poor man's meat' in developing countries like India. The pulses are the integral part of the cropping systems of the farmers all over the country because these crops fit well in the crop rotation and crop mixtures. Pulses are grown in an area of 807.54 lakh ha with the production of 730.07 lakh tones in the World (FAOSTAT, 2013). India is the largest producer and consumer of pulses in the world accounting for about 29 per cent of the world area and 19 per cent of the world's production. More importantly India is also the largest importer and processor of pulses in the world (Singh *et al*. 2015). Pulses hold a significant position in Indian agriculture as these are leguminous and play a key role in improving fertility of the soil. Pulses are the cheapest source of proteins and Indians fulfill 20 to 30 per cent of their protein requirement from pulses. The protein content of pulses is three times higher than cereals (Grover and Singh, 2015). The total production of pulses in India during the year 2014-15 was 17.16 million tons whereas area under pulses has increased from 19 million hectares to 23 million hectares (Tiwari and Shivhare, 2016). India is the leading country for high consumption of pulses with an average consumption of 35 g/person/day and the highest intake tended to be in northern States. The daily per capita availability of pulses in India has decreased, however, to a meager of 35 g against FAO recommended dose of 80g/day. It is a matter of concern to all of us (Pathak *et al*. 2017). In Rajasthan, area under chickpea is 12.56 lakh ha with the production of 9.11 lakh tons, while the area under moong bean and urd bean is 8.94 lakh ha and 2.02 lakh ha with the production of 4.61 lakh tons and 1.12 lakh tones (Anonymous 2014-15). Pulses are mostly cultivated under rainfed conditions and do not require intensive irrigation facility. Even in such conditions, pulses give better returns. Therefore, to enhance the production of pulses not only to meet the dietary requirement of protein but also to raise the awareness about pulses for achieving nutritional, food security and environmental sustainability, an attempt has been made to study the temporal changes in economics of selected pulse crops.

MATERIALS AND METHODS

To examine temporal changes in economic performance of selected pulse crops, the published data on cost of cultivation from cost of cultivation scheme, of past years were used. The structural changes in cost of cultivation were analyzed by working out the difference in cost at two points of time (i.e. 2001-02 to 2013-14), along with relative share to total cost. Cost structure of each crop was analyzed by working out the share of each item of cost in total cost of cultivation. The changes in structure of cost of cultivation of crops were assessed by comparing the cost structure of each crop during 2013-14 compared to 2001-02.

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To identify the crops having comparative advantage, various cost groups were compared with the gross income. The profit over cost 'A_2' and cost 'C_2' for each crop was compared, to identify crops having more comparative advantage in terms of farm business income and net income. It was assessed by cost and return concepts.

RESULT AND DISCUSSION

Temporal changes in cost of cultivation of Chickpea (gram): The details of cost of cultivation of chickpea in Rajasthan for the years 2001-02 to 2013-14 at triennium basis are given in Table 1 revealed that the total cost of cultivation per hectare of chickpea in Rajasthan has increased by 142.38 per cent from Rs. 9,941.66/ha in 2001-02 to Rs. 24,093.71/ha in 2013-14 over the time span of 13 years. During 2001-02, the operational cost and fixed cost was in the ratio of 68:32 and during 2013-14, these were in the ratio of 65:35. It indicates that the proportion of operational cost and fixed cost has changed only marginally. The increase in cost of cultivation has occurred in all major items of cost such as human labour, animal labour, machine labour, seed, fertilizers, rental value of owned land and interest on fixed capital. Out of total increase of Rs. 14,152.04/ha in cost of cultivation of chickpea over the years, 62.22 per cent was attributable to operational cost and 37.78 per cent to fixed cost items. The major items of operational cost which caused for the increase in cost of cultivation were family labour (23.50%), casual human labour (10.53%) seed (9.14%) and fertilizers (3.47%). Out of total fixed cost items, rental value of owned land and interest on fixed capital has contributed 26.33 per cent and 11.19 per cent respectively, share of increase in fixed cost. It is clear from the table that the rate of change in fixed cost has been higher (168.52%) over the rate of change in operational cost (130.12%).

Measures of farm profits in chickpea: The details of income measures of chickpea for the State of Rajasthan are given in Table 2. The gross income of chickpea has increased to Rs. 33,534.28/ha in 2013-14 from Rs. 11,339.25/ha in 2001-02 at triennium basis with per cent change of 195.74. During this period, farm business income of chickpea in Rajasthan has also increased by 244.81 per cent from Rs. 6,813.67/ha in 2001-02 to Rs. 23,494.41/ha in 2013-14. The net income of chickpea which is the residual of gross return over total cost has recorded a highest per cent change of 575.49 per cent from Rs. 1,397.58/ha in 2001-02 to Rs.

Table 1: Cost structure and change in cost of cultivation of Chickpea (gram).

Items	Cost Of Cultivation				Change in 2013-14 over 2001-02		Share in total change
	TE 2001-02 (Rs/ha)	%	TE 2013-14 (Rs/ha)	%	Rs/ha	%	%
Operational cost							
Human Labour							
Family	2491.15	25.06	5817.25	24.14	3326.10	133.52	23.50
Attached	38.22	0.38	129.61	0.54	91.39	239.12	0.65
Casual	328.35	3.30	1819.04	7.55	1490.69	453.99	10.53
Animal Labour							
Hired	31.38	0.32	7.58	0.03	-23.80	-75.83	-0.17
Owned	537.01	5.40	148.22	0.62	-388.79	-72.40	-2.75
Machine Labour							
Hired	997.94	10.04	2611.16	10.84	1613.22	161.66	0.00
Owned	40.97	0.41	181.79	0.75	140.82	343.75	0.99
Seed	1040.04	10.46	2332.79	9.68	1292.75	124.30	9.13
Fertilizers	117.02	1.18	607.44	2.52	490.41	419.07	3.47
Manure	5.66	0.06	1.21	0.01	-4.45	-78.63	-0.03
Insecticides	7.69	0.08	206.04	0.86	198.35	2579.32	1.40
Irrigation Charges	1003.65	10.10	1415.96	5.88	412.32	41.08	2.91
Miscellaneous	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	129.62	1.30	295.65	1.23	166.03	128.08	1.17
Total Operational cost	6768.70	68.08	15573.75	64.64	8806.18	130.12	62.22
Fixed Cost							
Rental value of owned land	1857.12	18.68	5584.35	23.18	3727.23	200.70	26.33
Rent paid for leased- in land	65.13	0.66	8.72	0.04	-56.41	-86.61	-0.40
Land Revenue, Taxes, Cesses	5.31	0.05	4.18	0.02	-1.14	-21.39	-0.01
Depreciation on implements and farm building	177.59	1.79	270.48	1.12	92.89	52.31	0.66
Interest on fixed capital	1067.82	10.74	2652.24	11.01	1584.42	148.38	11.19
Total Fixed cost	3172.96	31.92	8519.96	35.36	5347.00	168.52	37.78
Total Cost (A+B)	9941.66	100.00	24093.71	100.00	14152.04	142.38	100.00

9,440.58/ha in 213-14. As far as the farm investment income is concerned, there was an increase in the farm investment income by 308.96 per cent from Rs. 4,322.52/ha in 2001-02 to Rs. 17,677.17/ha in 2013-14. It is clear from the table that the rate of increase in the net income of chickpea has been excellently good in Rajasthan.

Cost and returns on the basis of cost concept in chickpea: The cost and returns on the basis of cost concept in the production of chickpea have been presented in Table 3 at triennium basis. It is clear from table that per hectare Cost-A_1, Cost-A_2, Cost-B_1, Cost-B_2, Cost C_1, and Cost-C_2 increased over the years. The highest change was observed in Cost-B_2 (145.30%) followed by Cost-C_2 (142.35%), Cost-C_1 (130.70%), and Cost B_1 (129.43%).

The income over different costs as presented in Table 3 also increased over the years. The average income per hectare over Cost-A_1 increased from Rs. 6,878.79 in 2001-02 to Rs. 23,503.13 in 2013-14 with per cent change of 241.68. Income over Cost-C_1 increased by 352.84 per cent from Rs. 3,319.83/ha in 2001-02 to Rs. 15,033.65/ha in 2013-14. Income over Cost B_1 and Cost B_2 also increased from Rs. 5,810.98/ha and Rs. 3,888.47/ha during 2001-02 to Rs. 20,850.90/ha and Rs. 15,257.83/ha in 2013-14, showing an increase of 258.82 and 292.39 per cent, respectively. It is revealed from the table that income over different cost has increased over the years.

Temporal changes in cost of cultivation of moong bean: The details of cost of cultivation of moong in Rajasthan for the years 2001-02 to 2013-14 at triennium basis are given in Table 4 which revealed that the cost of cultivation per hectare of moong has increased from Rs. 5,954.74/ha in 2001-02 to Rs. 17,793.53/ha in 2013-14 at triennium basis and showing an increase of 198.81 per cent over the time span of 13 years. During 2001-02, the operational cost and fixed cost was in the ratio of 69:31 and during 2013-14, these were in the ratio of 74:26. It indicates that the proportion of operational cost and fixed cost has changed only marginally The increase in cost of cultivation has occurred in all major items of cost such as human labour, animal labour, machine labour, seed, fertilizers, rental value of owned land and interest on fixed capital. Out of total increase of Rs. 11,838.79/ha in cost of cultivation of moong bean over the years, 76.99 per cent was attributable to operational cost and 23.01 per cent to fixed cost items. The major items of operational cost which caused for the increase in cost of cultivation were human family labour (32.19%), casual human labour (20.28%), hired machine labour (11.44%) and seed (7.17%). Out of total fixed cost items, rental value of owned land has contributed 17.45 per cent share of increase in fixed cost. It is clear from the table that the rate of change in operational cost has been higher (223.39%) over the rate of change in fixed cost (145.33%).

Measures of farm profits in moong bean: The details of income measures of moong bean for the State of Rajasthan are given in Table 5. The gross income of moong bean has increased to Rs. 18,797.84/ha in 2013-14 from Rs. 5,395.89/ha in 2001-02 with per cent change of 248.37 at triennium basis. During this period, farm business income of moong bean in Rajasthan has also increased from Rs.2,836.56/ha in 2001-02 to Rs. 10,484.38/ha in 2013-14 with a rise of 269.62 per cent. The net income of moong bean which is the residual of gross return over total cost has declined in 2001-02 as Rs. -558.85/ha and increased to Rs. 1,004.32/ha in

Table 2: Measures of farm profits in Chickpea in the State of Rajasthan.

Items	Chickpea		
	TE 2001-02	TE 2013-14	% Change
Value of main production/ha (Rs.)	10355.89	30821.94	197.63
Value of by-product /ha(Rs.)	983.36	2712.34	175.82
Gross Income (GI) (1 + 2)	11339.25	33534.28	195.74
Farm Business Income (GI- Cost A_2)	6813.67	23494.41	244.81
Family Labour Income (GI-CostB_2)	3888.47	15257.83	292.39
Farm Investment Income (GI- (Cost A_2+IFL)	4322.52	17677.17	308.96
Net Income (GI- Cost C_2)	1397.58	9440.58	575.49

Table 3: Break–up of total cost, cost concept wise and income over different costs in chickpea.

Different Costs	Break up of total cost			Income over different cost		
	TE 2001- 02 (Rs/ha)	TE 2013-14 (Rs/ha)	% change	TE 2001-02 (Rs/ha)	TE 2013-14 (Rs/ha)	% Change
Cost A_1	4460.45	10031.15	124.89	6878.79	23503.13	241.68
Cost A_2	4525.58	10039.87	121.85	6813.67	23494.41	244.81
Cost B_1	5528.26	12683.38	129.43	5810.98	20850.90	258.82
Cost B_2	7450.78	18276.45	145.30	3888.47	15257.83	292.39
Cost C_1	8019.41	18500.63	130.70	3319.83	15033.65	352.84
Cost C_2	9941.66	24093.70	142.35	1397.58	9440.58	575.49

Table 4: Cost structure and change in cost of cultivation of moong bean.

Items	Cost Of Cultivation				Change in 2013-14 over 2001-02		Share in total change
	TE 2001-02 (Rs/ha)	%	TE 2013-14 (Rs/ha)	%	Rs/ha	%	%
Operational cost							
Human Labour							
Family	1742.75	29.27	5553.29	31.21	3810.54	218.65	32.19
Attached	23.66	0.40	17.66	0.10	-6.00	-25.37	-0.05
Casual	578.57	9.72	2979.34	16.74	2400.76	414.95	20.28
Animal Labour							
Hired	7.57	0.13	14.12	0.08	6.56	86.65	0.06
Owned	78.02	1.31	110.37	0.62	32.34	41.45	0.27
Machine Labour							
Hired	704.63	11.83	2059.09	11.57	1354.46	192.22	11.44
Owned	47.79	0.80	77.29	0.43	29.51	61.75	0.25
Seed	490.34	9.77	1338.64	7.52	848.30	173.00	7.17
Fertilizers	59.24	0.99	498.41	2.80	439.17	741.35	3.71
Manure	145.20	2.44	65.97	0.37	-79.23	-54.57	-0.67
Insecticides	94.21	1.58	174.93	0.98	80.72	85.67	0.68
Irrigation Charges	37.10	0.62	73.37	0.51	36.27	97.77	0.31
Miscellaneous	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	70.82	1.19	231.54	1.30	160.72	226.93	1.36
Total Operational cost	4079.91	68.52	13194.03	74.15	9114.12	223.39	76.99
Fixed Cost							
Rental value of owned land	866.63	14.55	2932.16	16.48	2065.53	238.34	17.45
Rent paid for leased- in land	71.31	1.20	442.77	2.49	371.46	520.90	3.14
Land Revenue, Taxes, Cesses	2.87	0.06	2.26	0.01	-0.61	-21.25	-0.01
Depreciation on implements and farm building	147.99	17.94	227.55	1.28	79.56	53.76	0.67
Interest on fixed capital	786.03	13.20	994.76	5.59	208.73	26.56	1.76
Total Fixed cost	1874.83	31.48	4599.50	25.85	2724.67	145.33	23.01
Total Cost (A+B)	5954.74	100	17793.53	100	11838.79	198.81	100

Table 5: Measures of farm profits in moong bean in the State of Rajasthan.

Items	Moong bean		
	TE 2001-02	TE 2013-14	% Change
Value of main production/ha (Rs.)	4571.22	17279.43	278.01
Value of by-product /ha(Rs.)	824.67	1518.41	84.12
Gross Income (GI) (1 + 2)	5395.89	18797.84	248.37
Farm Business Income (GI- Cost A_2)	2836.56	10484.38	269.62
Family Labour Income (GI-CostB_2)	1183.90	6557.45	453.89
Farm Investment Income (GI- (Cost A_2+IFL)	1093.81	4931.09	350.82
Net Income (GI- Cost C_2)	-558.85	1004.32	-279.71

Table 6: Break–up of total cost, cost concept wise and income over different costs in moong bean.

	Break up of total cost			Income over different cost		
Different Costs	TE 2001-02 (Rs/ha)	TE 2013-14 (Rs/ha)	% change	TE 2001-02 (Rs/ha)	TE 2013-14 (Rs/ha)	% Change
Cost A_1	2488.03	7870.70	216.34	2907.86	10927.14	275.78
Cost A_2	2559.33	8313.47	224.83	2836.56	10484.38	269.62
Cost B_1	3274.05	8865.46	170.78	2121.83	9932.38	368.10
Cost B_2	4211.99	12240.39	190.61	1183.90	6557.45	453.89
Cost C_1	5016.80	14418.75	187.41	379.09	4379.09	1055.17
Cost C_2	5954.74	17793.53	198.81	-558.85	1004.32	-279.71

2013-14. As far as the farm investment income is concerned, Rajasthan recorded increase in farm investment income of moong bean by 350.82 per cent from Rs. 1,093.81/ha in 2001-02 to Rs. 4,931.09/ha in 2013-14. It is clear from the table that the rate of increase in the net income of moong bean was not good in Rajasthan due to erratic rainfall and low productivity.

Cost and returns on the basis of cost concept in moong bean: The cost and returns on the basis of cost concept in the production of moong bean have been presented in the Table 6 at triennium basis. It is evident from the table that, per hectare Cost-A_1, Cost-A_2, Cost-B_1, Cost-B_2, Cost C_1, and Cost-C_2 increased over the years. The highest change was observed in Cost-A_2 (224.83%) followed by Cost-A_1 (216.34%), and Cost C_2 (198.81%).

The income over different costs as presented in Table 6 also increased over the years. The average income per hectare over Cost-A_1 increased from Rs. 2,907.86/ha in 2001-02 to Rs. 10,927.14/ha in 2013-14, showing an increase of 275.78 per cent. Income over Cost-C_1 increased with the per cent change of 1055.17 from Rs.379.09/ha in 2001-02 to Rs. 4,379.09/ha in 2013-14. Income over Cost B_1 and Cost B_2 also increased from Rs. 2,121.83/ha and Rs. 1,183.90/ha during 2001-02 to Rs. 9932.38/ha and Rs. 6,557.45/ha in 2013-14, showing an increase of 368.10 and 453.89 per cent, respectively.

Temporal changes in cost of cultivation of Urd bean: The details of cost of cultivation of Urd bean in Rajasthan for the years 2001-02 to 2013-14 at triennium basis are given in Table 7. Table revealed that the cost of cultivation per hectare of urd bean has increased from Rs. 7,849.31/ha in 2001-02 to Rs. 21,346.36/ha in 2013-14 at triennium average basis, showing an increase of 171.95 per cent over the time span of 13 years. During 2001-02, the operational cost and fixed cost was in the ratio of 71:29 and during 2013-14, these were in the ratio of 76:24. It indicating the proportion of variable cost and fixed cost has changed only marginally. The increase in cost of cultivation has occurred in all major items of cost such as human labour, animal labour, machine labour, seed, fertilizers, rental value of owned land and interest on fixed capital. Out of total increase of Rs.13,497.05/ha in cost of cultivation per hectare of urd bean over the years, 79.04 per cent was attributable to operational cost and 20.96 per cent to fixed cost items. The major items

Table 7: Cost structure and change in cost of cultivation of Urd bean.

Items	Cost Of Cultivation				Change in 2013-14 over 2001-02		Share in total change
	TE Average 2001-02 (Rs/ha)	%	TE average 2013-14 (Rs/ha)	%	Rs/ha	%	%
Operational cost							
Human Labour							
Family	2631.89	33.53	8860.17	41.51	6228.28	236.65	46.15
Attached	50.05	0.64	74.83	0.35	24.78	49.51	0.18
Casual	253.45	3.23	1790.553	8.39	1537.10	606.46	11.39
Animal Labour							
Hierd	99.77	1.27	161.82	0.76	62.05	62.19	0.46
Owned	1169.70	14.90	1114.11	5.22	-55.59	-4.75	-0.41
Machine Labour							
Hierd	477.98	6.09	1701.92	7.97	1223.94	256.06	9.07
Owned	0.46	0.01	504.99	2.37	504.53	109679.71	3.74
Seed	578.01	7.36	1002.72	4.70	424.71	73.48	3.15
Fertilizers	176.22	2.25	541.46	2.54	365.24	207.26	2.71
Manure	18.37	0.23	160.75	0.75	142.38	774.91	1.05
Insecticides	16.21	0.21	120.39	0.56	104.18	642.84	0.77
Irrigation Charges	29.01	0.37	0.42	0.00	-28.58	-98.54	-0.21
Miscellaneous	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	89.67	1.14	224.18	1.05	134.52	150.02	1.00
Total Operational cost	5590.80	71.23	16258.32	76.16	10667.53	190.81	79.04
Fixed Cost							
Rental value of owned land	1143.12	14.56	3116.24	14.60	1973.07	172.60	14.62
Rent paid for leased- in land	117.33	1.49	171.72	0.80	54.38	46.35	0.40
Land Revenue, Taxes, Cesses	7.02	0.09	7.33	0.03	0.31	4.46	0.00
Depreciation on implements and farm building	207.69	2.65	279.88	1.31	72.19	34.76	0.53
Interest on fixed capital	783.35	9.98	1512.92	7.09	729.57	93.14	5.41
Total Fixed cost	2258.51	28.77	5088.04	23.84	2829.53	125.28	20.96
Total Cost (A+B)	7849.31	100	21346.36	100	13497.05	171.95	100

of operational cost which caused for the increase in cost of cultivation were human family labour (46.15%), casual human labour (11.39%) and hired machine labour (9.07%). Out of total fixed cost items, rental value of owned land and interest on fixed capital has contributed 14.62 per cent and 5.41 per cent respectively, share of increase in fixed cost. It is clear from the table that the rate of change in operational cost has been higher (190.81%) over the rate of change in fixed cost (125.28%).

Measures of farm profits in Urd bean: The details of income measures of urd bean for the State of Rajasthan are given in Table 8. The gross income of urd bean has increased to Rs. 19,037.11/ha in 2013-14 from Rs. 7,092.02/ha in 2001-02 at triennium basis with per cent change of 168.43. During this period, farm business income of urd bean in Rajasthan has also increased from Rs.3,801.06/ha in 2001-02 to Rs. 11,180.01/ha in 2013-14, showing a change of 194.13 per cent. The family labour income of urd bean has recorded highest per cent change of 249.46 from Rs. 1,874.59/ha in 2001-02 to Rs. 6,550.87/ha in 2013-14. The net income which is the residual of gross return over total cost has declined from Rs.-757.29/ha in 2001-02 to -2309.25/ha in 2013-14 with the per cent change of 204.94. As far as the farm investment income is concerned the State of Rajasthan recorded an increase in the farm investment income of urd bean by 264.78 per cent from Rs. 635.96/ha in 2001-02 to Rs. 2,319.85/ha in 2013-14. It is clear from the table that the rate of increase in the net income of urd bean has shown negative trend in Rajasthan.

Cost and returns on the basis of cost concept in Urd bean: The cost and returns on the basis of cost concept in the production of urd have been presented in Table 9 at triennium basis. It is clear from table that, per hectare Cost-A_1, Cost-A_2, Cost-B_1, Cost-B_2, Cost C_1, and Cost-C_2 increased over the years. The highest change was observed in Cost-C_1 (174.08%) followed by Cost-C_2 (171.95%), and Cost A_1 (142.16%).

The income over different costs as presented in Table 9 also increased except the income over cost C_2 which

Table 8: Measures of farm profits in Urd bean in the State of Rajasthan.

Items	Urd bean		
	TE 2001-02	TE 2013-14	% Change
Value of main production/ha (Rs.)	6018.24	17170.70	185.31
Value of by-product /ha(Rs.)	1073.78	1866.41	73.82
Gross Income (GI) (1 + 2)	7092.02	19037.11	168.43
Farm Business Income (GI- Cost A_2)	3801.06	11180.01	194.13
Family Labour Income (GI-CostB_2)	1874.59	6550.87	249.46
Farm Investment Income (GI- (Cost A_2+IFL)	635.96	2319.85	264.78
Net Income (GI- Cost C_2)	-757.29	-2309.25	204.94

Table 9: Break–up of total cost, cost concept wise and income over different costs in Urd.

	Break up of total cost			Income over different cost		
Different Costs	TE 2001-02 (Rs/ha)	TE 2013-14 (Rs/ha)	% change	TE 2001-02 (Rs/ha)	TE 2013-14 (Rs/ha)	% Change
Cost A_1	3173.63	7685.38	142.16	3918.38	11351.73	189.70
Cost A_2	3290.96	7857.10	138.75	3801.06	11180.01	194.13
Cost B_1	3956.98	9198.29	132.46	3135.04	9838.82	213.83
Cost B_2	5217.43	12486.24	139.32	1874.59	6550.87	249.46
Cost C_1	6588.87	18058.46	174.08	503.15	978.65	94.50
Cost C_2	7849.31	21346.41	171.95	-757.29	-2309.30	204.94

Table 10: Comparative advantage of chickpea, moong bean and urd bean.

Items	Chickpea			Moong bean			Urd bean		
	2001-02 (Rs./ha)	2013-14 (Rs./ha)	% Change	2001-02 (Rs./ha)	2013-14 (Rs./ha)	% Change	2001-02 (Rs./ha)	2013-14 (Rs./ha)	% Change
Operational cost	6768	15574	57	4080	13194	69	5591	16258	66
Fixed cost	3173	8520	63	1875	4600	59	2259	2830	20
Total cost	9941	24094	59	5955	17794	67	7849	21346	63
Cost A_2	4525	10039	55	2559	8313	69	3290	7857	58
Gross returns	11339	33534	66	5396	18798	71	7092	19037	63
Farm business income	6814	23494	71	2837	10484	73	3801	11180	66
Net income	1399	9441	85	-559	1004	156	-757	-2309	67

declined over the years. The average income per hectare over Cost-A_1 increased from Rs. 3,918.38 in 2001-02 to Rs. 11,351.73 in 2013-14, showing an increase of 189.70 per cent. Income over Cost-C_1 increased with the per cent change of 94.50 from Rs.503.15/ha in 2001-02 to Rs. 978.65/ha in 2013-14. Income over Cost B_1 and Cost B_2 increased from Rs. 3,135.04/ha and Rs. 1,874.59/ha during 2001-02 to Rs. 9,838.82/ha and Rs. 6,550.87/ha in 2013-14, with per cent change of 213.83 and 249.46 per cent, respectively. Income over Cost C_1 was found to have lowest per cent change of 94.50 from Rs. 503.15/ha in 2001-02 to Rs. 978.65/ha during 2013-14.

Comparative advantage of selected pulse crops: During 2001-02 (Table 10), the net income over total cost was highest for chickpea as it is major pulse crop of Rajasthan. Both moong bean and urd bean remained unprofitable over total cost. During 2013-14, chickpea and moong bean became profitable over total cost. The level of profit was highest for chickpea followed by moong bean. And again, urd bean remained unprofitable over total cost. Therefore, chickpea has more comparative advantage as compared to other selected pulse crops of the State during 2013-14.

During the last 13 years, the operational cost of cultivation of chickpea has increased by 57 per cent, fixed cost by 63 per cent, total cost by 59 per cent, cost A_2 by 55 per cent, gross returns by 66 per cent, and farm business income by 71 per cent, indicating cost effectiveness in technologies being used in the State.

In cases of moong bean, the operational cost of cultivation of chickpea has increased by 69 per cent, fixed cost by 59 per cent, total cost by 67 per cent, cost A_2 by 69 per cent, and gross returns by 71 per cent, showing cost effectiveness of technologies used.

For urd bean, operational cost of cultivation has increased by 66 per cent, fixed cost by 20 per cent and total cost by 63 per cent, cost A_2 by 58 per cent, gross returns by 63 per cent, indicating lack of cost effectiveness and technologies used.

CONCLUSION

It can be concluded from the above interpretation that the cost of cultivation of chickpea was observed higher than moong bean and urd bean because of its higher expenditure on human labour, seed and fertilizers etc. However, farmers comparatively focused towards chickpea cultivation because the net profit over total cost was highest for chickpea as compared with the moong bean and urd bean. Therefore, chickpea emerged as the profitable crop of Rajasthan.

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