



AN ECONOMIC EVALUATION OF QUALITY SEED PRODUCTION OF AN IMPORTANT LEGUMINOUS FODDER CROP - COWPEA [*VIGNA UNGUICULATA* (L) WALP] IN BUNDELKHAND REGION, U.P., INDIA

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Abstract

Cowpea is one among the most important leguminous fodder crops grown during summer and rainy season mainly due to its quick growing habit, high yielding ability and high protein content. The cost analysis of cowpea was done at IGFRI, Jhansi with the commercial variety EC4216 in the year 2010 and 2012. The rate for pure seed was considered as Rs 70 per kilogram in year 2010 and Rs 75 per kilogram in year 2012. The average total cost of cultivation incurred on farm is found as Rs 39148.29 per hectare and finally after processing was Rs 40038.43 per hectare. The average total labour mandays used per hectare was 144.60. The labour mandays used were higher as there are number of operations that are dependent mostly on labour as weeding, rouging, pod picking and harvesting. The average total expenditure incurred on labour was Rs 19862.09 which was 50.74 percent of total cost of cultivation. The average green fodder production was 202.50 quintal per hectare. From the average of 571.00 kg of ungraded seed, the total quality seed received was 529.13 kg. The average total return was worked out as Rs 59218.26 per hectare and the total cost (including processing) is Rs 40038.43. The average net return is found as Rs 19179.83 and the benefit cost ratio as 1.49. Thus, it is clear from the study that if there is market for the sale of green fodder, the Cowpea seed production is highly profitable enterprise.

Key words : Economics, cowpea seed production, cost of cultivation, seed processing, benefit- cost ratio.

Introduction

Cowpea is a most versatile as it feeds people, their livestock and the next crop. As a nitrogen-fixing legume, cowpea improves soil fertility, and consequently helps to increase the yields of cereal crops when grown in rotation. It is also called as as the “hungry-season crop” given that it is the first crop to give pods before the cereal crops are ready. Dual-purpose cowpea production offers versatility by utilization of both foliage and seeds from the same crop (Bubenheim *et al.*, 1990). It is a crop that offers farmers great flexibility. They can choose to apply more inputs and pick more beans, or if cash and inputs are scarce - they can pick fewer beans and allow the plant to produce more foliage.

This means more fodder for livestock, so that lower bean yields are balanced by more livestock feed, which in turn translates into more meat and milk. Cowpea is the most important leguminous fodder crop during summer and rainy season mainly due to its quick growing habit, high yielding ability and high protein content. The feeding

value of cowpea forage is high and comparable to Lucerne (Mukherjee and Maiti, 2009). It is suitable for green feeding, hay making and can also be used in ensiling in mixtures with sorghum or maize. It can also be used as green manure crop and as green cover crop in plantation crops.

The cultivated forms have been grown throughout the tropics, subtropics and warm temperate areas. It appears to have originated in Africa and India. It is an annual or perennial, bushy herb grown for both fodder and grain (as pulse). It is best suited to moderately humid areas of tropis and subtropics and up to height of 1500 m from sea level. The optimum temperature for its growth is 27 degree centigrade and minimum is 15 degree centigrade. It can be also intercropped with large taller plant such as maize particularly in rainfall areas because of the exceptional shade tolerance. It is grown for fodder and its grain are used as pulse in human diet. For fodder purpose, its seed gets huge demand in the market. The timely availability of seed to the farmers gets the full potential of its fodder. Thus, assurance of quality seed

assures the high green fodder yield also. Thus, the study has been initiated to evaluate the economics of seed production of cowpea and providing an opportunity to farmers/seed companies for taking the advantage of higher demand in the market.

Materials and Methods

The cost of production analysis of cowpea was done at IGFRI, Jhansi with the commercial variety EC4216 in the year 2010 and 2012. 3 fields were selected for the study in both seasons. The fields were prepared first by one cross harrowing followed by cultivator for good tilth. After making strips, the seed was sown by seed drill.

For seed production, the seed rate was taken as 12.5 kg per hectare and 100 kg DAP was applied as basal. In season 1, irrigations were not required as rain was sufficient and irrigations were required in season 2 and provided by diesel tubewell as and when required. One Weeding and two rouging were done manually. No fodder cuttings were taken. 3-4 picking of pods were made before harvesting. At the time of harvesting the fodder was also green. The pods were threshed with the help of thresher.

The ungraded produce was then processed through processing machine and pure seed was produced. The variable cost and fixed cost were calculated for different machines used and multiplied with hours for which they used to find the expenditures incurred on them. The labour rate was taken as Rs 128 per manday of 8 hours in 2010 and Rs 150 per day in 2012. The rate of green fodder was taken as Rs 100 per quintal and for dry pods straw received from threshing was calculated as Rs 300 per quintal. The rate for pure seed was considered as Rs 70 per kilogram in year 2010 and Rs 75 per kilogram in year 2012. The total working capital shows the total variable cost incurred on various operations. The addition of all the fixed cost, overhead cost and rental value of land gives the total fixed cost. The rental value of land was considered as that prevailing in the locality. The management and risk was considered as ten percent of total variable and fixed cost. The cost of cultivation data were calculated for every stage of crop growth (Kumar, 2013).

Results and Discussion

Cost of production is calculated over individual farms then the data are converted into per hectare basis and presented in table 1 and shown in figs. 1 and 2. The Table 1 one shows that the operation wise expenditure for the seed crop. The average expenditure incurred

Table 1 : Operation wise cost expenses (Rs/hectare).

Operations	Season 1	Season 2	Average	Per cent
Field preparation	950.40	1158.36	1054.38	2.69
Draft power variable cost	889.06	1085.81	987.44	
Total Labour (Mandays)	0.48	0.48	0.48	
Total Labour cost	61.34	72.54	66.94	
Sowing	563.83	1170.85	867.34	2.22
Seed cost	311.94	875.00	593.47	
Draft power variable cost	234.74	275.76	255.25	
Total Labour (Mandays)	0.13	0.13	0.13	
Total Labour cost	17.16	20.09	18.62	
Manures and fertilisers	3726.40	4789.90	4258.15	10.88
Manure cost	2546.40	2499.90	2523.15	
Fertiliser cost	1040.00	1950.00	1495.00	
Total Labour (Mandays)	1.09	2.27	1.68	
Total Labour cost	140.00	340.00	240.00	
Irrigation	6732.73	0.00	3366.37	8.60
Tubewell variable cost	3932.73	0.00	1966.37	
Total Labour (Mandays)	21.88	0.00	10.94	
Total Labour cost	2800.00	0.00	1400.00	
Weeding	3500.00	4500.00	4000.00	10.22
Total Labour (Mandays)	27.34	30.00	28.67	
Total Labour cost	3500.00	4500.00	4000.00	
Rouging	2047.42	2265.63	2156.52	5.51
Total Labour (Mandays)	16.00	15.10	15.55	
Total Labour cost	2047.42	2265.63	2156.52	
Pod picking	9000	5760	7380	18.85
Total Labour Mandays	71.31	38.4	54.855	
Total Labour cost	9000	5760	7380	
Harvesting and pooling	3200.00	5000.00	4100.00	10.47
Total Labour (Mandays)	25.00	33.33	29.17	
Total Labour cost	3200.00	5000.00	4100.00	
Threshing	828.41	834.21	831.31	2.12
Draft power hours	1.89	1.92	1.91	
Draft power variable cost	328.41	334.21	331.31	
Total Labour (Mandays)	3.91	3.33	3.62	
Total Labour cost	500.00	500.00	500.00	
Total working capital	30549.19	25478.94	28014.07	71.56
Interest on WC	916.48	764.37	840.42	
Total variable cost	31465.66	26243.31	28854.49	73.71
Fixed cost and overhead charges	187.50	187.50	187.50	
Rental value of land	5000.00	5000.00	5000.00	12.77
Total fixed cost	5187.50	5187.50	5187.50	13.25
TVC+TFC	36653.16	31430.81	34041.99	86.96
Management & Risk	5497.97	4714.62	5106.30	13.04
Total Cost	42151.14	36145.43	39148.29	100.00

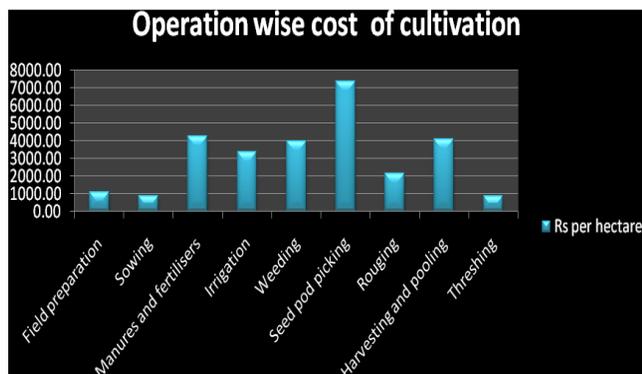


Fig. 1: Operation wise cost of cultivation (per hectare basis).

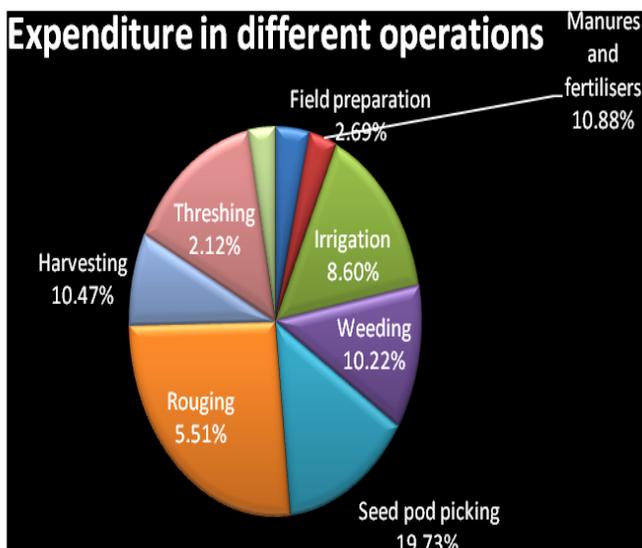


Fig. 2 : Percent expenditure under different operations of total cost in crop field (in percent per ha).

on field preparation is Rs 1054.38 per hectare that comes to 2.69 percent of total cost. The average expenditure per hectare made on manures and fertilizers is Rs 4258.15 that comes to 10.88 percent of total cost. The average expenditure made on weeding is Rs 4000 per hectare. Three pickings were made for pods. The total expenditure made on picking is Rs 7380 per hectare. Two rougings are performed and the average total mandays used for rouging are 15.55 per hectare and the cost incurred on that is Rs 2156.52. The total expenditure incurred on harvesting is Rs 4100, which is done manually by sickle. The total mandays used in harvesting is 29.17 per hectare. The average total expenditure incurred on threshing is Rs 831.31 per hectare and the involvement of total labour mandays are 3.62. Fig. 3 shows the average total working capital is found as Rs 28014.07 per hectare. The average interest on working capital is Rs 840.42. The total variable cost is found as Rs 28854.49. The rental value is taken as Rs 5000 per hectare as this is found prevalent in the locality. The total fixed cost is found as Rs 5187.50 per

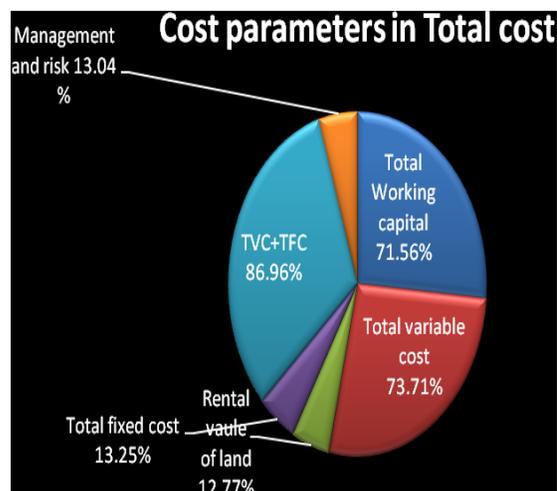


Fig. 3 : Cost parameters in total cost under crop field (in percent).

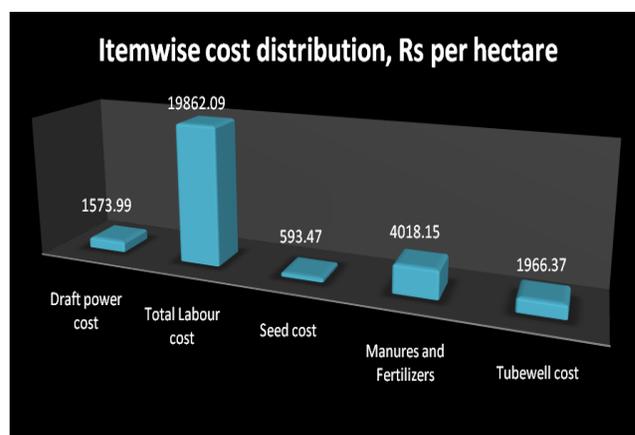


Fig. 4 : Item wise cost distribution in crop field (Rs per hectare).

hectare. The share of variable cost and fixed cost in total cost is 73.71 percent and 13.25 percent respectively. The average total cost is found as Rs 39148.29 per hectare. Table 2 presents the item wise cost of cultivation on per hectare basis. The average draft power used per hectare is 6.94 hours. The variable cost incurred on draft power is Rs 1573.99 per hectare. The average total labour mandays used per hectare are 144.60. The labour mandays used are higher as there are number of operations that are dependent mostly on labour only like weeding, rouging, pod picking and harvesting. The average total expenditure incurred on labour is Rs 19862.09, which is 50.74 percent of total cost of cultivation (fig. 4). The expenditure incurred on seed purchase is Rs 593.47 per hectare which is 1.52 percent of total cost. The total expenditure incurred on manures and fertilizers is Rs 4018.15 per hectare which is found as second highest in total cost that is 10.26 percent. Thus, the highest expenditure in percentage term is incurred on labour followed by manures and fertilizers. This also confirms

Table 2 : Item wise cost distribution (Rs/hectare).

	Season 1	Season 2	Average	Per cent
Draft power				
Draft power hours	6.83	7.04	6.94	
Draft power cost	1452.20	1695.78	1573.99	4.02
Labour power				
Total mandays	166.14	123.06	144.60	
Total Labour cost	21265.91	18458.26	19862.09	50.74
Seed cost	311.94	875.00	593.47	1.52
Manures and Fertilizers	3586.40	4449.90	4018.15	10.26
Irrigation				
Tubewell hours	84.43	0.00	42.21	
Tubewell cost	3932.73	0.00	1966.37	5.02
Plant protection chemicals	0.00	0.00	0.00	0.00
Total Working capital	30549.19	25478.94	28014.07	71.56
Interest on WC	916.48	764.37	840.42	2.15
Total variable cost	31465.66	26243.31	28854.49	73.71
Fixed and other overhead cost	187.50	187.50	187.50	0.48
Rental value of land	5000.00	5000.00	5000.00	12.77
Total fixed cost	5187.50	5187.50	5187.50	13.25
TVC+ TFC	36653.16	31430.81	34041.99	86.96
Management & risk	5497.97	4714.62	5106.30	13.04
Total Cost	42151.14	36145.43	39148.29	100.00

Table 3 : Cost and return and B:C ratio at farm level (Rs/ hectare).

Particulars	Season 1	Season 2	Average
Gross return at farm/ha	55937.59	60718.64	58328.12
Total cost	42151.14	36145.43	39148.29
Net return	13786.46	24573.21	19179.83
B:C ratio on total cost basis	1.33	1.68	1.50
B: ratio on variable cost basis	1.78	2.31	2.05

the findings that labour often accounts for over 70 percent of the total cost of production. This also confirms the findings of Langyintuo *et al.* (2003).

At farm, total and net returns from production of seed production (Value of seed, Green fodder and other

Table 4 : Returns from the processing (per ha).

Items	Season 1	Season 2	Average
Ungraded (Kg)	566.00	576.00	571.00
Rate (Rs/kg)	63.70	68.28	65.99
Value (Rs)	36054.68	39332.72	37693.70
Post harvest cost (Rs)	814.90	965.39	890.14
Total cost (Rs)	36869.58	40298.11	38583.85
TFL seed (kg)	523.72	534.53	529.13
Rate (Rs/kg)	70.00	75.00	72.50
Value (Rs)	36660.73	40089.60	38375.16
Waste seed (kg)	33.39	33.41	33.40
Rate, (Rs/kg)	6.00	6.00	6.00
Value (Rs)	200.35	200.45	200.40
Straw (kg)	8.51	8.06	8.29
Rate, (Rs/kg)	1.00	1.00	1.00
Value (Rs)	8.51	8.06	8.29
Total returns (Rs)	36869.58	40298.11	38583.85

Table 5 : Total cost and return from processed (Rs/hectare).

Particulars	Season 1	Season 2	Average
Cost of cultivation	42151.14	36145.43	39148.29
Processing	814.90	965.39	890.14
Total cost	42966.04	37110.82	40038.43
TFL seed (kg)	523.72	534.53	529.13
Rate/kg	70.00	75.00	72.50
Value	36660.73	40089.60	38375.16
Waste seed (kg)	33.39	33.41	33.40
Rate/kg	6.00	6.00	6.00
Value	200.35	200.45	200.40
Straw (kg)	391.42	393.98	392.70
Rate/kg	1.00	1.00	1.00
Value	391.42	393.98	392.70
Green fodder (kg)	19500.00	21000.00	20250.00
Rate/kg	1.00	1.00	1.00
Value	19500.00	21000.00	20250.00
Total return from production	56752.50	61684.03	59218.26

by products) comes to Rs 58328.12 per hectare and Rs 19179.83 per hectare, respectively (table 3). The average benefit cost ratio at farm is found as 1.50. The benefit cost ratio calculated on variable cost basis is found as 2.05. It is this value that is visible to farmers as other fixed costs are hidden. Table 4 shows the total returns from the processing of ungraded seed. From the average of 571.00 kg of ungraded seed, the total quality seed come out is 529.13 kg and the total of waste seed as 33.40 kg and 8.29 kg as straw. The average cost of processing is found as Rs 890.14. Table 5 shows the total cost and

Table 6 : Gross returns analysis and benefit cost ratio analysis for seed production.

Particulars	Season 1	Season 2	Average
Total return after processing (Rs)	56752.5	61684.03	59218.26
Total cost of seed production (Rs)	42966.04	37110.82	40038.43
Net return (Rs)	13786.46	24573.21	19179.83
B:C ratio on total cost basis	1.32	1.66	1.49
B:C ratio on variable cost basis	1.80	2.33	2.08
When by-product is sold (Rs/kg)	44.06	29.42	36.74
Only main product is considered (Rs/kg)	82.04	69.47	75.76

returns from both fields and processing. The total cost comes to Rs 40038.43 per hectare. The average green fodder production is 202.50 quintal per hectare. table 6 shows the gross return, total cost on seed production and benefit cost ratio for final pure seed production (including cost of cultivation). The average total cost is found as Rs 40038.43 and total return is found as Rs 59218.26 per hectare and the. The average net return is found as Rs 19179.83 and the benefit cost ratio as 1.49. The benefit cost ratio calculated on variable cost basis is 2.08. Thus, it is clear from the study that if there is market for the sale of green fodder, the Cowpea seed production is highly profitable. This also confirms the findings of Singh *et al.* (2003). The price of Cowpea seed varies in the market form Rs 70 per kilogram to Rs 110 per kilogram, the farmers can take the advantage of high price during the sowing season, so they are advised to sell the seed during the sowing season.

Summary and Conclusion

It has been found that in production of cowpea seed production for two seasons, the average quality seed production was 529.13 kg from one hectare of land. The highest expenditure in percentage term is incurred on labour followed by manures and fertilizers. The average total return is found as Rs 59218.26 per hectare and the total cost is Rs 40038.43 (which includes processing also). The average net return is found as Rs 19179.83 and the benefit cost ratio as 1.49. The benefit cost ratio calculated on variable cost basis is 2.08. Thus, it is clear from the study that the sale of green fodder and the cowpea seed production is highly profitable for farmers.

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