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Economic Study and Quality Analysis Of Cowpea Production Under Resource Constrants

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ABSTRACT

A field experiment was conducted during kharif season of 2015 Experimental Farm of Agronomy section, College of Agriculture, Latur to study the effect of production factors or constraints and their combinations on growth and yield of cowpea var. Konkan Sadabahar and studied the economics of crop production under resource constraints. As economics is an important consideration in the agriculture, study of economics is given more importance. The results indicated that (T_1) adoption of full package of practices (fertilizer + weeding + plant protection) was recorded significantly higher growth and yield attributes and produced seed yield (738 kg ha^{-1}) and give higher gross and net monetary returns 55350 ₹ ha^{-1} and 30855 ₹ ha^{-1} respectively and also gives higher B:C ratio viz 2.26. As treatment (T_7) (T1- weeding + plant protection) was given low growth and yield attributes as compared to full package of practices and produced seed yield 136 kg ha^{-1} and cause reduction in yield up to 82% and gave lowest gross and net monetary returns 10200 ₹ ha^{-1} and (-8145) ₹ ha^{-1} and gives negative B:C ratio viz 0.55 and and found to be as a major resource constraints in cowpea production. The application of full package of practices (T_1) was produced significantly higher protein yield (170 kg ha^{-1}) over rest all of the treatments The mean protein yield of cowpea was 89.83 kg ha^{-1}. protein yield Mean of cowpea was influenced significantly due to different treatments.

Key words: *cowpea, resource constraints, weeding, fertilizer, plant protection*

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INTRODUCTION

Cowpea (*Vigna unguiculata* L. walp) is a native to Central Africa and belongs to the family Fabaceae, and is eaten in the form of grain, green pods and leaves. In India pulses occupied an area of 23.4 million hectares with total production of 14.6 million tones and productivity of about 625 kg ha^{-1}[1]. India is one of the largest pulses producing countries in the world. Globally, pulses are second important after cereals. Maharashtra ranks first in acreage and production of pulses followed by Madhya Pradesh, Utter Pradesh, Rajasthan and Andhra Pradesh. Among pulses cowpea is of immense importance multipurpose grain legume in the tropics and subtropics. India is producing 2.21 million tones of cowpea from an area 3.9 million hectares having productivity of 683 kg ha^{-1} [2]. In Maharashtra cowpea occupied an area of 11,800 ha with an average productivity of 400 kg ha^{-1} [1]. Cowpea is known as 'vegetable meat' due to high amount of protein in the grain with better biological value on dry weight basis. The grain contents 26.61 per cent protein, 3.99 per cent lipid, 56.24 per cent carbohydrates, 8.60 per cent moisture, 3.84 per cent ash, 1.38 per cent crude fibre, 1.51 per cent gross energy and 54.85 per cent nitrogen free extract. Cowpea is one of the most important food legume crops in the semiarid tropics covering Asia, Africa, Southern Europe and central and South America. Study on resource constraints helps farmer in dry land and rain fed farming as in limited funding which operation is most essential in regards with optimum yield and higher maximum gross and net monetary returns so that farmer give priority to that particular operation. Though the input management had been given due importance, the percent contribution or the losses due to their non availability to the cowpea crop are yet to be quantified. Keeping in view, the present investigation is carried out.

MATERIAL AND METHODS

A field experiment was conducted during *kharif* season of 2015 Experimental Farm of Agronomy section, College of Agriculture, Latur. The soil of the experimental site was medium, black in colour with good drainage and alkaline in reaction having pH of 7.8. Soil was low in available nitrogen (215.86 kg ha^{-1}), medium in available phosphorus (20.42 kg ha^{-1}), very high in available potassium (485.89 kg ha^{-1}).

The experiment was laid out in Randomized Block Design. The seven treatments were replicated thrice. The treatments were T_1: Full package of practices, T_2: T_1 - Fertilizer, T_3: T_1- Weeding, T_4: T_1 - Plant Protection, T_5: T_1 - (Fertilizer + Weeding), T_6: T_1 - (Fertilizer + Plant protection), T_7: T_1 - (Weeding + Plant Protection). The seeds of variety Konkan Sadabahar were sown at the depth of 5 cm. Sowing was done by dibbling by using seed rate 15 kg ha^{-1}. The gross and net plot size was 5.4 x 4.2 m and 4.8 x 3.6 m respectively. The total rainfall received during growth period of cowpea was 297.5 mm with 22 rainy days. The recommended dose of fertilizer was 25:50:00 kg NPK ha^{-1} applied as per treatments through Urea and single super phosphate. The drenching of Chloropyriphos @ 2 ml lit^{-1} to control the root rot, spraying of Dimethoate (Roager) 1 ml lit^{-1} + Carbendazim (Bavistin) 1 g lit^{-1} , Qunolphos 1.5 ml lit^{-1} + Acephate 2 g lit^{-1} and Emamectin benzoate 5 % SG (Proclaim) @ 0.2 g lit^{-1} of water for the control of semilooper , sucking pests (Aphids) and pod borer respectively as per the treatments was done. Weed control was done by hand weeding. Statistical analysis of the data was carried out using standard analysis of variance. The cost of cultivation (`₹ $ha^{-1}$) of each treatment was worked out by considering the price of inputs, charges for cultivation, labour, land and other charges. The net monetary returns (`₹ ha^{-1}) of each treatment were worked out by deducting the mean cost of cultivation (`₹ ha^{-1}) of each treatment from the gross monetary returns (``₹ ha^{-1}) gained from the respective treatments. The benefit: cost ratio of each treatment was calculated by dividing the gross monetary returns with the mean cost of cultivation.

RESULT AND DISCUSSION

Data presented in table 1 shows that The mean gross and monetary return of cowpea was recorded as 30021₹ ha^{-1} and 21411 ₹ ha^{-1}

Table 1 . Mean seed yield and economics of cowpea as influenced by different treatments

Treatments	Seed yield (kg ha^{-1})	Economics (₹ ha^{-1})			B:C ratio
		GMR	CC	NMR	
T_1: Full package of practices	738	55350	24495	30855	2.26
T_2: T_1-Fertilizer	503	37725	23450	14275	1.61
T_3: T_1-Weeding	463	34725	20745	13980	1.67
T_4: T_1-Plant protection	374	28050	22095	5955	1.27
T_5: T_1-(Fertilizer + Weeding)	311	23325	19700	3925	1.18
T_6:T_1-(Fertilizer + Plant protection)	277	20775	21050	-275	0.99
T_7: T_1-(Weeding + Plant protection)	136	10200	18345	-8145	0.55
SEm±	22	1611	-	1611	-
C.D. at 5%	66	4964	-	4964	-
General Mean	**400**	**30021**	**21411**	**8610**	**1.40**

*GMR- Gross monetary return *CC- cost of cultivation *NMR- Net monetary return

The gross and net monetary return was significantly influenced due to different treatments. The significantly highest gross and net monetary return 55350 ₹ ha^{-1} and 30855 ₹ ha^{-1} was obtained with the application of full package of practices (T_1). This treatment was found significantly superior over rest of all treatments while treatment T_7 (T_1-Weeding + Plant protection) gave the significantly lowest gross and net monetary return 10200 ₹ ha^{-1} and (-8145) ₹ ha^{-1}.

The mean benefit: cost ratio was observed as 1.40. The higher B:C ratio (2.26) was observed with the full package of practices (T_1) whereas treatment T_7 (T_1-Weeding + Plant protection) and T_6 (T_1-Fertilizer + Plant protection) was recorded negative B:C ratio (0.55 and 0.99 respectively).

Increase in dry matter resulted in maximum seed yield, gave maximum gross monetary returns. Increase in net returns might be due to the comparatively higher cost of cultivation in proportionate to their respective seed and biological yield was with the treatments of T_2, T_3, T_4, T_5, T_6 andT_7. Treatment T_6 (T_1-Fertilizer + Plant protection) and T_7 (T_1-Weeding + Plant protection) was gave negative net returns which was due to less net returns as compared with cost of cultivation. This happens because of more reduction in yields due to various constraints.

Effect of different constraints on protein content was found to be non-significant. Application of full package of practices (T_1) was recorded maximum protein content (23.12 %) while treatment of T_7 (T_1-weeding + plant protection) recorded minimum protein content (21.54 %). This might be due to higher nitrogen in seed is directly responsible for higher protein because it is primary component of amino acids

which constitute the basis of protein. Unweeded plants can be ascribing to several competitions by weeds which might have resulted in less uptake nutrients and water, which was adversely affected the assimilation of amino acids and ultimately protein synthesis. Similar results were recorded by Verma *et al.* [4] and Magani and Kuchinda [3] were reported an increase of about 5% seed protein content as a result of P application.

Table 2. Protein content and protein yield as influenced by different resource constraints

Treatments	Seed yield kg ha^{-1}	Protein content (%)	Protein yield kg ha^{-1}
T_1: Full package of practices	738	23.12	170
T_2: T_1-Fertilizer	503	22.47	113
T_3: T_1-Weeding	463	22.38	103
T_4: T_1-Plant protection	374	22.32	83
T_5: T_1-(Fertilizer + Weeding)	311	22.11	69
T_6:T_1-(Fertilizer + Plant protection)	277	21.84	61
T_7: T_1-(Weeding + Plant protection)	136	21.54	29
SEm±	22	0.36	4.32
C.D. at 5%	66	NS	13.32
General Mean	**400**	**22.25**	**89.83**

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