

## Assessing the Productivity and Profitability of Cowpea (*Vigna unguiculata* L. Walp.) under Different Land Preparation and Weed Control Practices in Lamjung, Nepal

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Received: January 21, 2019; Published: April 12, 2019

### Abstract

Cowpea (*Vigna unguiculata* L. Walp.) is the important vegetable and fodder crop in Nepal, but the current yields are low and total production varies, mostly due to weed and unmanaged land management practices. To solve this issue, a field research was conducted at Institute of Agriculture and Animal Science, Lamjung Campus, Sundarbazar, Lamjung Nepal during May to July 2016. Treatments were laid-out in two factor factorial randomized complete block design with three replications. Land preparation methods contained: Flat bed (FB) and Ridge bed (RB) while, weeding options contained: No weeding (NW), Hand weeding at 25 DAS (HW25), Hand weeding at 25 and 45 DAS (HW 25 and 45) and hand weeding at 45 DAS (HW45). The result revealed that interaction effects of land preparation and weeding practices found to be significant on harvest index (HI), where maximum HI (36.70%) was found in FB with HW25 and 45 DAS, followed by FB with HW25 (32.58%). The effect of land preparation was found significant on cowpea seed yield, HI, gross and net returns and B/C ratio, where in the highest seed yield (2394 kg/ha), HI (28.53%) and B/C ratio (9.18) was found under raised bed. Similarly, the highest seed yield (3823 kg/ha), HI (34.53%) gross return (57047NRs/ha), B/C ratio (3.68) was found under HW25 and 45. Thus, it was recommended that raised bed and two hand weeding options can be followed to increase the productivity and profitability of cowpea during monsoon season in hill topography.

**Keywords:** Cowpea; Land Preparation Method; Weeding Practices; Yield

### Introduction

Cowpea (*Vigna unguiculata* L. Walp) is an important vegetable crop which is consumed for seeds, green pods, and as cover crops because it increases the water holding capacity of soil and makes the soil more fertile. Likewise, it is a fodder which has good palatability and good source of nutrients. In Nepal, the productivity of cowpea is 700 kg/ha which is very low. It is due to weed, intercropped with maize, rice, sugarcane, millet etc and cultivated in marginalized land [1]. Yield loss in cowpea due to weeds was 12.7 – 60.0% [2] in the world. Land preparation is provided to prepare the necessary soil conditions and for the successful establishment of newly emerged plants. Different land preparation determines rate of nutrient and water- use efficiency. Moreover, the agronomic packages like seed distribution, seed rate, growth, yield, intercultural practices, cost of cultivation, crop losses, weed

competition etc also vary with land management options which governs the profitability of the crops and cropping systems. This research was therefore, conducted to increase the productivity and profitability of cowpea through measuring efficiencies in different weeding and land preparation options.

### Materials and Method

The experiment site was accomplished at the premises of IAAS Lamjung campus during rainy season in 2016. Prakash variety of cowpea was selected and it was planted following 2 factorial RCBD, where two land preparation options (Flat bed and Ridge bed) and five weeding options [No weeding (HW), hoeing after 25 DAS (H25), hand weeding at 25 DAS (HW25), hand weeding at 25 and 45 DAS (HW25 and 45) and hand weeding at 45 DAS (HW45) containing 10 treatments with 3 replications. Total area of beds was 50.22 m<sup>2</sup>, in which, 60 kg FYM, 3kg DAP and 1.5 kg MOP were applied

basally. Thinning out and gap filling was done at the time of first weeding. Seed and biological yields (kg/ha), harvest index (%), and economic analysis (total cost of cultivation, gross and net returns and B/C ratio) were analyzed by SPSS 16 and Gen STAT 2010.

## Results

Flat bed and Ridge bed showed highly significant result on seed yield resulting more values on ridge bed compared to flat bed in seed yield (2394 kg/ha), harvest index (28.90%), gross return (36912 NRs/ha), net return (3297 NRs/ha) and B/C(9.18) ratio. Different weeding options also expressed highly significant seed

yield (3823 kg/ha), harvest index (34.55%), gross return (57472 NRs/ha), net return (5263 NRs/ha), B/C ratio (13.63) on hand weeding at 25 and 45 DAS followed by hand weeding at 25 DAS, hoeing at 25 DAS, hand weeding at 45 DAS and the least with no weeding options.

The results of interaction between land preparation and weeding options was highly significant on harvest index (%) and has high value at on ridge bed with hand weeding at 25 and 45 DAS (35.23%) and the lowest value on flat bed with no weeding options (7.23%).

Treatments	Seed yield (kg/ha)	Harvest index (%)	Gross return (NRs/ha)	Net return (NRs/ha)	B/C ratio
<b>Land preparation options</b>					
Flat bed	1886 <sup>a</sup>	22.20 <sup>a</sup>	29624 <sup>a</sup>	25768 <sup>a</sup>	7.47 <sup>a</sup>
Ridge bed	2394 <sup>b</sup>	28.90 <sup>b</sup>	36912 <sup>b</sup>	32976 <sup>b</sup>	9.18 <sup>b</sup>
Grand mean	2140	25.36	33268	29372	8.3
<b>Weeding options</b>					
No weeding	329 <sup>a</sup>	14.44 <sup>a</sup>	61130 <sup>a</sup>	2568 <sup>a</sup>	1.71 <sup>a</sup>
Hoeing at 25 DAS	2301 <sup>c</sup>	23.27 <sup>c</sup>	37464 <sup>c</sup>	33440 <sup>c</sup>	9.33 <sup>c</sup>
Hand weeding at 25 DAS	3195 <sup>d</sup>	31.82 <sup>d</sup>	48478 <sup>d</sup>	44614 <sup>d</sup>	12.53 <sup>d</sup>
Hand weeding at 25 and 45 DAS	3823 <sup>e</sup>	34.55 <sup>e</sup>	57047 <sup>e</sup>	52863 <sup>e</sup>	13.63 <sup>d</sup>
Hand weeding only at 45 DAS	1051 <sup>b</sup>	22.73 <sup>b</sup>	17239 <sup>b</sup>	13375 <sup>b</sup>	4.44 <sup>b</sup>
LSD (0.05)	324.5	4.21	4565	4564	1.13
CV (%)	12.5	13.8	11.3	12.8	11.1

**Table 1:** Effect of different land preparation and weeding practices on yield and economics of cowpea during rainy season in 2016 at Lamjung.

Note: Treatment means followed by common letter/letters within column are not significantly different among each other based on DMRT at 0.05

**Figure 1:** Interaction between land preparation and weeding options on harvest index of cowpea.

Note: h1, h2, m1, m2, m3, m4, m5 represents ridge bed, flat bed, no weeding, hoeing at 25 DAS, hand weeding at 25 DAS, hand weeding at 25 & 45 DAS and hand weeding at 45 DAS.

## Discussion

Ridge bed reduces water logging injury as compared to flatbed [3]. Flatbed has ineffective use of applied Nitrogen, poor aeration, leaching and volatilization losses, lower down the water use-efficiencies and increase the crust formation in soil [4]. Fresh and dry weight of plant, weight of pods/plant, number of pods, number of seeds per pod was high in ridge bed compared to flat bed. Number of weed species that compete with the crops from germination to harvest sharply, affect the crop yield [5]. Critical period of weed removal for economic efficiencies and optimum yield is between 20-45 DAS in cowpea [6]. Hoeing was done by digging the cowpea rows in shallow depth and field was kept moist which help to re-establish the perennial weeds and recorded the more weeds. Weeding at 25 DAS had good vegetative growth and facilitates the reproductive growth by increasing grain weight, the largest mean undamaged pods and number of grain per pod.

Seed and biological yields are the field observation whereas the harvest index is the mathematical ratio of seed yield and biological yield. The LSD between seed yield and biological yield was wide.

## Conclusions

Crop productivity and economic efficiencies was high in hand weeding at 25 and 45 DAS and in ridge bed from experiment result. Thus, raised bed and two hands weeding at 25 and 45 DAS can be followed to increase the productivity and profitability of cowpea during monsoon season in hill topography.

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**Volume 3 Issue 5 May 2019**

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