



EFFECT OF IRRIGATION SCHEDULES AND PLANTING METHODS ON YIELD, ATTRIBUTES AND ECONOMICS OF GREEN GRAM (*PHASEOLUS RADIATE* L.) UNDER RICE – WHEAT – GREEN GRAM CROPPING SYSTEM

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Abstract

A field experiment was conducted during *Zaid* season of 2010-11 at N.D. University Kumarganj, Faizabad (U.P.), India to study irrigation of four irrigation schedules based on irrigation water (IW) : cumulative pan evaporation (CPE) rate and three planting methods of green gram. The yield and yield attributes *viz.*, number of pods plant⁻¹, number of seed pod⁻¹, harvest index and benefit : cost ratio increased with increase into among the planting methods maximum 1000-seed weight (34.15), grain yield (13.74 qha⁻¹), harvest index (26.03%), net return (Rs. 43592) and benefit : cost ratio 3.37 were recorded with raised bed of plant in method, while minimum with method. The maximum grain yield (14.46 qha⁻¹), harvest index (24.94%) and net return Rs. 44898 were noted the IW : CPE 1.0 at 6cm depth among the different irrigation schedules.

Key words : Green gram, planting method, irrigation schedule, yield, economics water productivity of furrow irrigated raring pulses or pluses planted on raised bed – Ohindual (2006).

Introduction

Green gram (*Phaseolus radiate* L.) is one of the important pulses crop, which is contributing 11 percent to the total production of pulses in the country. After the harvest of *Rabi* crops, a vast in northern India is brought under cultivation only with the onset of monsoon. The yield of green gram during summer season is much higher than the *Kharif* with pulses the availability of short durations varieties of green gram due to less infestation of disease, insect and pest. Among other agronomic practices, proper method of planting may considerably increased the production of green gram. Ideal planting geometry is precious and important for better and efficient utilization of available plant growth resources in order to get maximum productivity. Therefore, it is necessary to evaluate irrigation need as well as suitable planting method to obtain more plant growth yield and WUE. Hence, a study was taken up to evaluate the optimum level of irrigation and planting method for summer green gram under rice –wheat –green gram cropping system.

Results and Discussion

Effect of planting pattern

Yield and yield attributes

All the yield attributes except 1000-seed weight varied significantly due to planting methods (table 1) significantly higher number of pods plant⁻¹ and number of seeds pod⁻¹ were observed with raised bed planting method compared to other method of planting. Raised bed planting methods brought about a significant improvement in grain yield of green gram over ridge and plant bed planting methods. However, the maximum grain yield (13.74 qha⁻¹) and harvesting index (26.03%) were recorded with raised bed method of planting. The higher yield obtained under these planting methods might be owing to cumulative effect of increase in dry matter production and yield attributing characters *viz.*, number of pods/plant, pod length and number of grain/pod due to improved soil-moisture availability. These result is in conformity to the findings of Tripathi & Singh (2007) and Pramanic *et al.* (2009).

Table 1 : Effect of irrigation schedules and planting method on yield attributes.

Treatment planting method	No. of pod plant ⁻¹	No. of seeds pods ⁻¹	1000-seed weight (g)	Grain yield (q/ha)	Biological yield	Straw yield (q/ha)	Yield (2Iha)	WUE (Kg/ha)	Total water received (cm)
Flat	16.65	7.71	33.54	11.35	43.71	32.38	11.35	38.87	
Ridged	17.87	8.88	33.91	12.80	50.03	36.23	12.80	46.61	
Raised	18.49	9.27	34.15	13.74	52.78	39.04	13.74	46.81	
CD=5%	0.57	0.26	NS	0.76	3.14	2.14	0.76		
Irrigation schedule									
IW/CPEO.6	13.96	5.96	32.43	9.26	32.07	23.21	2.26	49.12	
0.8	16.35	7.66	33.46	12.28	46.00	33.72	12.28	49.41	
1.0	21.10	11.38	35.06	14.46	57.97	43.51	14.46	39.24	
10 days intervals	19.27	9.50	34.51	14.37	57.56	43.20	14.37	38.99	
CD = 5%	0.72	0.33	NS	0.94	3.97	2.72	0.94		

Table 2 : Economics of different combination in green gram.

Treatment	Gross income (Rs./ha)	Total cost of cultivation (Rs./ha)	Net return (Rs/ha)	B:C ratio
I1M1	29214	10760	18454	1.72
I1M2	35082	11160	23922	2.14
I1M3	36789	11560	25229	2.18
I2M1	37889	11260	26629	2.36
I2M2	47320	11660	35660	3.06
I2M3	48431	12060	36371	3.02
I3M1	48608	12260	36348	2.96
I3M2	51283	12660	38623	3.05
I3M3	57958	13060	44898	3.44
I4M1	49384	12260	37124	3.03
I4M2	50934	12660	38274	3.02
I4M3	57012	13060	43952	3.37

Economics

Raised bed planting in green gram increased variable cost of cultivation by Rs. 13060 over other methods of planting due to additional preparation of raised bed by special implement (table 2). Though, the maximum gross return Rs. 57012, net return Rs. 43952 and benefit : cost ratio 3.37 were higher in the raised bed compared to yield, economics and WUE of chickpea (*Cicer arietinum*) under various on raised bed planting system. This is due to higher yield ha⁻¹ in raised bed method (Pranamik *et al.*, 2009).

Yield and yield attributes

Irrigation had a marked effect on seed yield (table 1) as irrigation frequency was increased from IW : CPE ratio 6 to 1.0 which increased yield significantly and the

highest seed (13.74 qha⁻¹) and straw (39.04 qha⁻¹) yield were recorded at IW : CPE ratio 1.0. These findings are in agreement with those of Bhunia *et al.* (2006) and Bharti *et al.* (2007). Higher yield with higher levels of irrigation might be due to its key role in root development by mechanical resistant of soil, higher transpiration, greater nutrient uptake and more photosynthesis due to better metabolic activities in the plant. Increase in irrigation level also increased the harvest index. Irrigation at IW:CPE ratio 1.0 gave higher harvest index 26.03%.

Economics

The net profit per hectare and net return per rupee of investment (table 2) increased with increase in the levels of irrigation. The maximum net return and net return/Rs. investment were recorded at IW:CPE ratio

1.0 and the net returns were minimum at IW:CPE 0.6. The finding is in accordance with earlier who reported that the higher response of winter maize potato intercropping to irrigation and graded levels of NPK. PhD thesis, RAU, PUSA (Samastipur), Bihar: A.K. Singh (2003).

Net profit and net profit per rupee investment at higher level of irrigation was due to higher yield. Though, the cost of irrigation was higher when the number of irrigation was increased, the net profit was relatively higher because the magnitude of increase in yield was more. This findings is in close conformity with those of Singh (2003) and Bharti *et al.* (2007).

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