Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.3098

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **5 (3):** 392-397 (2017)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Effect of Sowing Dates and Weed Management Practices on the Productivity of *Summer* Green Gram

Harphool Meena*, P.K.P. Meena and B. L. Kumhar

AICRP on Irrigation Water Management, Agricultural Research Station,

Ummedganj Agriculture University, Kota-324001, Rajasthan

*Corresponding Author E-mail: hpagron@rediffmail.com

Received: 7.06.2017 | Revised: 15.06.2017 | Accepted: 18.06.2017

ABSTRACT

An experiment was conducted during two consecutive years of zaid 2008 and 2009 at Agricultural Research Station, Borwat Farm, Banswara to find out optimum sowing date and suitable herbicide for weed management in summer green gram under Humid Southern Plain Zone of Rajasthan. The results revealed that the maximum seed yield (1268 kg/ha), net return (Rs. 32178/- ha^{-1}) and B: C ratio (1.74) was observed under sowing of green gram on 15th March over sowing of green gram on 5thand 15th April, respectively. However, it was found at par with sowing of green gram on 25th March. In weed management application of Fluchloralin @ 0.75 kg a.i. /ha PPI gave significantly higher seed yield (1017 kg/ha) net return (Rs. 22164/- ha^{-1}) and B: C ratio (1.20) over weedy check (control), but it was found at par with application of Pendimethalin @ 0.75 kg a.i. /ha PE and weed free in the pooled analysis. Sowing of green gram under different dates, the weed population m^{-2}, weed dry matter accumulation (g m^{-2}) and weed control efficiency at 30 DAS were found not significant with each other during both the years as well as in the pooled analysis. Application of Fluchloralin @ 0.75 kg a.i. /ha PPI gave significantly higher weed control efficiency (52.82 per cent), lowest weed population (12.39 m^{-2}) and weed dry matter accumulation (14.53 g m^{-2}) at 30 DAS over weedy check (control), but it was found at par with the application of Pendimethalin @ 0.75 kg a.i./ha PE and weed free in the pooled analysis.

Key words: *Moongbean, Summer, Weed Management, Sowing Date.*

INTRODUCTION

Green gram (*Vigna radiata L.*) is one of the most important pulse crops in India and mostly used as dried seed and occasionally as forage or green pods for vegetables[9]. It not only plays an important role in human diet but also in improving the soil fertility by fixing the atmospheric nitrogen. Its seed is more palatable, nutritive, digestible and non-flatulent than other pulses[1]. The latest estimates indicate that the present production of pulses is 14.66 million tons with productivity of 637 kg ha^{-1}.

Cite this article: Meena, H., Meena, P.K.P. and Kumhar, B.L., Effect of Sowing Dates and Weed Management Practices on the Productivity of *Summer* Green Gram, *Int. J. Pure App. Biosci.* **5(3):** 392-397 (2017). doi: http://dx.doi.org/10.18782/2320-7051.3098

The major producers of pulses in the country are Madhya Pradesh (24%), Uttar Pradesh (16%), Maharashtra (14%), Rajasthan (6%), Andhra Pradesh (10%) followed by Karnataka (7%) which together share about 77% of total pulse production while remaining 23% is contributed by Gujarat, Chhattisgarh, Bihar, Orissa and Jharkhand. (IIPR Vision, 2030).

The optimum time of sowing ensures the complete harmony between the vegetative and reproductive phases on one hand, and the climatic rhythm on the other and helps in realizing the potential yield. Temperature is the prime weather variable which affects plant life. Heat unit concept is the agronomic application of temperature effect on plant, which has been employed to correlate phenological development in crops and to predict maturity dates[10]. For summer green gram, germination is affected due to low temperature if sowing is done early and if the crop is sown late, there are chances of damage from rain. It is, therefore, necessary to find out optimum period of sowing for green gram in summer season for obtaining higher productivity. Similarly among several factors responsible for low yields of pulse crops in India, weed infestation is considered one of the major factors. Green gram often suffers severe weed competition especially during early growth phases. Being a short duration and initially slow growing, green gram is heavily infested with narrow and broad leaved weeds and sedges which compete with crops, resulting in yield reduction to the tune of 30-50 per cent. It needs more attention to control weeds during summer as it grows more vigorously due to more sunshine and irrigation[9].

The weeds compete to a great extent with crop for nutrients, moisture, light and space and results in 30 to 50 per cent reduction in yield[3]. Therefore, removal of weeds at appropriate time using a suitable method is essential to obtain high yield of green gram. In green gram, weeds could be controlled by hand weedings[4]. However, hand weeding is laborious, time consuming, costly and tedious. Moreover, many times labour is not available at the critical period of weed removal. Furthermore, weather conditions (rains) do not permit timely hand weeding due to wet field conditions. Delayed removal of weeds is not as effective in controlling weeds and obtaining higher yields as the timely removal of weeds. Under these conditions, use of herbicides offers an alternative for possible effective control of weeds. Keeping aforesaid points in view, the present investigation entitled, Effect of sowing dates and weed management practices on the productivity of *summer* green gram.

MATERIAL AND METHODS

An experiment was conducted during two consecutive years of *zaid* 2008 and 2009 at Agricultural Research Station, Borwat Farm, Banswara. The experiment was laid out in split plot design with three replications having sixteen treatment combinations *i.e.*four date of sowing 15th March, 25th March, 05th April and 15th April and four weed management practices i.e. weedy check, weed free, Fluchloralin @ 0.75 kg a.i./ha PPI and Pendimethalin @ 0.75 kg a.i./ha PE. The experimental field was well prepared by two ploughing followed by harrowing & cultivator and one planking for uniform levelling were performed for sowing of green gram. The bulk density, pH and cation exchange capacity of these soils varies between 1.34-1.58 Mg/m^3, 7.0-7.5 and 31- 41Cmol/kg, respectively. The soils of the region are medium in organic carbon (0.50±0.08), available nitrogen (275±5 kg/ha), available P_2O_5 (24.2± 1.0 kg/ha) and high in available K_2O (290 ± 8 kg/ha). Full dose of recommended nitrogen, phosphorus and potash were drilled before sowing. Sowing of green gram as per sowing dates in treatments. All production and protection measures were applied as per package and practices of the Humid Southern plain Zone of Rajasthan.

RESULTS

Growth: It is evident from two years pooled data shows that (table.1) the significantly influence growth parameter of green gram

under sowing on different dates. Results revealed that the maximum plant height (50.35 cm) was obtained where sowing of green gram on 15th March over sowing of green gram on 5thand 15th April, respectively. However, it was found at par with sowing of green gram on 25th March (48.41 cm) plant height in the pooled analysis. It is clear from results that different weed management treatments evaluated for their efficacy in present study differed significantly in their effect on plant growth in green gram. Application of Fluchloralin @ 0.75 kg a.i./ha PPI gave higher plant height (46.23 cm) over weedy check (34.48 cm), but it was found at par with the application of Pendimethalin @ 0.75 kg a.i./ha PE and weed free (44.78 and 48.05 cm) in the pooled analysis. Under timely sown of green gram, plant growth reached at optimum level and resulted in higher dry matter accumulation than later sowing schedules. Green gram sown on later dates experienced high temperature during growth stages, which resulted in quick desiccation of leaves, unbalanced ratio of photosynthesis and respiration which ultimately resulted in low dry matter accumulation. These results are accordance with those of Williams[12] and Garcia *et al*[7].

Yield attributes: An examination of two years pooled data shows that (table.1) the significantly influence yield attributes of green gram under sowing on different dates. The maximum pods plant^{-1}(12.74), seeds pod^{-1} (10.05) and seed index (4.0 g) were recorded under sowing of green gram on 15th March as compared to sowing of green gram on 5thand 15th April, but it was found at par with sowing of green gram on 25th March pods plant^{-1}(12.20), seeds pod^{-1} (9.63) and seed index (3.98 g) in the pooled analysis. Under the weed management practices, significantly influence yield attributes of green gram. The application of Fluchloralin @ 0.75 kg a.i./ha PPI gave significantly higher pods plant^{-1}(11.83) , seeds pod^{-1} (9.78) and seed index (4.04 g) over weedy check, but it was found at par with weed free and application of Pendimethalin @ 0.75 kg a.i./ha PE, higher pods plant^{-1}(12.45 and 11.12) , seeds pod^{-1} (10.47 and 9.59) and seed index (4.08 and 4.00 g), respectively. The higher yield was obtained in timely sowing, due to owing favourable temperature and humidity during their growth period and nodulation formation stage resulting in better growth. The results confirm the findings of Kumar *et al*.[8] and Gangwar *et al*[6].

Table 1: Effect of sowing dates and weed management practices on growth and yield attributes of *summer* green gram

Treatments	Plant height (cm)			Pods/plant			Seeds/ pod		
	2008	2009	Pooled	2008	2009	Pooled	2008	2009	Pooled
Sowing dates									
15th March	51.00	49.70	50.35	13.28	12.20	12.74	10.15	9.94	10.05
25th March	48.67	48.15	48.41	12.61	11.78	12.20	9.89	9.36	9.63
05th April	41.90	40.02	40.96	9.17	9.02	9.10	7.28	6.87	7.08
15th April	38.24	37.61	37.93	7.66	7.50	7.58	6.75	6.59	6.67
SEm±	1.78	1.65	1.58	0.90	0.79	0.85	0.59	0.61	0.55
CD (p=0.05)	5.20	5.08	4.75	2.76	2.48	2.54	1.78	1.85	1.66
Weed management									
Weedy check	36.50	32.45	34.48	06.24	6.04	6.14	5.42	5.17	5.30
Weed free	49.80	46.30	48.05	12.65	12.25	12.45	10.68	10.26	10.47
Fluchloralin	47.69	44.76	46.23	11.94	11.72	11.83	9.91	9.65	9.78
Pendimethalin	46.07	43.49	44.78	11.18	11.06	11.12	9.74	9.43	9.59
SEm±	1.70	1.56	1.49	0.71	0.68	0.64	0.79	0.75	0.70
CD (p=0.05)	4.98	4.81	4.50	2.20	2.16	1.92	2.42	2.31	2.13

Seed yield: The pooled data of two years shows that (table.2) the significantly decreasing seed yield of *summer* green gram with the increasing of sowing period under different sowing dates. The maximum seed yield (1268 kg/ha) was recorded under sowing of green gram on 15th March over sowing of green gram on 5thand 15th April (987 and 793 kg/ha), but it was found at par with sowing of green gram on 25th March seed yield (1194 kg/ha) in the pooled analysis. Under the weed management practices, significantly influence seed yield of *summer* green gram. The application of Fluchloralin @ 0.75 kg a.i. /ha PPI gave significantly higher seed yield (1017 kg/ha) over weedy check (747 kg/ha), but it was found at par with weed free and application of Pendimethalin @ 0.75 kg a.i./ha PE (1046 and 996 kg/ha),respectively. The increase seed yield of green gram due to either of these treatments can be better explained with their effectiveness in weed control in comparison to weedy check treatment. Application of herbicides alone and with hand weeding because it improved the tilth by making soil more vulnerable for the plants to utilize water and air. The increase in seed yield of green gram was also largely due to higher harvest indices reflecting greater partitioning of assimilates towards sink under weed free environment. In the presence of weeds, although the vegetative growth of the crop attained a level but sink was not sufficient enough to accumulate the meaningful food assimilates translocation towards grain formation Srinivasan[11] and Chand *et al*[5].

Table 2: Effect of sowing dates and weed management practices on yield and economics of *summer* green gram

Treatments	100 seed weight (g)			Seed yield (kg/ha)		
	2008	2009	Pooled	2008	2009	Pooled
Sowing dates						
15th March	4.02	3.98	4.00	1289	1247	1268
25th March	4.00	3.95	3.98	1202	1185	1194
05th April	3.81	3.78	3.80	996	977	987
15th April	3.73	3.69	3.71	805	781	793
SEm±	0.05	0.04	0.04	61	57	54
CD (p=0.05)	0.15	0.13	0.12	185	170	163
Weed management						
Weedy check	3.20	3.14	3.17	785	709	747
Weed free	4.10	4.06	4.08	1064	1027	1046
Fluchloralin	4.07	4.01	4.04	1025	1009	1017
Pendimethalin	4.02	3.98	4.00	1007	985	996
SEm±	0.06	0.06	0.05	70	68	63
CD (p=0.05)	0.18	0.17	0.16	218	207	191

Weed population: Pooled data of two years shows that (table.3) the weed population was found not significant under different sowing dates in *summer* green gram. The maximum weed population (38.12 m^{-2}) was recorded under weedy check control as compared to weed free (6.65 m^{-2}) at 30 DAS .The application of Fluchloralin @ 0.75 kg a.i. /ha PPI and Pendimethalin @ 0.75 kg a.i./ha were found at par with each other in terms of weed population (12.39 and 15.41m^{-2}) at 30 DAS in the pooled analysis. These above are in accordance with those obtained by Chand *et al.*[5]and Gangwar *et al*[6].

Weed dry matter accumulation: Two years pooled data shows that (table.3) the weed dry matter accumulation at 30 DAS was found not significant under different sowing dates in *summer* green gram. The maximum weed dry matter accumulation (43.55 g m^{-2}) was recorded under weedy check control as compared to weed free (9.03 g m^{-2}) at 30 DAS .The application of Fluchloralin @ 0.75 kg a.i. /ha PPI and Pendimethalin @ 0.75 kg a.i. /ha

were found at par with each other in terms of weed dry matter accumulation (14.53 and 15.63 g m^{-2}) at 30 DAS in the pooled analysis. These above are in accordance with those obtained by Srinivasan[11] and Chand *et al*[5].

Table 3: Effect of sowing dates and weed management practices on weed population, weed dry matter and weed control efficiency in *summer* green gram

Treatments	Weed population (m^{-2}) at 30 DAS			Weed dry matter (g m^{-2}) at 30 DAS			WCE (%)		
	2008	2009	Pooled	2008	2009	Pooled	2008	2009	Pooled
Sowing dates									
15th March	15.30	15.41	15.36	17.29	17.47	17.38	53.76	53.65	53.71
25th March	15.65	15.98	15.82	18.08	18.25	18.17	52.15	53.90	53.03
05th April	15.20	15.36	15.28	17.97	18.05	18.01	51.93	53.00	52.47
15th April	15.00	15.78	15.39	17.59	17.67	17.63	50.29	50.43	50.36
SEm±	2.03	2.08	1.89	1.80	1.86	1.68	5.12	5.23	4.76
CD (p=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS
Weed management									
Weedy check	38.00	38.24	38.12	42.10	45.00	43.55	0.00	0.00	0.00
Weed free	6.50	6.80	6.65	8.96	9.10	9.03	63.55	64.20	63.88
Fluchloralin	12.00	12.78	12.39	14.45	14.60	14.53	52.47	53.16	52.82
Pendimethalin	15.08	15.74	15.41	15.59	15.67	15.63	48.25	49.01	48.63
SEm±	1.63	1.71	1.54	1.32	1.40	1.25	2.68	2.80	2.52
CD (p=0.05)	5.16	5.22	4.61	4.20	4.34	3.70	8.12	8.56	7.55

Weed control efficiency: An examination of two years pooled data shows that (table.3) the weed control efficiency at 30 DAS was found not significant under different sowing dates in *summer* green gram. The maximum weed control efficiency (63.88 per cent) was recorded under weedy free as compared to weed check control at 30 DAS .The application of Fluchloralin @ 0.75 kg a.i. /ha PPI and Pendimethalin @ 0.75 kg a.i./ha were found at par with each other in terms of weed control efficiency (52.82 and 48.63 per cent) at 30 DAS in the pooled analysis. These above are in accordance with those obtained by Srinivasan[11], Chand *et al.*[5] and Gangwar *et al*[6].

Table 4: Effect of sowing dates and weed management practices on economics of *summer* green gram

Treatments	Net return (Rs. ha^{-1})			B:C ratio		
	2008	2009	Pooled	2008	2009	Pooled
Sowing dates						
15th March	30482	33874	32178	1.65	1.83	1.74
25th March	27676	31770	29723	1.54	1.77	1.65
05th April	20348	23534	21941	1.16	1.34	1.25
15th April	13590	15802	14696	0.80	0.93	0.86
SEm±	1856	1905	1730	0.08	0.10	0.08
CD (p=0.05)	5570	5720	5192	0.26	0.29	0.25
Weed management						
Weedy check	12830	12778	12804	0.75	0.75	0.75
Weed free	20432	23134	21783	1.02	1.16	1.09
Fluchloralin	20450	23878	22164	1.11	1.29	1.20
Pendimethalin	19766	22870	21318	1.07	1.24	1.15
SEm±	1672	1698	1550	0.10	0.09	0.08
CD (p=0.05)	5023	5102	4651	0.31	0.28	0.26

Economics: The pooled data of two years shows that (table.4) the significantly decreasing monetary return from *summer* green gram with the increasing of sowing period under different sowing dates. The maximum net return (Rs.32127/- ha^{-1}) and B:C

ratio (1.74) were recorded under sowing of green gram on 15th March over sowing of green gram on 5thand 15th April, but it was found at par with sowing of green gram on 25th March, net return (Rs.29723/- ha^{-1}) and B:C ratio (1.65) in the pooled analysis. Under the weed management practices, significantly influence monetary return from *summer* green gram. The application of Fluchloralin @ 0.75 kg a.i. /ha PPI gave significantly higher net return (Rs. 22164/- ha^{-1}) and B: C ratio (1.20) over weedy check, but it was found at par with weed free and application of Pendimethalin @ 0.75 kg a.i. /ha PE, net return (Rs. 21783/- and 21318/- ha^{-1}) and B: C ratio (1.09 and 1.15), respectively. These above are in accordance with those obtained by Srinivasan[11], Chand *et al.*[5] and Gangwar *et al*[6].

CONCLUSION

Based on this experimentation, it may be concluded that, the sowing of green gram from 15th to 25th March gave significantly higher seed yield and monetary return. Application of Fluchloralin @ 0.75 kg a.i./ha PPI and Pendimethalin @ 0.75 kg a.i./ha PE were found beneficial for weed management in *summer* green gram.

REFERENCES

1. Anjum, M. S., Ahmed, Z. I., and Rauf, C. A., Effect of *Rhizobium* inoculation and nitrogen fertilizer on yield and yield components of green gram. *International Journal of Agriculture and Biology*, **8:** 238-240 (2006).
2. AVRDC, Proceedings of International Consultation Workshop on Green gram.7-11 September, 1997 at New Delhi, India. AVRDC, Shanhua, Taiwan, p.198 (1998).
3. Bhan, V.M. and Singh, A.N., Weed management - A tool for increasing production of oilseed and pulses. Agricultlural Situation in India: 409 (1991).
4. Chand, R., Singh, N.P. and Singh, V.K., Effect of weed control treatments on weeds and seed yield of late sown urdbean (*Vigna mungo* L.) during *kharif* season. *Indian Journal of Weed Science*, **36 (1&2):** 127-128(2004).
5. Chand, R., Singh, N.P. and Singh, V.K., Effect of weed management practices on productivity of late planted urdbean during *kharif* season. *Indian Journal of Pulses Research,* **16 (2):** 163-164 (2003).
6. Gangwar, A., Jadhav, T.A. and Sarvade S., Productivity, nutrient removal and quality of urdbean varieties planted on different dates. Bioinfolet. **10 (1A):** 139-142 (2013).
7. Garcia, A. G., Guerra, L. C. and Hoogenboom, G., Impact of planting date and hybrid on early growth of sweet corn, *Agron. J.* **101:** 193-200 (2009).
8. Kumar, A., Singh, N.P., Singh, V.K., Rana, N.S. and Singh, A., Effect of planting dates on yield and nutrient uptake by green gram (*Vigna radiata* (L.) Wilezek) and urdbean (*Vigna mungo* L. Hepper) varieties during *spring* season. *Field Crop Abstracts.* **61 (9):** 11-42 (2008).
9. Lawn, R.J., The Asiatic Vigna species.Vigna spp. (*V. radiata, V. mungo, V. angularis, V. umbellata and V. acontifolia)* (Leguminosae-Papilionoideae). In: Smartt J, Simmonds NW (eds) Evolution of Crop Plants, 2nd edn. Longman, London, pp 321-326 (1995).
10. Modak, R., Chakraborty, T. and De, G.C., Method of weed management on weed biomass, yield of blackgram (*Phaseolus mungo*) and nitrogen uptake. *Indian J. Agron.* **40(1):** 115-117 (1995).
11. Srinivasan G., Pothiraj P. and Sankaran S., Effect of management practices on weed dynamics in rice (*Oryza sativa*) based cropping system. *Indian J. Agron.* **37:** 13-17 (1992).
12. Williams, M. M., Sweet corn growth and yield responses to planting dates of the North Central United States. *Hortic. Sci.* **43(6):** 1775-1779 (2008).