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EFFECT OF WEED MANAGEMENT ON WEEDS, GROWTH AND YIELD OF SUMMER GREENGRAM (*VIGNA RADIATA* L.)

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ABSTRACT
A field experiment was conducted at College farm, Navsari Agricultural University, Navsari (Gujarat) during summer season of the year 2014 to study the "Weed management study in summer green gram (*Vigna radiata* L.) under south Gujarat condition" Among the different herbicidal weed management treatments, Pendi methalin @ 1.0 kg ha^{-1} PE (T_4) recorded lowest weed population of monocot, dicot and sedge at 25, 50 and at harvest of crop, which resulted in lowest dry weight of weed (435 kg ha^{-1}), highest weed control efficiency (79.59 %) as well as lower weed index (7.55 %). Weed free treatment (T_1) registered significantly higher number of branches per plant at harvest (8.88), yield and yield attributing characters viz., number of pods per plant^{-1}(20.73) followed by T_9 (8.85 and 20.40), T_8 (8.79 and 19.73) and T_4 (8.17 and 18.40), respectively. The significantly higher seeds and stover yield (1378 and 1627 kg ha^{-1}, respectively) were recorded in weed free treatment. Effective weed control in green gram can be achieved by hand hoeing at 20 and 30 DAS during crop growth period with an alternative is application of pendi methalin 1.0 kg ha^{-1} PE.

INTRODUCTION

Among the pulses, green gram (*Vigna radiata* L.) is one of the most important and extensively cultivated crop in India, Which is cultivated in arid and semi arid region. Green gram is locally known as "*moong*". It contains about 25 % protein, 1.3 % fat, 3.5% mineral, 4.1 % fiber and 56.7 % carbohydrate. In spite of the importance of this crop in our daily diet average productivity of this crop is very low in India as well as in the Gujarat. The low production of this crop is mainly due to crop-weed competition and other reasons.

Weed management is an important key factor for enhancing the productivity of green gram, as weeds compete for nutrient, water, light and space with crop plants during early growth period. Moreover, besides low yield of crop, they increase production cost, harbor insect-pest and diseases, decreasing quality of farm produce and reduce land value of the different factors known for reduction in crop production, among them weed stand first (Subramainian *et al*., 1993). Weeds spread easily, because of their enormous seed production and once established are not easily eradicated. Life cycle of most of them coincide with that of crop they invade, thus ensuring mixing of their seed with those of the crops (Mahroof *et al*. 2009). Depending on weed type and crop weed competition it reduces crop yield up to 96.5 % (Verma *et al*., 2015), Whereas the loss of mung bean yield due to weeds ranges from 65.4 to 79.0 % (Dungarwal *et al*. 2003). The magnitude of losses largely depends upon the composition of weed flora, period of weed-crop competition and its intensity. Weeds emerge with the summer sown crops and create severe competition unless controlled timely and effectively. Inter-row cultivation is not sufficient and intra-row hand weeding is necessary under most conditions. Therefore, there is an urgent need to move from costly manual-mechanical weed control to an integrated weed control. In the more developed agricultural systems, herbicides have already replaced mechanical weed control. Unavailability of labours at the time of weeding resulting in sever field infestation, which make mechanical weeding ineffective, tedious and costly. Under such circumstances, chemical control of weeds may be the viable and cost effective alternative for this crop. Effective herbicide at appropriate rate may prove as an effective weed control method and replace conventional methods of weed control. So, if weed growth is minimize during the period of crop weed competition, crop yield will be equivalent to that of weed free crop. Therefore, it is an essential to control weeds by any means during crop weed competition. This paper deals with the objective of to study different weed flora, effect of different weed control practices on growth and yield and efficacy of different herbicide for controlling weeds in green gram.

MATERIALS AND METHODS

A field experiment was carried out during summer season of 2014. The experiment was laid out in randomized block design with three replications and ten treatments (Table-1) comprising of weed management practices. The soil of the experimental field was clayey in texture and showed low, medium and high rating for available nitrogen (226.86 kg ha^{-1}) (Kjeldahl method), phosphorus (30.26 kg ha^{-1}) (Olesen's method) and

potassium (384.25 kg ha^{-1}) (Flame photometric method), respectively. The soil was found slightly alkaline (pH 7.8) (Potentiometric method) with normal electric conductivity. The seed of green gram Meha variety was sown on 4th February, 2014 at a row spacing of 30 × 10 cm using seed rate of 20 kg ha^{-1} and fertilized with 20-40-00 N-P_2O_5-K_2O. Pre and post-emergence herbicide spray was done using 500 liters of water per hectare as per treatments. For making Sorgaab, sorghum plant herbage was harvested at maturity. After sun drying it was chaffed into 2-3 cm pieces. This chaffed material was soaked in water in a ratio of 1:10 (w/v) for 24 hr at room temperature (34ºC ± 2) and filtered to collect sorgaab. Sorgaab was used as a spray material (Cheema *et al*., 2000). The crop was grown with recommended package of practices for South Gujarat Heavy Rainfall Agro-climatic Zone and was harvested on 3rd May 2014.

RESULTS AND DISCUSSION

Effect on weed population, dry weight of weed, WCE and WI

Different types of weed flora were observed in experimental field during summer season of 2014. The most common weed species observed on experimental plot were *Echinochloa crusgalli* L., *Cyperus rotundus* L., *Cynodon dactylon* L., *Digera arvensis Forsk., Digitaria sanguinalist* L., *Convolvulus arvensis* L., *Eclipta alba* L., *Amaranthus viridis* L., *Alternanthera pungens, Physalis minima* L., *Trianthema portulacastrum, Sorghum halepense* L., *Vernonia cinerea* L., *Euphorbia hirta* L., *Abutilon theophrasti*. These similar work done by Chhodavadia *et al*. (2014).

All weed management treatment significantly reduce the population of weeds as compare to weedy check (T_{10}). Among the different treatment tried (Table 1), treatment T_1 (weed free) recorded significantly lowest number of monocot, dicot and sedge per m^2 compared to rest of the treatments at 25, 50 DAS and at harvest, which was at par with T_9, T_8 and T_4 in case of monocot, dicot and sedge at 25 DAS, 50 DAS and at harvest of crop. The highest number of monocot, dicot and sedge were recorded under un weeded treatment (T_{10}). The remarkable reduction in weed population at different stages might be due to effective weed control in respective treatments either manual or herbicidal control or both. These finding are confirmed with those reported by Raj *et al*. (2010).

Among the different treatments (Table 1), significantly the highest dry weight of total weeds was recorded under weedy check treatment (T_{10}). However, it was found that, among the different weed management treatments, treatment T_9 in which, hand weeding was done at 20 and 30 DAS, recorded significantly minimum dry weight of weed at harvest, which was at par with hand hoeing was done at 20 and 30 DAS (T_8) treatment and pre-emergence application of pendi methalin 1.0 kg ha^{-1} (T_4). Minimum weed dry weight in different weed management treatment with weed free condition might be due to effective weed control obtained under hand hoeing, hand weeding and pre-emergence application herbicides at initial and early crop growth stage, which resulted into the lowest weed counts and finally reduced the total dry weight of weeds at harvest, ultimately the rapid growth of green gram crop, dense crop canopy might be suppressed weed growth as indicated by plant height and more number of branches

Table 1: Effect of different weed management practices on population, dry weight of weed, weed control efficiency and weed index of greengram (*Vignaradiata* L.)

Tr. No.	Treatments	Weed population per m^2								Dry weight of weeds (kg ha^{-1})	WCE (%)	WI (%)
		Monocot			Dicot			Sedges				
		25 DAS	50 DAS	At hartvest	25 DAS	50 DAS	At hartvest	25 DAS	50 DAS	At hartvest		
T_1	Weed free	-	-	-	-	-	-	-	-	-	100	-
T_2	Sorgaab conc.@10 lit ha^{-1}(1:10 ratio) at 20 and 30 DAS	6.00(35.10)	7.08(49.07)	6.63(43.10)	7.66(57.86)	9.75(94.15)	9.07(81.30)	6.86(46.09)	7.87(60.99)	7.44(54.45)	1794	15.81	19.59
T_3	Sorgaab conc.@10 lit ha^{-1}(2:10 ratio) at 20 and 30 DAS	5.84(33.15)	6.71(44.20)	6.27(38.37)	7.35(53.12)	9.32(85.90)	8.92(78.62)	6.57(42.20)	7.53(56.02)	7.15(50.17)	1680	21.11	18.58
T_4	Pendimethalin 1.0 kg ha^{-1} PE	4.02(15.24)	3.75(13.09)	3.58(11.97)	4.66(20.91)	4.44(19.72)	3.86(14.07)	4.96(23.64)	4.73(21.48)	4.46(18.91)	435	79.59	7.55
T_5	Quizalofop-P-ethyl 0.075 kg ha^{-1}PoE, 20 DAS	5.07(24.74)	4.06(15.46)	3.91(14.33)	8.23(66.91)	9.60(91.44)	9.67(92.86)	5.73(31.93)	5.10(26.56)	4.65(20.73)	1108	48.01	9.29
T_6	Pendimethalin 0.5 kg ha^{-1} PE + T_2	5.58(30.16)	6.42(40.28)	5.93(34.16)	7.12(49.80)	8.51(71.53)	8.40(69.65)	6.38(39.73)	7.05(48.73)	6.51(41.53)	1359	36.22	18.36
T_7	Pendimethalin 0.5 kg ha^{-1} PE + T_3	5.38(28.02)	6.19(37.33)	5.53(29.62)	6.57(42.20)	7.88(61.23)	7.74(58.90)	6.26(38.34)	6.45(40.77)	5.87(33.49)	1189	44.20	17.85
T_8	Hand hoeing at 20 and 30 DAS	3.63(12.26)	3.49(11.21)	3.29(9.87)	4.01(15.25)	3.86(14.02)	3.54(11.76)	4.73(21.40)	4.55(19.76)	4.37(18.20)	381	82.12	3.48
T_9	Hand weeding at 20 and 30 DAS	3.59(12.01)	3.34(10.21)	3.09(8.60)	4.00(15.22)	3.62(12.18)	3.38(10.57)	4.46(19.12)	4.45(18.97)	4.18(16.58)	329	84.56	3.27
T_{10}	Weedy check	6.33(39.14)	7.53(55.89)	6.93(47.10)	8.56(72.28)	10.11(101.29)	9.32(86.13)	7.14(50.05)	8.49(71.13)	7.68(58.16)	2131	-	33.24
	S.Em. ±	0.17	0.16	0.19	0.27	0.29	0.25	0.19	0.23	0.17	85.10	-	-
	C. D. at 0.05 %	0.51	0.46	0.55	0.82	0.87	0.76	0.56	0.69	0.50	252.86	-	-

Table 2: Effect of different weed management practices on growth and yield of greengram (*Vigna radiata* L)

Tr. No	Treatments at harvest	Plant height branches (cm)	No. of /plant per plant	No. of pods yield	Seed yield (kg ha^{-1})	Stover (kg ha^{-1})
T_1	Weed free	49.80	8.88	20.73	1378	1627
T_2	Sorgaab conc.@10 lit ha^{-1} (1:10 ratio) at 20 and 30 DAS	40.96	7.16	14.83	1108	1246
T_3	Sorgaab conc.@10 lit ha^{-1}(2:10 ratio) at 20 and 30 DAS	42.01	7.42	15.10	1122	1263
T_4	Pendimethalin 1.0 kg ha^{-1} PE	45.58	8.17	18.40	1274	1385
T_5	Quizalofop-P-ethyl 0.075 kg ha^{-1}PoE, 20 DAS	44.06	8.00	17.90	1250	1378
T_6	Pendimethalin 0.5 kg ha^{-1} PE + T_2	42.12	7.43	15.83	1125	1319
T_7	Pendimethalin 0.5 kg ha^{-1} PE + T_3	43.96	7.60	16.97	1132	1320
T_8	Hand hoeing at 20 and 30 DAS	47.04	8.79	19.73	1330	1515
T_9	Hand weeding at 20 and 30 DAS	48.80	8.85	20.40	1333	1557
T_{10}	Weedy check	51.04	5.05	13.67	920	1100
	S.Em. ±	2.13	0.39	1.29	75.52	100.84
	C. D. at 0.05 %	6.33	1.15	3.83	224	300

per plant, which did not allow weeds to grow vigorously due to smothering effect. These result confirm the finding of Rajib *et al*. (2014). Various weed management treatment showed better weed control efficiency. The highest weed control efficiency at harvest was recorded under weed free treatment (T_1) followed by treatments T_9 (84.56 %), T_8 (82.12 %) and T_4 (79.59 %). The higher weed control efficiency recorded under weed management treatments might be due to periodical removal of weeds by hand weeding, hand hoeing or herbicidal control resulted in remarkable reduction in weed population and ultimately less dry weight of weeds. These is in agreement with the findings of Malliswari *et al*. (2008).

Looking to the weed index, which is the indicator of losses in seed yield due to presence of weeds, Weed free treatment (T_1) is considered as base for calculating weed index, was followed by treatment T_9 (3.27 %), T_8 (3.48 %), T_4 (7.55 %) and T_5 (9.29 %). This might be due to effective weed control achieved under these weed management treatments, which resulted in reduction of weeds biomass ultimately, achieving higher weed control efficiency. The finding on weed dry weight, WCE and WI are colloborule the result of Sultan and Baigh (2013) and Chhodavadia *et al*. (2014) in green gram.

Effect on crop

Growth attributes

The plant height was significantly more (51.04 cm) with lowest number of branches per plant (5.05), in un weeded control, which might be due to severe competition by weeds for moisture and nutrients; consequently the plant growth was affected. However, in the treatment T_1 the plant height was 49.80 cm with highest number of branches (8.88), which was at par with treatments T_9, T_8 and T_4. The results are in agreement with the finding of Raj *et al*. (2012) and Chhodavadia *et al*. (2013).

Seed yield and yield attributes

The highest value of number of pod per plant (20.73) was recorded with the weed free treatment (T_1) followed by treatment T_9, T_8, T_4 and T_5. Similar effect was also reported by Khot *et al*. (2012). Weed free treatment (T_1) recorded significantly higher seed yield (1378 kg ha^{-1}), which was remain at par with treatments T_9, T_8, T_4 and T_5 and significantly superior over weedy check (T_{10}). The per cent increase in seed yield under treatment T_1 to the tune of 49.7 % over weedy check, while 3.4 %, 3.6 %, 8.2 % and 10.2 % over T_9, T_8, T_4 and T_5 respectively. The significantly higher stover yield (1627kg ha^{-1}) was recorded under weed free treatment (T_1), which was at par with T_9, T_8, T_4 and T_5. The increase in seed and stover yield mainly due to maintenance of weed free environment, especially during critical growth stages of crop, reduce crop weed competition helped in better growth and development of green gram crop resulting in higher seed and stover yield. The yield loss study also shows that reduced weed population initially by pre-emergence herbicide followed by weed control around 25 to 30 DAS either by post emergence herbicide or hand weeding and hand hoeing have less reduction in yield. This result indicated that appreciable increase in seed yield and decrease total dry weight of weeds were recorded under these treatments are also responsible for better seed and stover yield of green gram. These findings are accordance with the finding those of Chhodavadia *et al*. (2014). Based on results of the field experimentation, it seems quite logical to conclude that profitable, potential production and effective weed control in green gram can be achieved by hand hoeing at 20 and 30 DAS during crop growth period. Whereas labours are not easily available, another alternative is application of pendi methalin 1.0 kg ha^{-1} PE was also equally effective for profitable green gram production.

REFERENCES

Cheema, Z. A., Rakha, A. and Khaliq, A. 2000. Use of sorgaab and sorghum mulch for weed management in mungbean. *Pakistan J. Agricultural science.* **37(3-4):** 140-144.

Chhodavadia, S. K., Mathukiya, R. K. and Dobariya, V. K. 2013. Pre and post emergence herbicides for integrated weed management in summer greengram. *Indian J. Weed science.* **45(2):** 137-139.

Chhodavadia, S. K., Sagarka, B. K. and Gohil, B. S. 2014. Integrated management for improved weed suppression in summer greengram (*Vigna radiata* L. Wilczek). *The Bioscan.* **45(2):** 137-139.

Dungarwal, H. S., Chalot, P. C. and Nagda, B. L. 2003. Chemical weed control in mungbean (*Pheseolus radiates* L.). *Indian J. Weed Science.* **35(3-4):** 283-284.

Khot, D. B., Munde, S. D., Khanpara, V. D. and Pagar, R. D. 2012. Evaluation of new herbicides for weed management in summer blackgram (*Vigna mungo* L.). *Crop Research.* **44(3):** 326-330.

Mahroof, K., Satish, K. and Hamal, I. A. 2009. Diversity of weed associated with rabi and kharif crops of sewa river catchment area in the north west Himalaya. *The Bioscan*. **4(3):** 437-440.

Malliswari, T., Reddy, M. P., Sagar, G. K. and Chandrika, V. 2008. Effect of irrigation and weed management practices on weed control and yield of blackgram. *Indian J. Weed science*. **40(1&2):** 85-86.

Raj, V. C., Arvadia, M. K. and Patel, D. D. 2010. Effect of integrated weed management practices on *rabi* greengram (*Vigna radiate* L.). *Green farming*. **1(4):** 377-379.

Raj, V. C., Patel, D. D., Thanki, J. D. and Arvadia, M. K. 2012. Effect of integrated weed management on weed control and productivity of greengram (*Vigna radiata* L.). *Bioinfolet*. **9(3):** 392-396.

Rajib Das., Patra, B. C., Mandal, M. K. and Animesh Pathak. 2014. Integrated weed management in blackgram (*Vigna mungo* L.) and its effect on soil microflora under sandy loam soil of west Bengal. *The Bioscan*. **9(4):** 1593-1596.

Subramanian, S., Mohamed, A. and Jayakumar, R. 1993. All about weed control. Kalyani pub., New Delhi. pp. 1-5.

Sultan, T. and Baigh, M. A. 2013. Weed control in summer *moong* (*Vigna radiata* L.), Shalimar moong-1. *Environment and Ecology*. **31(2A):** 775-777.

Verma, S. K., Singh, S. B., Meena, R. N., Prasad, S. K., Meena, R. S. and Gaurav. 2015. A review of weed management in India: the need of new directions for sustainable agriculture. *The Bioscan*. **10(1):** 253-263.