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RESEARCH ARTICLE

EFFECT OF INTERGRATED WEED MANAGEMENT ON WEED CONTROL INDEX, YIELD COMPONENTS AND YIELD OF IRRIGATED BLACKGRAM

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ABSTRACT

Field experiments were conducted during 2011 and 2012 in Annamalai University, using black gram varieties "ADT 5" in Randomized Block Design (RBD) with eight treatments and three replications. The treatments comprised of T₁ – Unweeded check, T₂ – Twice Hand weeding (15 and 30 DAS), T₃ – Pendimethalin 1.0 kg ha⁻¹ as pre-emergence application on 3 DAS, T₄ – Quizalofop-ethyl 62.5 g ha⁻¹ as post-emergence application on 20 DAS, T₅-Imazethapyr 75g ha⁻¹ as post-emergence on 20 DAS, T₆ – Quizalofop-ethyl 31.2 g ha⁻¹+ Imazethapyr 37.5 g ha⁻¹ as post-emergence application on 20 DAS, T₇– Pendimethalin 1.0 kg ha⁻¹ as pre-emergence application on 3 DAS + Imazethapyr 75g ha⁻¹ as post-emergence on 20 DAS and T₈ – Pendimethalin 1.0 kg ha⁻¹ as pre-emergence on 3 DAS+Quizalofop-ethyl 62.5g ha⁻¹ as post-emergence on 20 DAS, Significant influence on growth, yield components and yield of black gram were observed in both the cropping season. Among the treatments T₂ – Twice Hand weeding (15 and 30 DAS), recorded the least weed count and higher WCI. The same treatment recorded higher yield attributes and higher grain yield (1003 kg ha⁻¹ and 1175kg ha⁻¹) and statistically on par with Pendimethalin 1.0 kg ha⁻¹ as pre-emergence on 3 DAS + Imazethapyr 75g ha⁻¹ as post-emergence on 20 DAS (T₇). Un weeded check recorded the least grain yield in both the season.

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INTRODUCTION

Pulses constitute an important dietary protein ingredient in Indian vegetarian diet. Dietary protein provides amino acid for the synthesis of pod protein and other biologically important compound in the body. Pulses are important for sustainable agriculture as they improve physical, chemical and biological properties of soil and function as mini nitrogen factory. The per capita availability is reduced from 60.7g in 1951 to 39.4g in 2011. The per capita availability can be increased by a possible breakthrough in the production of pulses in India could be achieved by the way of increasing more area under pulses and raising the productivity of pulses per unit of land. (Jagadish kumar 2000). Besides bringing more area under pulses, yield maximization with agronomic practices such as weed management practice play a vital role in increasing the production potential of black gram and to maintain soil fertility. Although hand weeding is widely practiced herbicides are considered to be more efficient and quick for timely weed control due to scarcity of labour and cost. Since hand weeding is considered to be more energy consuming, hence there is more attention towards integrated weed management in irrigated black gram.

MATERIALS AND METHODS

Field experiments were conducted at the Experimental farm, Department of Agronomy, Annamalai University, Annamalainagar. The soil of the experimental field is clay loam in texture with low in available nitrogen, medium in available phosphorus, high in available potassium and low in available sulphur. The treatments comprised of T₁ – Unweeded check, T₂ – Twice Hand weeding (15 and 30 DAS), T₃ – Pendimethalin 1.0 kg ha⁻¹ as pre-emergence application on 3 DAS, T₄ – Quizalofop-ethyl 62.5 g ha⁻¹ as post-emergence application on 20 DAS, T₅-Imazethapyr 75g ha⁻¹ as post-emergence on 20 DAS, T₆ – Quizalofop-ethyl 31.2 g ha⁻¹+ Imazethapyr 37.5 g ha⁻¹ as post-emergence application on 20 DAS, T₇– Pendimethalin 1.0 kg ha⁻¹ as pre-emergence application on 3 DAS + Imazethapyr 75g ha⁻¹ as post-emergence on 20 DAS and T₈ – Pendimethalin 1.0 kg ha⁻¹ as preemergence on 3 DAS+Quizalofop-ethyl 62.5g ha⁻¹ as post-emergence on 20 DAS, The trial was laid out in a randomized block design with three replication plot size was 5 x 4 m for crop seed rate is 25 kg ha⁻¹(ADT3 black gram). N, P, and K were applied in the form of urea, single super phosphate and muriate of potash at 25:50:0 NPK ha⁻¹ respectively was followed as RDF. The pre-emergence herbicide viz., Pendimethalin was sprayed on 3 DAS and the post emergence herbicide Quizalofop-ethyl, Imazethapyr were sprayed on 21 DAS with 500 litres of water ha⁻¹through knapsack sprayer fitted with flood jet nozzle separately in specified plots as per the treatments schedule. All the agronomic practices were carried out uniformly to raise the crop.

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Effect of integrated weed management on weed control index, yield components and yield of irrigated black gram

Treatments	Total weed count (m ⁻²)	Weed DMP kg ^{ha} ⁻¹	WCI (%) 30 DAS	Plant height (cm)		LAI at flowering	Seed yield kg ^{ha} ⁻¹	Haulm yield kg ^{ha} ⁻¹
				30 DAS	40 DAS			
T ₁ – unweeded check	195.5 (13.89)	909	-	18.0	32.5	2.95	516	850
T ₂ – Twice Hand weeding (15 and 30 DAS)	81.34 (9.04)	569	37.04 (37.47)	29.4	43.2	4.43	1003	1700
T ₃ – Pendimethalin 1.0 kg ^{ha} ⁻¹ as pre-emergence application on 3 DAS	123.32 (11.12)	742	18.47 (25.40)	22.0	38.5	3.29	750	1133
T ₄ – Quizalofop-ethyl 62.5 g ^{ha} ⁻¹ as post-emergence application on 20 DAS	142.4 (11.95)	875	3.77 (11.09)	20.1	34.0	3.06	590	908
T ₅ – Imazethapyr 75g ^{ha} ⁻¹ as post-emergence on 20 DAS	131.8 (11.50)	832	8.44 (16.88)	21.1	35.5	3.23	640	950
T ₆ – Quizalofop-ethyl 31.2 g ^{ha} ⁻¹ + Imazethapyr 37.5 g ^{ha} ⁻¹ as post-emergence application on 20 DAS	119.15 (10.93)	686	24.49 (29.66)	24.0	40.0	3.47	833	1200
T ₇ – Pendimethalin 1.0 kg ^{ha} ⁻¹ as pre-emergence application on 3 DAS + Imazethapyr 75g ^{ha} ⁻¹ as post-emergence on 20 DAS	82.70 (9.12)	576	36.59 (37.22)	29.2	43.0	4.39	970	1685
T ₈ – Pendimethalin 1.0 kg ^{ha} ⁻¹ as pre-emergence on 3 DAS + Quizalofop-ethyl 62.5g ^{ha} ⁻¹ as post-emergence on 20 DAS	98.42 (9.94)	631	30.54 (33.54)	27.1	41.6	3.79	900	1300
SEd	0.33	16.29	0.85	0.6	0.61	0.14	18.80	17.75
CD (P=0.05)	0.67	32.59	1.70	1.41	1.23	0.28	37.61	35.51

RESULTS AND DISCUSSION

Weed Observation:

Among the weed control measures, hand weeding twice (T₂) performed better in controlling weeds throughout the cropping period through repeated hand weeding and weed infestation was controlled in a fool-proof manner in twice hand weeding treatment that registered the least value on total weed count and recorded higher weed control index. The similar findings were reported by Malliswari *et al.*, (2008). Among the herbicides pendimethalin 1.0 kg^{ha}⁻¹ as pre-emergence application on 3 DAS + Imazethapyr 75g^{ha}⁻¹ as post-emergence on 20 DAS was on par with hand weeding twice and significantly superior to rest of the treatments in respect of weed count and weed control index. Effective weed control measures by pre-emergence application of pendimethalin at 3 DAS might have helped in minimizing total weed count and then by reduced the weed competition for light, moisture and nutrients as compared to all other herbicide treatment. The similar results were reported by Nayak *et al.* (2000) and Malliswari *et al.* (2008). Post-emergence herbicide Imazethapyr effectively controlled both annual broad leaved weeds and grasses simultaneously this could be attributed to the longer persistence and broad spectrum weed control by Imazethapyr post-emergence application.

Crop biometrics

Among the weed management practices hand weeding twice on 15 and 30 DAS (T₂) significantly recorded higher values on growth components like plant height and LAI. A weed free environment till the critical period of crop growth by hand weeding twice facilitated good crop growth. Among the chemical weed control methods pendimethalin 1.0 kg^{ha}⁻¹ as pre-emergence application on 3 DAS + Imazethapyr 75g^{ha}⁻¹ as post-emergence on 20 DAS (T₇) performed on par with

hand weeding twice on 15 and 30 DAS in growth parameters. Observation of Angiras and Rana (1995) lend support for the present trend of result. The similar finding was reported by Sunil Kumar (2010). Un weeded check recorded the least growth parameters such as plant height and LAI, because of the poor control of weeds that leads to more weed count, the highest weed DMP and heavy competition between crop and weeds. This result is in line with the earlier findings of Chaudhary *et al.* (2005).

Crop yield: Hand weeding twice on 15 and 30 DAS provided a perfect weed free environment all throughout the critical period of crop growth offered the highest seed yield of 1003 kg^{ha}⁻¹. The results are in agreement with the findings of Malliswari *et al.* (2008). Among the chemical weed control methods pendimethalin 1.0 kg^{ha}⁻¹ as pre-emergence application on 3 DAS + Imazethapyr 75g^{ha}⁻¹ as post-emergence on 20 DAS (T₇) registered the highest value of seed yield of 970 kg^{ha}⁻¹ comparable to that of twice hand weeding. It could be attributed to significantly lower weed population, DMP of weeds and hence higher seed and haulm yield. This results are in agreement with the findings of Meena *et al.* (2009), Bhengra *et al.* (2010). The unweeded check recorded the least seed yield of 516 kg^{ha}⁻¹ was due to severe competition of weeds in unweeded checks results in suppression of crop growth and thereby reduction in seed yield.

Conclusion

From the study, it may be concluded that the application of Pendimethalin 1.0 kg^{ha}⁻¹ as pre-emergence on 3 DAS + Imazethapyr 75g^{ha}⁻¹ as post-emergence on 20 DAS (T₇) is considered to be a judicious recommendation to increase the growth and yield of irrigated black gram in view of inadequate labour and higher weeding cost.

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