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Short communication

Post-emergence herbicides for weed control in blackgram

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Blackgram *(Vigna mungo)* is one of the most highly prized pulse crop, cultivated in almost all parts of India. It is the cheapest available source of protein for the poor and vegetarians. Blackgram popularly known as *urdbean* or *urd* has emerged as a potential *Kharif* pulse of Chhattisgarh. It is being grown in an area around 1.81 lakh ha with a production of 5.61 lakh tons which accounts for an average productivity of 315 kg/ha in the year 2008. The major districts growing blackgram in Chhattisgarh are Bastar (41.6% area), Jashpur (30.17%), Sarguja (28.73%) and Raigarh (18.47%) (Anonymous, 2005).

Weeds are major threat in *Kharif* season which adversely affect the yield. The extent of yield reduction depends upon the density of weed species, crop varieties, weather conditions and fertility of the soil. Various methods like cultural, mechanical, biological and chemicals are used for weed control. The chemical weed control method is becoming popular among the farmers.The efficacy of pre-plant incorporated and pre-emergence herbicides for weed control is reduced by various climatic and edaphic factors. The use of post-emergence herbicides alone or in combination may broaden the window of weed management by broad spectrum weed control . Keeping the above points in the present investigation was carried out.

The experiment was carried out during *Kharif* season 2009 in the Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh. The crop received 999.7 mm of rainfall during the entire growth period. The average monthly maximum temperature for different months varied from 30.7 ^{0}C to 32.3 ^{0}C, while monthly average minimum temperature ranged between 25.1^{0}C to 25.48 ^{0}C. The experiment was done in randomized block design with 14 treatments in three replications (Table 1). Variety "*TU 94-2"* was used in the study. Plant height, no. of leaves and branchs were taken from the five tagged plants from each plot. Weed control efficiency, weed index, harvest index was calculated as per the standard formulae.

Hand weeding twice at 20 and 40 DAS produced significantly taller plants as compared to others, though it was at par to fenoxaprop-p-ethyl at 60 g/ha + chlorimuron-ethyl at 4.0 g/ha and imazethapyr at 25 g/ha. The lowest plant height was recorded in unweeded check plot at all the time interval of observations (Table 1). During initial stage, different weed management practices, failed to show their significant impact. However, at later stage significantly maximum number of leaves/plant was noted with hand weeding twice (20 and 40 DAS), though at 60 DAS, it was at par to fenoxaprop-p-ethyl at 60 g/ha + chlorimuron-ethyl at 4.0 g/ha, imazethapyr at 25 g/ha, chlorimuron-ethyl at 4.0 g/ha and othr treatments

At harvest, the number of branches/plant was significantly higher under hand weeding twice (20 and 40 DAS) than rest of the treatment except imazethapyr at 25 g/ha. The lowest was recorded under unweeded check. At harvest, dry matter accumulation was significantly higher under hand weeding twice (20 and 40 DAS) and lowest under unweeded check followed by rest of the treatments. The number of nodules was increased from 25 to 50 DAS. At 50 DAS, hand weeding twice (20 and 40 DAS) produced significantly the highest number of nodules/plant, though it was at par to herbicde treatments. More nodules count in the above treatments might be due to greater infection of *Rhizobium* in the growing roots. At 50 DAS, hand weeding twice (20 and 40 DAS) gave significantly higher dry weight of nodules, which was at par to fenoxaprop-p-ethyl at 60 g/ha + chlorimuron-ethyl at 4.0 g/ha, imazethapyr at 25 g/ha and pendimethalin at 1.0 kg/ha *fb* quizalofop-p-ethyl at 37.5 g/ha + chlorimuron-ethyl at 4.0 g/ha. Low dry weight of nodule in unweeded check might be due to more crop-weed competition. These results were in agreement with the finding of Raman *et al.* (2005).

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Table 1. Effect of different herbicides on growth parameters of blackgram

Treatment	Dose (g/ha)	Time of application	Plant height at harvest (cm)	No. of leafs/ plant (at harvest)	No. of branches/ plant	Dry matter accumulation at harvest (g)	No. of nodule/ plant (50 DAS)	Dry weight of nodule/ plant (g) (50 DAS)
Pendimethalin	1000	2 DAS	43.6	19.3	5.44	8.99	35.7	30.0
Quizalofop-ethyl	37.5	20 DAS	41.2	18.4	5.33	8.44	34.3	29.0
Chlorimuron-ethyl	4.0	20 DAS	40.1	17.3	5.11	7.68	33.7	27.7
Fenoxaprop-p-ethyl	60.0	20 DAS	41.2	18.9	5.33	8.77	35.0	29.3
Quizalofop-ethyl + chlorimuron-ethyl	37.5+4.0	20 DAS	42.3	20.0	5.66	9.07	37.0	30.3
Fenoxaprop-p-ethyl + chlorimuron-ethyl	60+4.0	20 DAS	45.7	20.5	6.11	9.64	39.1	31.3
Imazethapyr	25	2 DAS	46.3	21.5	6.22	10.04	40.0	31.7
Chlorimuron-ethyl	4.0	1 DBS	42.0	21.0	5.44	9.23	35.3	29.7
Quizalofop-ethyl + chlorimuron-ethyl	37.5+4.0	35 DAS	39.4	16.3	5.11	7.60	33.4	26.0
Fenoxaprop-p-ethyl + chlorimuron-ethyl	60+4.0	35 DAS	41.7	20.3	5.88	9.35	34.0	28.7
Pendimethalin *fb* quizalofop-ethyl + chlorimuron-ethyl	1000 *fb* 37.5+4.0	2 *fb* 35 DAS	43.7	21.1	6.00	9.49	38.2	30.0
Pendimethalin *fb* fenoxaprop-p-ethyl + chlorimuron-ethyl	1000 *fb* 60+4.0	2 *fb* 35 DAS	43.2	17.8	5.00	9.42	37.3	30.7
Unweeded check	-	-	39.0	16.0	5.00	6.83	33.3	21.7
Hand weeding twice	-	20 and 40 DAS	47.0	22.0	6.77	10.66	40.3	31.0
LSD (P=0.05)			3.35	1.98	0.64	1.13	2.67	2.8

DAS = Days after sowing; DBS = Day before sowing, *fb* = Followed by

Significantly higher seed yield was obtained with hand weeding twice (20 and 40 DAS) (0.695 t/ ha) than rest of the treatments and the lowest was recorded under unweeded check (0.343 t/ha). The yield attributes *viz*., number of pods/plant, number of seeds/ plant, number of seeds/pod, 100-seed weight were higher with hand weeding twice (20 and 40 DAS) which contributed towards the higher seeds yield (Table 2) . The increase in yield attributes under hand weeding twice (20 and 40 DAS) was due to weed management from early crop growth and higher dry matter accumulation which resulted in greater translocation of food materials to the reproductive parts and reflected in superiority of yield attributing characters and ultimately to higher yield. The lower weed density and higher weed control efficiency also resulted in higher seed yield. Crop parameters like branch/plant (6.9), pods/plant (40.7), seeds/pod (11.5) was found highest under twice hand weeded treatment. Similar findings were also reported by Gogoi *et al.* (1991) and Raman *et al.* (2005).

Harvest index was significantly influenced by various weed management practices. The maximum harvest index (39.0%) was estimated under hand weeding twice (20 and 40 DAS) due to high economic yield *i.e.* seed yield in proportion to stover yield because of low crop-weed competition. The minimum harvest index (32.86%) was obtained in fenoxaprop-p-ethyl at 60 g/ha and unweeded check due to low seed yield and more crop-weed competition.

Weed index indicate the reduction in yield due to crop-weed competition as compared to hand weeding twice (20 and 40 DAS). The maximum seed yield reduction was found under unweeded check (50.69%) and fenoxaprop-p-ethyl at 60 g/ha due to the fact that there was minimum seed yield. Whereas minimum registered in imazethapyr at 25 g/ha and fenoxaprop-p-ethyl at 60 g/ha + chlorimuron-ethyl at 4.0 g/ha. The maximum weed index was estimated under unweeded check. The weed index was influenced due to all weed management practices. Similar observation was also reported by Yadav *et al.* (1997).

The weed growth rate increased from 20-40 DAS and minimum was noted during 60 DAS-harvest time intervals. During 60 DAS-harvest, application of pendimethalin at 1.0 kg/ha *fb* fenoxaprop-p-ethyl at 60 g/ha + chlorimuron-ethyl at 4.0 g/ha recorded the lowest weed growth rate followed by hand weeding twice (20 and 40 DAS), fenoxaprop-p-ethyl at 60 g/ ha, quizalofop-p-ethyl at 37.5 g/ha + chlorimuron-

Table 2. Effect of different herbicides on weed index, weed control efficiency, harvest index and seed yield on blackgram

Treatment	Dose (g/ha)	Time of application	Weed control efficiency (%)	Weed index	Harvest index	Seed yield (kg/ha)
Pendimethalin	1000	2 DAS	51.8	27.3	34.5	505
Quizalofop-ethyl	37.5	20 DAS	38.3	33.1	35.9	465
Chlorimuron-ethyl	4.0	20 DAS	32.7	44.6	33.9	385
Fenoxaprop-p-ethyl	60.0	20 DAS	46.4	49.6	33.8	350
Quizalofop-ethyl + chlorimuron-ethyl	37.5+4.0	20 DAS	56.5	25.2	34.6	520
Fenoxaprop-p-ethyl + chlorimuron-ethyl	60+4.0	20 DAS	64.4	13.6	37.3	600
Imazethapyr	25	2 DAS	69.6	12.2	37.4	610
Chlorimuron-ethyl	4.0	1 DBS	51.6	35.9	35.7	445
Quizalofop-ethyl + chlorimuron-ethyl	7.5+4.0	35 DAS	31.8	43.2	34.2	395
Fenoxaprop-p-ethyl + chlorimuron-ethyl	60+4.0	35 DAS	55.6	32.6	36.3	468
Pendimethalin *fb* quizalofop-ethyl + chlorimuron-ethyl	1000 *fb* 37.5+4.0	2 *fb* 35 DAS	65.1	18.7	36.9	565
Pendimethalin *fb* fenoxaprop-p-ethyl + hlorimuron-ethyl	*1000fb* 60+4.0	2 *fb* 35 DAS	67.3	16.5	37.3	580
Unweeded check	-	-	-	50.7	32.8	342
Hand weeding twice	-	20&40 DAS	71.4	-	39.0	695
LSD(P=0.05)			-	-	0.67	13

DAS = Days after sowing; DBS = Day before sowing, *fb* = Followed by

ethyl 4.0 g/ha, fenoxaprop-p-ethyl at 60 g/ha + chlorimuron-ethyl at 4.0 g/ha, imazethapyr at 25 g/ha and pendimethalin at 1.0 kg/ha *fb* fenoxaprop-p-ethyl at 60 g/ha + chlorimuron-ethyl at 4.0 g/ha. However, unweeded check gave the highest weed growth rate during all the time intervals.

The highest weed control efficiency, at harvest was witnessed under hand weeding twice (71.45%) followed by imazethapyr at 25 g/ha (69.63%) (Table 2). This was due to less dry matter production and density of weeds which resulted by successfully checking the weed growth in the above treatments. The minimum was found under quizalofop-p-ethyl at 37.5 g/ha + chlorimuron-ethyl at 4.0 g/ha (31.81%).

SUMMARY

Experiment was conducted in the Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh during *Kharif* season 2009. The treatment comprised of 14 weed management practices and blackgram variety "*TU 94-2*". The results revealed that higher plant population, plant height, number of leaves, number of branches, dry matter accumulation, number of nodules, dry weight of nodules, crop growth rate, seed yield, weed growth rate, weed control efficiency and harvest index were obtained under hand weeding twice (20 and 40 DAS), followed by imazethapyr at 25 g/ha pre-emergence and minimum was obtained under unweeded check.

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