AGRIWAYS | VOLUME 1 | ISSUE 1 | JUNE, 2013 | 32-37

RESEARCH ARTICLE

STUDIES ON THE EFFICACY OF DIFFERENT HERBICIDES AGAINST WEEDS OF BLACK GRAM (*Vigna mungo* L.)

■ Ram Pyare, Vishram Singh and Kedar Prasad Kushwaha

Department of Agronomy, C.S.AzadUniversity of Agriculture and Technology, Kanpur *(U.P.)* INDIA

ABSTRACT

A field experiment was conducted at the Students Instructional Farm of Chandra Shekhar Azad University of Agriculture and Technology, Kanpur during Kharif season 2009 and 2010 evaluate the efficacy of different herbicides against weeds of black gram crop. Results revealed that used of Clethodium 24%EC @48g.a.i./ha+AMS were lowest dry weight of weeds (8.96g) and higher weed control efficiency (26.98%) than remaining tested herbicides in first year while, in second year the dry weight of weeds (6.59g) and maximum weed control efficiency (33.16%) were observed with the application of Clethodium 24%EC @60g.a.i./ha + NIS+AMS. The growth attributes viz., plant population (23.3 and 25.1), dry weight (25.00 and 27.15g) and branches/ plant (3.33 and 3.37) and yield attributes viz., grains/ pod (6.30 and 7.05) and test weight (37.53 and 38.12 g) were highest in Clethodium 24%EC @60g.a.i./ha +NIS+AMS during both the years. The highest seed yield of 6.90 and 10.12 q/ha and maximum net return Rs.9232 and Rs.19788/ha was obtained with the spraying of Clethodium 24% EC @60g.a.i./ha + NIS+AMS in first and 2nd year experimentations, respectively. .

Key **W**ords : *Herbicides, weeds, Black gram***.**

Food legumes constitute an important source of dietary proteins of the people in Asia, Africa, Latin America and other developing countries of the world. In developing countries like India, the pulses have been as “poor man’s meat”. Pulses restore soil fertility through biological nitrogen fixation and green manuring, supply of nutrients, fodder feed to cattle and an indispensable constituent of Indian diet. The pulse production in India is about 17.29 million tonnes from a land area about 23.05 million hectare (FAO, 2011). In India black gram is grown in almost all the states. It is grown in about 3.1 million hectare area with a production of 1.49 million tonnes (Annonymous, 2006). In spite of having many qualities, area and production of pulses remain stagnated because dramatic increase in cereal production which has pushed the ratio of cereals/ pulses production. Their production need to be increased by about three folds. In U.P. it is mainaly grown in K*harif* season. Associated weeds with crop not only compete for nutrients, moisture and light but space too. Timely control of nature and intensity of weeds can significantly improve the yield of urdbean. Different types of weeds i.e. grasses, broad leaves and sedges compete jointly or individually with different growth factors. Under these circumstances, use of herbicides may be desirable for the control of weeds particularly at early stages which will control the emerged and emerging weeds for a substantial period of time. During the recent years the chemical weed control in black gram has attracted the attention of research workers. Therefore, the present investigation was undertaken to develop an effective and economical weed control schedule in *Kharif* black gram.

MATERIALS AND METHODS

A field experiment was conducted at SIF, during kharif 2009 and 2010, respectively. The variety Shekhar-2 was sown on dated: 12.07.2009 and 26.07.2010 at row spacing of 40 cm. Soil was sandy loam having 7.6 pH, 0.40% organic carbon, available N 183.0 kg/ha, P 18.0 kg/ha and K 235.0 kg/ha. The treatments comprised of eleven combinations viz., *Clethodium* 24%EC @36g.a.i./ha+NIS+AMS, *Clethodium* 24%EC @48g.a.i./ha+NIS+AMS, *Clethodium* 24%EC @60g.a.i./ha+NIS+AMS, *Clethodium* 24%EC @48g.a.i./ha+NIS,

Clethodium 24%EC @48g.a.i./ha+AMS, *Quizalofop- Ethyle @50g.a.i./ha, Fenoxaprop-P- Ethyle 9.3%EC @67.50g.a.i./ha*, two hand weeding, untreated plot (control) and higher dose of *Clethodium* 24%EC @96g.a.i./ha+NIS+AMS. The dose of Non Ionic Surfactant (NIS) is used 0.25% and Ammonium Sulphate (AMS) is used 4.0g/L. Experiment was laid out in Randomized Block Design with 3 replications. Remaining agronomic practices were adopted as per recommendation of the crop. The herbicides was sprayed 20-25 days after sowing and/or 3 to 5 leaf stage during both the year. The crops were harvested on dated: 21-10-2009 in first year and 13.10.2010 in second year. The observations were recorded on weeds and crop related growth characters, yield attributes and yields. The economics of treatments were also worked out on the basis of market prices of different inputs and produce. Weed control efficiency is calculated with the help of following formula:-

$$\text{W.C.E.}(\%) = \frac{\text{Dry wt. of weeds in control plot} - \text{Dry wt. of weeds in treated plot}}{\text{Dry wt. of weeds in control plot}} \times 100$$

RESULTS AND DISCUSSION

The Results obtained from the present investigation has been discussed below :

Weed studies :

Weed population:

The maximum weed populations of *D. arvensis* (4.98 and 5.10) were recorded in untreated ((control)) plots and lowest weed population in two hands weeding of 3.52 and 3.12 during the both year of study. Among the weedicides used the lowest weed population of *D. arvensis* was recorded in Quizalofop-Ethyl 5%EC @50g.a.i. (3.54) followed by *Clethodium 24%EC @60g.a.i./ha+NIS+AMS* in first year and 3.15 in *Clethodium 24%EC @60g.a.i./ha* and 3.81 in *Quizoalofop-Ethyl5%EC @50g.a.i./ha* in second year of study, respectively. The population of *T. monogyna* weeds was highest recorded under treatment of untreated (control) plot (2.83 and 2.75) closely followed by application of *Quizoalofop-Ethyl 5%EC @50g.a.i./ha* (2.36 and 2.13/m^2) during 2009-10 and 2010-11 years, respectively. However, lowest weed population (1.55 and 1.67/m^2) were found in two hand weeding during both the year followed by use of *Clethodium 24%EC @60g.a.i./ha +NIS+AMS* (1.85/m^2) and 1.67/m^2 in first year and second year, respectively. The highest population of *C. rotundus* weed (11.92 and 11.67/m^2) was noted under untreated (control) plot, clearly followed by *Clethodium 24%EC @48g.a.i./ha* (9.50 and 8.18/m^2) during both the year. The lowest weed population of 7.39 and 6.56/m^2 were counted in two hands weedings during both the year. Use of *Clethodium 24%EC @36g.a.i./ha +NIS+AMS* (7.40) and *Fenoxaprop-Ethyl 5%EC @67.50g.a.i./ha* (7.44/m^2) had at par weed density in first year while in second year *Clethodium 24%EC @48g.a.i./ha +NIS* (7.17/m^2). The *L. chinensis* showed highest weed population (7.76 and 7.81/m^2) at untreated ((control)) plots. It

Table-1: Weed population/m^2 in Blackgram under different weed control treatments

Treatments	D. arvensis		T. monogyna		C. rotundus		L. chinensis		P. hysterophorus	
	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11
Clethodium 24% EC @36g.a.i.+NIS+AMS	4.62	4.51	2.12	2.00	7.40	7.20	7.40	7.31	2.80	2.50
Clethodium 24% EC @48g.a.i.+NIS+AMS	4.10	4.35	2.07	1.97	7.51	7.31	7.10	6.95	4.28	3.13
Clethodium 24% EC @60g.a.i.+NIS+AMS	3.93	3.15	1.85	1.67	7.87	7.60	5.92	5.16	2.71	2.13
Clethodium 24% EC @48g.a.i.+NIS	4.94	4.61	1.97	1.85	8.08	7.17	5.66	5.42	3.24	3.00
Clethodium 24% EC @48g.a.i. AMS	4.21	4.12	1.94	1.75	8.68	8.13	6.61	6.31	4.66	3.90
Clethodium 24% EC @48g.a.i.	4.25	4.21	2.06	1.91	9.50	8.18	7.05	6.97	3.02	2.80
Quizalofop Ethyle 5% EC @50 g.a.i.	3.54	3.81	2.36	2.13	7.76	7.68	5.94	5.80	2.70	2.11
Fenoxaprop-P- Ethyle 9.3% @67.50g.a.i.	4.06	3.90	2.21	2.10	7.44	7.33	7.21	7.00	4.21	3.19
Two hand weeding	3.52	3.12	1.55	1.67	7.39	6.56	4.27	4.01	2.31	1.97
Untreated (Control)	4.98	5.10	2.83	2.75	11.92	11.67	7.76	7.81	6.23	6.20
Clethodium 24% EC @96g.a.i.+NIS+AMS	3.57	3.59	1.97	2.13	8.61	8.41	6.22	6.23	6.21	6.15
SE (d)	0.23	0.20	0.27	0.12	0.44	1.02	0.42	0.26	0.41	0.17
C.D. at 5%	0.48	0.41	0.57	0.24	0.92	2.12	0.88	0.55	0.86	0.35

was closely followed by *Clethodium 24%EC @36g.a.i./ha+NIS+AMS* (7.40 and 7.31/m^2), whereas, lowest weed population (4.27 and 4.01/m^2) was found in two hand weeding during both the years. Weed population 5.66/m^2 at *Clethodium 24%EC @48g.a.i./ha +NIS+AMS* in first year and 5.16/m^2 at *Clethodium 24%EC @60g.a.i./ha +NIS+AMS* in second year, respectively. The highest population of *P. hysterophorus* (6.23 and 6.20/m^2) was recorded under untreated (control) plots. However, lowest weed population (2.31 and 1.97/m^2) under two hand weeding followed by *Quizalofop-Ethyl 5%EC @50g.a.i./ha* (2.67 and 2.11/m^2) during both the year (Table-1). Beneficial effect of different herbicides on weed population in control plot of black gram has also been reported by Veeruputhian *et. al.* (2008), Akhtar *et. al.* (2009) and Rao *et. al.* (2010) under varied agro-climatic conditions. However, all herbicidal treatments reduced weed population as compared untreated (control) plot.

Dry weight of different weeds:

The highest dry weight of *D. arvensis* (2.78 and 3.67g) was recorded under untreated (control) treatments and lowest dry weight was recorded with two hand weeding of 1.49 and 1.15g during both the year followed by *Clethodium 24%EC @48g.a.i./ha* (2.16g) in first year and *Clethodium 24%EC @60.a.i./ha +NIS+AMS* (1.75g) in second year of study. The highest dry weight of *T. monogyna* (3.39 and 3.19g) was recorded under untreated (control) plots and lowest with two hand weeding of 2.47 and 2.15g during both year and closely followed by *Clethodium 24%EC @48g.a.i./ha* of 2.49g in first year and *Clethodium 24%EC @60g.a.i./ha* of (2.37g) in second year of study. The highest dry weight of *C. rotundus* (1.28 and 1.12g) was found in untreated (control) plots, closed followed by *Quizalofop-Ethyl 5%EC @ 48g.a.i./ha* (1.21 and 1.11g). It was lowest in *Clethodium 24%EC @60g.a.i./ha +NIS+AMS* (0.72 and 0.63g) during both the year. The dry weight of *L. chinensis* (1.72 and 1.65g) was found highest in untreated (control) plot and lowest (1.19 and 1.00g) in two hand weeding during both the year and at equal *Clethodium 24%EC @36g.a.i./ha+NIS+AMS*(1.19g) only in first year and followed by Clethodium 24%EC @60g.a.i.+NIS+AMS (1.05g) in second year, respectively. The *P. hysterophorus* weed had highest dry weight (3.10 and 1.23g) in untreated (control) plot, and lowest (1.74 & 0.65g) in two hand weeding, closed followed by *Clethodium 24%EC @60g.a.i./ha* (1.87 and 0.79g) during the both years whereas, the higher dose of *Clethodium 24%EC @96g.a.i./ha +NIS+AMS* the dry weight of all the weeds minimum but their effect on crops was clear (Table-2). The lowest dry weight of all type weeds were recorded in *Clethodium 24%EC @48g.a.i./ha+AMS*of 8.96g in first year and in*Clethodium 24%EC @60g.a.i./ha +NIS+AMS* of 6.59g in second year and among the all treatment the minimum in two hand weeding of 7.75g and 5.68g in both the years, respectively. These results may be supported by the findings of Raman (2006), Akhtar *et.al.* (2009) and Rao *et.al.* (2010) confirm the results.

Weed control efficiency:

The highest weed control efficiency of 26.98% was recorded under *Clethodium 24%EC @48g.a.i.+AMS* and followed by *Clethodium 24%EC @36g.a.i./ha + NIS+AMS* (24.94%) in first year, while in second year it was highest in *Clethodium 24%EC @60g.a.i./ha* +NIS+AMS (36.16%)

Table-2: Dry weight of weeds (g) per m^2 in Blackgram under different treatments

Treatments	D. arvensis		T. monogyna		C. rotundus		L. chinensis		P. hysterophorus	
	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11
Clethodium 24% EC @36g.a.i.+NIS+AMS	2.40	2.17	2.70	2.51	0.99	1.00	1.19	1.09	1.93	0.99
Clethodium 24% EC @48g.a.i.+NIS+AMS	2.58	2.41	3.12	3.10	0.87	0.95	1.33	1.12	2.09	1.00
Clethodium 24% EC @60g.a.i.+NIS+AMS	2.34	1.75	3.29	2.37	0.72	0.63	1.20	1.05	1.87	0.79
Clethodium 24% EC @48g.a.i.+NIS	2.39	2.19	3.35	3.10	0.95	0.90	1.40	1.30	2.02	0.98
Clethodium 24% EC @48g.a.i. AMS	2.23	3.00	2.49	2.85	0.90	0.78	1.32	1.15	2.02	1.00
Clethodium 24% EC @48g.a.i.	2.16	2.00	2.89	2.79	0.88	0.81	1.44	1.22	1.93	1.07
Quizalofop Ethyle 5% EC @50 g.a.i.	2.34	2.75	3.23	3.13	1.21	1.11	1.21	1.10	1.92	1.00
Fenoxaprop-P- Ethyle 9.3% @67.50g.a.i.	2.54	2.48	3.17	2.91	0.80	0.70	1.21	1.10	1.89	0.97
Two hand weeding	1.49	1.15	2.47	2.15	0.86	0.73	1.19	1.00	1.74	0.65
Untreated (Control)	2.78	3.67	3.39	3.19	1.28	1.12	1.72	1.65	3.10	1.23
Clethodium 24% EC @96g.a.i.+NIS+AMS	2.27	2.00	3.23	3.15	0.94	1.00	1.32	1.20	1.70	0.60
SE (d)	0.21	0.17	0.22	0.16	0.11	0.08	0.12	0.11	0.24	0.09
C.D. at 5%	0.45	0.36	0.46	0.33	0.22	0.18	0.26	0.23	0.49	0.20

Table 3: Dry weight of weeds andweed control efficiency of all weeds in black gram during 2009- 10 and 2010- 11

Treatment	Dry weight of all type weeds (g)		Weed control efficiency (%)	
	2009-10	2010-11	2009-10	2010-11
Clethodium 24%EC @36g.a.i./ha + NIS+ AMS	9.21	7.76	24.94	21.30
Clethodium 24%EC @48g.a.i./ha + NIS+ AMS	9.99	8.58	18.58	12.98
Clethodium 24%EC @60g.a.i./ha + NIS+ AMS	9.42	6.59	23.23	33.16
Clethodium 24%EC @48g.a.i./ha + NIS	10.11	8.47	17.60	14.10
Clethodium 24%EC @48g.a.i./ha + AMS	8.96	8.78	26.98	10.95
Clethodium 24%EC @48g.a.i./ha	9.30	7.89	24.21	19.98
Quizalofop-Ethyle 5%EC @50g.a.i./ha	9.91	9.09	19.23	7.81
Fenoxaprop-P-Ethyle 9.3%EC @67.50g.a.i./ha	9.61	8.16	21.68	17.24
Two hand weeding	7.75	5.68	36.84	42.39
Untreated (control)	12.27	9.86	-	-
Clethodium 24%EC @96g.a.i./ha + NIS + AMS	9.26	7.95	24.53	19.37

among the weedicides and maximum of 36.84% and 42.39% in two hand weeding during both the years, respectively (Table-3). Subramanian *et.al.* (2006) reported that the two hands weeding at 25 and 45 days after sowing had high as weed control efficiency.

Crop studies :

Growth and yield attributes:

The plant height was significantly highest (46.66cm) in two hand weeding and followed by *Clethodium 24%EC @48g.a.i./ha +NIS* (45.00cm) during first year but in second year higher *Clethodium 24%EC @60g.a.i./ha+ NIS+AMS* (47.56cm) at par two hand weeding (47.15cm). However, significantly dwarf was recorded in the treatment of untreated control plot in both the years. Dry weight was registered highest in two hand weeding (27.00 and 27.35g) however, *Clethodium 24%EC @60g.a.i./ha +NIS+AMS* and *Fenoxaprop-P-Ethyle 9.3% @67.50g.a.i./ha* were found at par with two hand weeding during both the years except *Fenoxaprop-P-Ethyle 9.3%EC @67.50g.a.i./ha* in second year. Lowest dry weight was recorded in untreated control plot and highest dose of *Clethodium 24%EC @96g.a.i./ha +NIS+AMS* during both the years. Among herbicides *Clethodium* at dose rate of 60g.a.i./ha and applied two hand weeding also had better control of weeds thus crop plants faced lesser competition for nutrients space and maximum use of solar radiation etc and improved the growth attributes viz., plant height and dry weight. On the other hand, uncontrolled weeds in untreated plots posed maximum competition for crop plants thus their growth was poorest. These results are in agreement to the findings of Kalyanasunderam *et.al*., (2005) and Mishra, (2004). The maximum branches were recorded with application of *Fenoxaprop-P-Ethyle 9.3% @67.50g.a.i./ha* (4.00g) in first year and with two hand weeding (3.50) in second year followed by *Clethodium 24%EC @60g.a.i./ha +NIS+AMS* (3.33g) and two hand weeding (3.32g) in first year and by *Clethodium 24%EC @60g.a.i./ha +NIS+AMS* (3.37g) in second year only. However, a minimum branches were recorded with untreated control plot (1.00g and 1.00g) during both the years, respectively. The number of pods/plant were found highest with two hand weeding (

ntrol plot (36.12g) followed by *Pendimethailin 30%EC @750g.a.i./ha* (36.47g) in second year of field trial. Superiority of applied two hand weeding and use of *Clethodium 24%EC @60g.a.i./ha +NIS+AMS* treatments might be due to reduced crop weed competition because of efficient weed control and improved the yield attributes. These results are in closed conformity to those of Singh *et.al*. (2006) and Debnath (2008).

Yields :

The highest grain yield of 8.50 and 10.67q/ha were produced with two hand weeding followed by *Clethodium 24%EC @60g.a.i./ha +NIS+AMS* (6.90 and 10.12q/ha) in first and second years of experimentations, respectively. However, the lowest grain yield was recorded under untreated plot (5.58q/ha) in first year and under *Fenoxaprop-Ethyl 9.3%EC @67.50g.a.i./ha* (6.13 q/ha) in second year, respectively. Among weedicides the application of *Clethodium 24%EC @60g.a.i./ha +NIS+AMS* produced the highest grain yield of Black gram during both the years of study. On an average the use two hand weeding increased the grain yield to the tune of 3.21q/ha (50.31%), 2.85q/ha (42.28%), 1.08q/ha (12.69%), 3.29q/ha (52.22%), 3.18q/ha (49.61%), 3.15q/ha (48.91%), 3.02q/ha (45.97%), 3.54q/ha (58.51%), 3.33q/ha (53.19%), and 3.52q/ha (57.99%) over *Clethodium 24%EC @36g.a.i./ha +NIS+AMS, Clethodium 24%EC @48g.a.i./ha +NIS+AMS, Clethodium 24%EC @60g.a.i./ha +NIS+AMS, Clethodium 24%EC @48g.a.i./ha +NIS, Clethodium 24%EC @48g.a.i./ha +AMS, Clethodium*

Table 4 : Growth and yield attributes of blackgram as affected by herbicides during 2009- 10 and 2010 - 11

Treatments	Plant population		Plant height (cm)		Dry weight (g)		Branches/plant		Pods/plant		Grains/pod		Test weight (g)	
	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11
Clethodium 24% EC @36g a i +NIS+AMS	19.66	21.37	37.33	38.11	20.00	20.12	1.90	1.95	30.99	31.35	5.06	5.25	36.06	36.57
Clethodium 24% EC @48g.a.i.+NIS+AMS	22.00	22.75	39.66	41.25	17.00	22.00	2.00	2.10	27.66	32.00	5.73	5.75	37.40	37.67
Clethodium 24% EC @60g.a.i.+NIS+AMS	23.33	25.12	44.66	47.56	25.00	27.15	3.33	3.37	29.88	34.87	6.30	7.05	37.53	38.12
Clethodium 24% EC @48g.a.i.+NIS	18.66	23.33	45.00	45.40	21.00	24.97	2.33	2.83	29.88	32.80	5.86	6.33	36.67	37.32
Clethodium 24% EC @48g.a.i. +AMS	21.33	22.50	37.66	38.17	23.00	22.25	3.00	3.00	28.77	32.20	6.20	6.85	37.46	37.50
Clethodium 24% EC @48g.a.i.	22.66	24.67	41.66	42.33	19.00	22.95	2.33	2.85	26.21	30.60	5.73	6.25	36.66	37.30
Fenoxaprop-P- Ethyle 9.3%@67 50g a i.	16.66	19.66	44.66	45.22	25.00	23.00	4.00	3.00	29.66	31.15	5.33	5.88	36.33	36.85
Pendimethalin 30%EC @750g.a.i./ha	22.00	24.35	39.66	42.00	17.00	22.50	2.33	2.53	27.00	30.90	5.33	6.00	35.00	36.47
Two hand weeding	20.00	24.85	46.66	47.15	27.00	27.35	3.32	3.50	32.77	35.31	6.86	7.15	37.89	38.33
Untreated (Conurol)	22.00	19.35	34.33	35.27	11.00	14.75	1.00	1.00	23.44	27.11	4.76	4.85	36.03	36.12
Clethodium 24% EC@96 g.a.i. + NIS+ AMS	22.00	21.75	39.66	38.35	11.00	15.52	2.00	1.85	29.66	28.75	5.66	5.20	37.33	36.57
SE (d)	1.79	1.02	1.64	1.71	1.86	1.28	0.36	0.21	1.81	1.85	0.53	0.43	0.55	0.52
C.D. at 5%	3.73	2.13	3.42	3.56	3.87	2.66	0.75	0.45	3.78	3.86	1.11	0.88	1.14	1.07

24%EC @48g.a.i./ha, Quizalofop Ethyle 5%EC @50g.a.i./ha, Fenoxaprop-P-Ethyle 9.3%EC @67.50g.a.i./ha, untreated control plot and higher dose of *Clethodium 24%EC @96g.a.i./ha +NIS+AMS,* respectively. The highest straw yield (17.43 and 19.97 q/ha) were obtained in two hand weeding followed by *Clethodium 24%EC @60g.a.i./ha+NIS+AMS* (16.11 and 19.12q/ha) during both the years, respectively. Whereas, lowest straw yields were recorded at untreated (control) plot (12.23 and 12.97q/ha) in all treatments during both the years (Table-5). These results are in accordance to the finding of Tewari *et.al.* (2004), Veeraputhiran *et.al.* (2008) and Pal and Debinath (2008) and supermacy of hand weeding over herbicides in crop yields might be due to improvement in soil condition and efficient weed control.

Economics:

The net profit was the highest of Rs.13916 and Rs.23007/ha at two hand weeding followed by the use of *Clethodium 24%EC @60g.a.i./ha+NIS+AMS* of Rs.9232/ha and Rs.19788/ha and lowest in *Clethodium 24%EC @96g.a.i./ha +NIS +AMS* of Rs.5021 and Rs.5987/ha during both the years of study, respectively. Whereas, the higher dose of *Clethodium 24%EC @ 100g.a.i./ha* control all the weeds maximum but their effect on crops was harmful. On an average, two hand weeding increased the net profit to the margin of Rs.11796/ha (47.98%), Rs.11242/ha (44.72%), Rs.3952/ha (12.19%), Rs.11963/ha (49.00%), Rs.12018/ha (49.33%), Rs.11111/ha (43.97%), Rs.11717/ha (47.51%), Rs.12996/ha (55.58%), Rs.12590/ha (52.92%) and Rs.12975/ha (55.44%) than *Clethodium 24%EC @36g.a.i./ha +NIS+AMS, Clethodium 24%EC @48g.a.i./ha +NIS+AMS, Clethodium 24%EC @60g.a.i./ha +NIS+AMS, Clethodium 24%EC @48g.a.i./ha +NIS, Clethodium 24%EC @48g.a.i./ha +AMS, Clethodium 24%EC @48g.a.i./ha, Quizalofop Ethyle 5%EC @50g.a.i./ha, Fenoxaprop-P-Ethyle 9.3%EC @67.50g.a.i./ha,* untreated plotandhigher dose of *Clethodium 24%EC @96g.a.i./ha +NIS+AMS,* respectively. The Return per rupee investment was maximum of 1.75 and 2.33 at two hand weeding followed by *Clethodium 24%EC @60g.a.i./ha* of 1.52 and 2.07 during both the year, respectively. The minimum Return per rupee was obtained by the *Clethodium 24%EC @100g.a.i./ha +NIS+AMS* of 1.27 and 1.33 ratio because, of their phytotoxiciy affect on crop (Table-5). These results may be supported by the findings of Rao *et.al*. (2010).

REFERENCES

Anonymous (2006). Hand Book of Agriculture. *Pub. ICAR, New Delhi, ISBN, 81-7164-050-8.* PP- 925.

Table-5: Yields (q/ha) and economics (Rs/ha) of Blackgram under different treatment during 2009 – 10 and 2010 – 11

Treatments	Grain yield		Straw yield		Gross income		Net income		Return per rupee	
	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11
Clethodium 24% EC @36g.a.i.+NIS+AMS	5.85	6.90	14.33	15.67	22664	26501	5590	10427	1.43	1.65
Clethodium 24% EC @48g.a.i.+NIS+AMS	6.33	7.15	13.00	14.13	23129	27145	6227	10243	1.36	1.61
Clethodium 24% EC @60g.a.i.+NIS+AMS	6.90	10.12	16.11	19.12	26566	38288	9232	19788	1.52	2.07
Clethodium 24% EC @48g.a.i.+NIS	5.72	6.87	15.42	16.19	22357	26474	5652	9769	1.45	1.58
Clethodium 24% EC @48g.a.i. +AMS	5.85	6.97	12.36	13.15	22353	26368	5703	9718	1.34	1.58
Clethodium 24% EC @48g.a.i.	6.03	6.85	13.50	13.75	24498	26038	8298	9738	1.49	1.60
Quizalofop Ethyle 5% EC @50 g.a.i.	6.00	7.13	16.00	16.79	21850	27474	5664	12138	1.47	1.79
Fenoxaprop-P- Ethyle 9.3% @67.50g.a.i.	5.97	6.13	13.00	14.13	23190	23575	7183	7901	1.45	1.50
Two hand weeding	8.50	10.67	17.43	19.97	32416	40341	13916	23007	1.75	2.33
Untreated (Control)	5.58	6.93	12.23	12.97	21377	26201	6327	11151	1.41	1.74
Clethodium 24% EC @96g.a.i.+NIS+AMS	5.94	6.19	14.28	14.81	22921	23887	5021	5987	1.27	1.33
SE (d)	0.33	0.45	0.87	0.80	1453	1079	367	569	0.06	0.14
C.D. at 5%	0.99	0.95	1.808	1.68	3032	2251	746	1187	0.14	0.30

Akhtar M W, Dwaipayan S, Alam S and Chaudhary A (2009). Degradation dynamic of dinitroaniline herbicides (Trifluralin) on urd bean (*Vignamungo L Hepper*) under East Indian climate condition. *Electronic Journal of Environment Agriculture and food chemistry*. 8 (11): 1172-1177.

Kalyansundaram D, Kumar S R V and Santhikumar K P (2005). Residual effect of butachlor applied with organic manure in direct sown rice on succeeding blackgram. *Plant Archives*, **5** (2): 585-587.

Mishra, J.S., Bhan, M. Moorthy, B.T.S. and Yaduraju, N.T.(2004). Bio-efficiency of herbicides against cuscutta in Urdbean (*Vignamungo L Hepper*). *Indian Journal of Weed Science*, **36** (3/4): 278-279.

Pal A K and Debnath S (2008). Effect of nonmonetary inputs on productivity of blackgram (*Vignamungo L Hepper*). *Environment and Ecology*, **26** (3A): 1269-1272.

Rao A S, Rao G S and Ratan M (2010). Bio-efficiency of sand mix application of pre-emergence herbicides alone and in sequence with imazethapur on weed control in relay crop of blackgram, *Pakistan Journal of Weed Research*, **16** (3): 279-285.

Raman R (2006). Impact of weed management practices on the growth and yield of urdbean (*Vignamungo L Hepper*) *Crop Rearch Hisar*, **32** (1): 24-26.

Singh V, Gautam R C and Kumar S (2006). Performance of *Kharif* urdbean as influenced by row spacing and weed management practices. *Indian Journal of Pulse Research*, **14** (1): 119-120.

Subramanium E, Martin G J and Balasubramanium R (2006). Effect of integrated weed management practices on growth and yield of wet seeded rice (*Oryza sativa*) and their residual effect on succeeding pulse crop. *Indian Journal of Agronomy*, **51** (2): 93-96.

Tiwari A N, Rathi J P S, Tiwari S N and Tripathi A K (2004). Effect of Imazethapur a selective herbicides in green gram with special reference to parthenium hysterophorus control. *Farm Science Journal*, **13** (2): 114-115.

Veeraputhiran R, Srinivasan S and Chinnaswamy C (2008). Evaluation of post emergence herbicides and its time of application on black gram under rice fallow condition. *Madras Agriculture Journal.*, **95** (7/12): 376-379.

****