Indian Journal of Weed Science 42(1&2) : 98-100, 2010 **Short communication**

Efficacy of new herbicides in *kharif* pigeonpea under south Saurashtra condition

Babulal Meena, B.K. Sagarka and R.R. Pisal
Department of Agronomy, Junagadh Agricultural University, Junagadh (Gujarat)
E-mail : rrpagri@gmail.com

ABSTRACT

***Panicum colonum*, *Celosia argentea*, *Commelina benghalensis*, *Eragrostis major*, *Cyperus rotundus* and *Digera arvensis* were the dominant weeds in pigeonpea. Integration of pendimethalin as pre-emergence, quizalofop ethyl as post-emergence and oxadiargyl as pre-emergence with one hand weeding and one interculture operation at 40 days after sowing (DAS) proved effective in reducing total weed density and dry weight of weeds. The maximum growth parameters, yield attributes and yield were significantly recorded under weed free condition which was closely followed by pendimethalin 900 g/ha as pre-emergence with one hand weeding and one inter-culturing at 40 DAS, quizalofop ethyl 40 g/ha as post-emergence with one hand weeding and one interculturing at 40 DAS and oxadiargyl 90 g/ha as pre-emergence with one hand weeding and one interculturing at 40 DAS. Chemical analysis of plant indicated that weed free treatment gave maximum N, P and K uptake in grain as well as in stover. Integration of pendimethalin, quizalofop ethyl and oxadiargyl with one hand weeding and one interculturing were found at par with weed free. The maximum net return was acquired under pendimethalin 900 g/ha as pre emergence with one hand weeding and one interculturing at 40 DAS closely followed by, weed free, quizalofop ethyl 40 g/ha as post emergence with one hand weeding and one interculturing at 40 day after sowing and oxadiargyl 90 g/ha as pre emergence with one hand weeding and one interculturing at 40 DAS.**

Key words : Pigeonpea, Chemical control, Saurashtra region

Pigeonpea [*Cajanus cajan* (L.) Millsp.] commonly known as red gram, *tur* or *arhar* is the fifth prominent legume crop in the world and second in India after chickpea. Crop yield losses due to weeds have been estimated to range from 55 to 60% (Kandasamy, 1999). The predominant method of weed control by mechanical hoeing and manual weeding over extensive scale is found to decline because of shift of agricultural labourers to industries for better and assured wages. The use of herbicides alone or in combination with other weed control techniques reduces the crop weed competition and the risk of weeds growing unchecked in period of adverse weather. The integrated weed management approach is advantageous because one technique rarely achieve complete long and effective control of all weeds during crop season. Therefore the present investigation was undertaken to provide appropriate options to farmers for effective weed management in *kharif* pigeonpea.

An experiment was conducted during *kharif* season of 2008-09 at Junagadh Agricultural University, Junagadh (Gujarat). The soil of the experimental field was clay in texture, medium in available nitrogen, phosphorus and potash and slightly alkaline in reaction with pH and EC 7.9 and 0.32/dsm respectively. A total of 12 treatments was assigned in randomized block design with three replications. The pigeonpea variety *BDN-2* was sown at 90 cm row spacing and 20 cm plant spacing at 15 kg seed/ha on July 05 and harvested on January 20. Pendimethalin 900 g/ha and oxadiargyl 90 g/ha were sprayed next day of sowing and quizalofop ethyl 40 g/ha and oxadiargyl 90 g/ha were sprayed on 20 and 40 DAS at spray volume of 500 lit/ha. Spraying was done by manually operated Knapsack sprayer. Follow up weeding and interculture operation after herbicide application as per treatment. The crop was grown with standard package of practices for the region.

Effect on weeds

The predominant weeds recorded on the experimental site were *Celosia argentea* L, *Commelina benghalensis* L., *Eragrostis major* Host, *Cyperus rotundus* L., *Digera arvensis* Forsk, *Indigoflora glandulosa* L., *Euphorbia hirta* L., *Amaranthus viridis* L., *Panicum colonum* L. Among herbicide treatments pre-emergence pendimethalin and oxadiargyl resulted in excellent control of monocot and dicot weeds (Table 1). Post-emergence application of quizalofop ethyl and oxadiargyl resulted in excellent control of monocot weeds and dicot weeds respectively. However, integration of one hand weeding and one interculturing with pendimethalin 900g pre-emergence, quizalofop ethyl 40g post emergence and oxadiargyl 90g pre-emergence proved more effective in reducing the weed density at harvest in comparison to

Table 1. Effect of different treatments on monocot and dicot weeds population, dry weight of weeds, weed control efficiency.

Treatments	Monocot weeds/m^2 at harvest	Dicot weeds/m^2 at harvest	Dry weight of weeds (g/m^2)	Weed control efficiency(%)	Weed index (%)
Pendimethalin (PE) *fb*1HW+	2.5 (14.4)	3.8 (13.8)	25 (63)	83.3	8.22
IC at 40 DAS Oxadiargyl (PE)	4.7 (12.4)	7.5 (55.0)	46 (215)	43.0	41.36
Oxadiargyl (PE) *fb* HW at 40 DAS	3.6 (12.6)	4.4 (18.7)	30 (89)	76.5	29.22
Quizalofop-ethyl (POE) at 20 DAS	4.4 (4.5)	7.5 (55.6)	46 (207)	49.2	38.36
Quizalofop-ethyl (POE) at 20 DAS *fb* 1HW and IC at 40 DAS	2.6 (6.1)	4.0 (15.3)	27 (74)	80.3	15.07
Oxadiargyl (POE) at 20 DAS	4.3 (6.0)	7.7 (58.1)	49 (237)	37.1	42.92
Oxadiargyl (POE) *fb*1HW and IC at 40 DAS	2.7 (6.7)	4.1 (16.1)	28 (82)	78.3	16.44
Pendimethalin as (PE) *fb* quizalofop-ethyl (POE) at 40 DAS	4.0 (3.9)	4.4 (18.7)	31 (93)	75.4	33.79
Pendimethalin (PE) *fb* oxadiargyl (POE) at 40 DAS	3.8 (3.6)	5.0 (24.4)	32 (1037)	72.5	35.16
Two HW at 20 and 40 DAS	3.6 (10.3)	4.2 (17.4)	29 (85)	77.5	25.11
Weed free	0.7 (0.0)	0.7 (0.0)	0.71 (0.0)	100.0	0.0
Unweeded control	6.8 (46.1)	7.9 (62.1)	61 (378)	0.0	50.68
LSD (P=0.05)	0.4	0.4	4.8	-	-

Note : $\sqrt{x + 0.5}$ transformation (figures in parenthesis are original values). PE- Pre-emergence, POE- Post-emergence, IC-Inter cultivation, HW- Hand weeding, DAS- Days after sowing

herbicides applied alone. Pendimethalin 900 g/ha pre-emergence, 40 g/ha quizalofop ethyl post-emergence at 20 DAS and oxadiargyl 90 g/ha, followed by one hand weeding and one interculturing operation at 40 DAS significantly reduce the weed dry weight and gave higher weed control efficiencies of 83.29, 80.26 and 78.30%, respectively. Integrated treatments also recorded lower weed index as compare to sole herbicides, 2 hand weeding as well as unweeded control. This might be due to the efficient control of dicot weeds by hand weeding and interculturing or application of herbicides. These findings are in concurrence with those of Sukhadia *et al*. (2000) and Idapuganti *et al.* (2005).

Effect on crop

Though plant height, number of branches per plant, number of pods per plant and grain and stover yield recorded maximum under weed free treatments (Table 2), however, amongst the set of herbicidal treatments, the maximum grain and stover yield was recorded with pendimethalin 900 g/ha as pre emergence with one hand weeding and one interculturing at 40 DAS followed by quizalofop ethyl 40 g/ha as post emergence with one hand weeding and one interculturing at 40 DAS and oxadiargyl 90 g/ha as pre emergence followed by one hand weeding and one interculturing at 40 DAS. These findings are in close conformity with those reported by Sukhadia *et al*. (2000) and Vivek *et al*. (2003). The maximum net return was accured under pendimethalin 900 g/ha as pre emergence with one hand weeding and one interculturing at 40 DAS closely followed by weed free, quizalofop ethyl 40 g/ha as post emergence with one hand weeding and one interculturing at 40 DAS and oxadiargyl 90 g/ha as pre emergence with one hand weeding and one interculturing at 40 DAS. The different herbicidal treatments appreciably increased nitrogen content (Table 3). Chemical analysis of plant indicated that weed free treatment contents maximum N, P and K content (2.97, 0.337, 0.773 and 0.807, 0.157, 0.257%) in grain and stover respectively. Integration of pendimethalin, quizalofop ethyl and oxadiargyl with one hand weeding and one interculturing were found at par with weed free. N, P and K content of grain and stover of pigeonpea were significantly influenced by weed control treatments. The weed free treatment recorded significantly the highest uptake of N, P and K (Table 4) by crop (74.87, 10.62, 21.02%), which was statistically at par with pendimethalin 900 g/ha as pre emergence with one hand weeding and one interculturing 40 DAS in respect of N uptake and with pendimethalin 900 g/ha as pre emergence with one hand weeding and one interculturing at 40 DAS, quizalofop-ethyl 40 g/ha post emergence with one hand weeding and one interculturing at 40 DAS in respect of P and K uptake. It can be explained in the light of the facts that these treatments controlled the weeds effectively, might have made more nutrients available to crop and consequently encouraged higher concentration of nutrients and more yield and thereby higher uptake of nutrients. These findings corroborate the reports of Rana *et al*. (1999) and Vyas *et al*. (2003).

Table 2. Effects of different treatments on plant height, number of branches per plant, number of pods per plant, grain yield, stover yield and net returns.

Treatments	Plant height at harvest (cm)	No. of branches per plant	No. of pods per plant	Stover yield	Grain yield	Net returns
Pendimethalin (PE) *fb* 1HW and IC at 40 DAS	141.7	11.4	148.2	3259	1489	31625
Oxadiargyl (PE)	124.2	8.5	122.8	2044	993	18314
Oxadiargyl (PE) *fb* 1HW at 40 DAS	137.4	9.5	139.8	2696	1148	21704
Quizalofop-ethyl (Post E) at 20 DAS	125.7	8.7	124.1	2089	1000	18532
Quizalofop-ethyl (Post E) at 20 DAS + 1HW and IC at 40 DAS	141.7	11.2	144.7	3252	1378	27609
Oxadiargyl (Post E) at 20 DAS	123.8	8.3	120.2	2015	926	16424
Oxadiargyl (Post E) *fb* 1HW and IC at 40 DAS	140.2	10.9	142.3	3185	1356	26961
Pendimethalin as (PE) *fb* quizalofop-ethyl (Post E) at 40 DAS	132.7	9.1	134.4	2607	1074	20283
Pendimethalin as (PE) *fb* oxadiargyl (Post E) at 40 DAS	131.3	8.9	132.7	2533	1052	19631
Two HW at 20 and 40 DAS	137.7	9.8	140.3	2652	1215	22462
Weed free	152.2	11.7	151.6	3289	1622	30322
Unweeded control	111.7	7.3	115.2	1852	800	12995
LSD (P=0.05)	14.9	2.2	13.4	434.09	279.87	-

Table 3 Efect of organic manure and bio-fertilizer on nitrogen, phosphorus, potassium content (%) of soybean seed and stover and N, P, K uptake by crop.

Treatment	Nitrogen content (%)		Phosphorus content (%)		Potassium content (%)		Nutrient uptake (%)		
	Seed	Stover	Seed	Stover	Seed	Stover	N	P	K
Pendimethalin (PE)*fb*1HWand IC at 40 DAS	2.95	0.80	0.33	0.15	0.76	0.26	70.21	9.91	19.56
Oxadiargyl (PE)	2.45	0.60	0.27	0.11	0.66	0.22	36.37	4.97	11.10
Oxadiargyl (PE) *fb* 1HW at 40 DAS	2.80	0.73	0.31	0.14	0.73	0.23	52.16	7.35	14.63
Quizalofop-ethyl (Post E) at 20 DAS	2.47	0.62	0.27	0.11	0.68	0.22	37.82	5.06	11.47
Quizalofop-ethyl (Post E) at 20 DAS *fb* 1 HW and IC at 40 DAS	2.93	0.80	0.33	0.15	0.76	0.25	66.39	9.48	18.67
Oxadiargyl (Post E) at 20 DAS	2.43	0.58	0.27	0.10	0.65	0.22	33.83	4.54	10.44
Oxadiargyl (Post E) *fb* 1HW and IC at 40 DAS	2.90	0.79	0.33	0.15	0.75	0.25	64.33	9.25	18.21
Pendimethalin as (PE) *fb* quizalofop-ethyl (Post E) at 40 DAS	2.55	0.69	0.29	0.13	0.69	0.22	45.09	6.56	13.10
Pendimethalin as (PE) *fb* oxadiargyl (Post E) at 40 DAS	2.52	0.66	0.29	0.12	0.69	0.22	42.87	6.14	12.82
Two HW at 20 and 40 DAS	2.87	0.75	0.31	0.15	0.74	0.25	54.90	7.66	15.71
Weed free	2.97	0.81	0.34	0.16	0.77	0.26	74.87	10.62	21.02
Unweeded control	2.37	0.56	0.21	0.09	0.62	0.20	29.39	3.40	8.73
LSD (P=0.05)	0.39	0.09	0.05	0.03	0.07	0.03	5.78	1.29	2.36

Note : $\sqrt{x + 0.5}$ transformation (figures in parenthesis are original values). PE- Pre-emergence, Po-E-Post emergence, IC-Inter cultivation, HW- Hand weeding, DAS- Days after sowing

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