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Effect of Integrated Weed Management Practices on Yield and Weed Dynamics in Soybean + Pigeonpea Intercropping System

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ABSTRACT

A field experiment was conducted during 2015-16 and 2016-17 at Experimental Farm, Department of Agronomy, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani to study the effect of integrated weed management practices on crop and weed parameters. The soil of the experimental site was clayey in texture. pH was 8.0, low in available Nitrogen (160.7 kg/ha), medium in Phosphorus (11.7 kg/ha) and high in potassium (489.61 kg/ha). The experiment was laid out in randomized block design with three replications and ten different treatments. Results revealed that the minimum weed growth rate, density and dry matter production of weeds and the higher weed control efficiency were recorded with pre emergence application of Pendimethalin 30% EC @ 0.75 kg a.i./ha fb tank mix POE - Imazethapyr 10% SL @ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i./ha supplemented with 1 Hoeing (40-50 DAS). The highest Soybean Equivalent Yield were obtained with the application of PE–Pendimethalin 30% EC @ 0.75 kg a.i./ha +1 Hoeing (30-40 DAS) + 1 Hand Weeding (40-50 DAS). The highest weed index was recorded under weedy check.

Key words: *Dicot, Intercropping, Monocot, Pigeonpea, Soybean, SEY, Weed.*

INTRODUCTION

Soybean (*Glycine max* (L.) Merrill) is a leguminous crop and belongs to family leguminoaceae with sub family papillionaceae Soybean (*Glycine max* L.) is the only major crop that has witnessed an impressive expansion in acreage and production at the global level. Major soybean growing states in India are Madhya Pradesh, Uttar Pradesh, Maharashtra, Gujarat, Rajasthan, Karnataka and Andhra Pradesh. Pigeonpea (*Cajanus cajan* (L.) Millsp.) is the fifth prominent legume crop in the world and ranked second after chickpea in India in terms of area and production. When pigeonpea is grown as a sole crop, it is relatively inefficient because of its slow initial growth rate and low harvest index[15], therefore it is grown as intercrop, which helps in efficient utilization of available resources for enhancing the productivity and profitability.

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Weed flush come at same time in almost all the *Kharif* crops, which also restrict the availability of manpower for weeding operation in these crops. The untimely and poor weed management adversely affects proper growth and yield of soybean and pigeonpea. Weed management through the herbicidal application remains the only viable option under these situations. Application of herbicides as pre-emergence for effective weed control in soybean + pigeonpea are required to be used within very short period (2-3 DAS) of time after sowing. In monsoon season, if rains captures this critical period of application then pre emergence herbicide cannot be used effectively to control the weeds.

Integration of weed control methods are effective and workable practices that may be used ecologically and economically viable to the farmers. Unavailability of adequate labour during peak period of weeding and difficulty in use of mechanical weeding in heavy rains create problem for effective weed management in crops[7]. Under such condition, mulching, hand hoeing and weed control through herbicides remains the choice for controlling the weeds. Therefore integrated approach of mechanical cultural and chemical control may be more feasible. Till now no systematic work has been made on integrated weed management in soybean + pigeonpea intercropping system under Vertisols in Marathwada region of Maharashtra. In present investigation an attempt has been made to determine the integrated approaches for the management of weed in soybean + pigeonpea intercropping system.

MATERIAL AND METHODS

The present investigation was carried out during *Kharif* 2015 and 2016 at the Experimental Farm, Department of Agronomy, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani to study the effect of integrated weed management practices on crop and weed parameters. The soil of the experimental site was clayey in texture. pH was 8.0, low in available Nitrogen (160.7 kg/ha), medium in Phosphorus (11.7 kg/ha) and high in potassium (489.61 kg/ha). The experiment was laid out in randomized block design and replicated thrice. The treatments consisted of ten weed management practices *viz.,* T_1- *PE*- Pendimethalin 30% EC @ 1.0 kg a.i./ha, T_2- *PE*–Pendimethalin 30% EC @ 0.75 kg a.i./ha +1 Hoeing (30-40 DAS) + 1 Hand Weeding (40-50 DAS), T_3- *PE*- Pendimethalin 30% EC @ 0.75 kg a.i./ha +*POE* – Imazethapyr 35% + Imazamox 35% WG @ 0.01 kg a.i /ha + 1 Hoeing (40-50 DAS), T_4- *PE* - Pendimethalin 30% EC @ 0.75 kg a.i./ha + *POE* - Imazethapyr 10% SL @ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i./ha + 1 Hoeing (40-50 DAS), T_5- Stale seed bed technique + 1 Hoeing (25-30 DAS) + mulching (30 DAS), T_6 - Stale seed bed technique + 1 Hoeing (25-30 DAS) + 1 Hand Weeding (40-50 DAS), T_7- Stale seed bed technique + *POE*-Imazethapyr35% + Imazamox 35% WG @ 0.01 kg a.i./ha, T_8- Stale seed bed technique + *POE*-Imazethapyr 10% SL @ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i. /ha, T_9 - Weed free, T_{10} – Weedy check. The recorded agronomic practices were followed for both crops. Weed management practices were adopted as per the treatments. In weedy check plot weeds were permitted to grow without any control measures throughout the crop growing period. Mulching in inter row space was done by soybean straw at 30 DAS as per treatment of weed management. Herbicides were applied with the help of Knapsack sprayer fitted with flat fan nozzle. Weed density were recorded at 30, 60, 90 DAS and at harvest stage by quadrate randomly placed in each plot to count the weed species in each plot. The weed biomass from different plots under all the treatments was recorded at 30, 60, 90 DAS and at harvest. The weeds were first sun dried and thereafter kept in paper bags and dried in oven at 60oC for 48 hours and dry weight was recorded till constant weight was achieved. The weed control efficiency was calculated on the basis of reduction in dry matter production of weeds in treated plot in comparison with weedy check and expressed in percentage as suggested by Mani *et al.,*[6].

$$WCE\ (\%) = \frac{DWC - DWT}{DWC} \times 100$$

Whereas, WCE = Weed control efficiency in percent, DWC = Weed dry weight in control plot, DWT = Weed dry weight in treated plot.

The data obtained on various observations were tabulated and subjected to their analysis by using analysis of variance and the treatments were tested by F test[10]. The soil samples taken for analysis from 0-15 cm soil layer were analyzed in the laboratory using standard procedures. Available N, P and K were determined by the methods described by Dalal *et al.*[1], Subbiah and Asija[14], Olsen *et al.*[9], respectively.

RESULTS AND DISCUSSION

Seed and Straw Yield

In soybean Under different weed management practices weed free treatment recorded highest seed and straw yield. But among weed management application of PE–Pendimethalin 30% EC @ 0.75 kg a.i./ha +1 Hoeing (30-40 DAS) + 1 Hand Weeding (40-50 DAS) recorded significantly highest yield than other treatments (Table 3). On the other hand, the minimum seed yield was recorded under weedy check during both the years of study. Kamble *et al.*[5],reported similar kind of findings. The capacity of plants to produce seed yield depends not only the size of photosynthetic systems, it's efficiently and length of time for which it is active but also on translocation of dry matter into economic sink. The final build up of yield is cumulative function of yield components. Lower weed population and higher weed control efficiency also resulted in higher seed yield[3].

In pigeonpea, the highest seed and straw yield was recorded in weed free treatment but it was numerically at par with *PE* - Pendimethalin 30% EC @ 0.75 kg a.i./ha + *POE* - Imazethapyr 10% SL @ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i./ha + 1 Hoeing (40-50 DAS). The minimum seed and straw yield was recorded in unweeded check plots. The minimum yield of seed and straw was due to the less dry matter accumulation, less LAI, less CGR, high weed infestation and high competition during the critical periods, which does not allow the crop to grow their potential and vice versa. Similar results were also reported by Dhaker *et al.*[2].

As far as Soybean Equivalent yield (SEY) is concerned it was highest with the weed free treatment. However, it was at par with PE–Pendimethalin 30% EC @ 0.75 kg a.i./ha +1 Hoeing (30-40 DAS) + 1 Hand Weeding (40-50 DAS) and rest of the treatments shows significant differences.

Weed Density

Integrated weed management practices had a remarkable effect on weed density (Table 1). Maximum density of weeds was observed throughout the investigation period under weedy check. Whereas minimum density is observed under weed free treatment. At 30 DAS, minimum density of weeds was observed with application of *PE* - Pendimethalin 30% EC @ 0.75 kg a.i./ha + *POE* - Imazethapyr 10% SL @ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i./ha + 1 Hoeing (40-50 DAS) and which was closely followed by the application of *PE*- Pendimethalin 30% EC @ 0.75 kg a.i./ha +*POE* – Imazethapyr 35% + Imazamox 35% WG @ 0.01 kg a.i /ha + 1 Hoeing (40-50 DAS). It was observed that the application of pre emergence herbicides effectively controlled both monocot and dicot weeds whereas, application of post emergence was found mainly effective to control the grassy weeds[4]. Similar results were also reported by Nepalia *et al.*[8].

Weed Dry Matter Production

Weed dry matter production is presented in Table 2 at different time interval. The significant highest weed dry matter production was recorded in weedy check plot at all the stages of observation, which was closely followed with the application of *PE*-

Pendimethalin 30% EC @ 1.0 kg a.i./ha. The treatments involving the integrated application of herbicides and cultural practices (T_4, T_3) recorded significantly less weed dry matter production compared to other treatments. Similar results were also reported by Rai *et al.*[12].

Weed Control Efficiency

The highest weed control efficiency was witnessed under weed free treatment which remained statistically at par with *PE* - Pendimethalin 30% EC @ 0.75 kg a.i./ha + *POE* - Imazethapyr 10% SL @ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i./ha + 1 Hoeing (40-50 DAS) and these was closely followed by the application of *PE*- Pendimethalin 30% EC @ 0.75 kg a.i./ha +*POE* – Imazethapyr 35% + Imazamox 35% WG @ 0.01 kg a.i /ha + 1 Hoeing (40-50 DAS). This is due to less dry matter production and density of weeds which reduced by successful checking the weed growth in the above treatments. Similar results were also reported by Reddy *et al.*[13].

Weed Index

The data revealed that there was much variation in weed index. The maximum seed yield reduction (Table 3) was found under weedy check followed by *PE*- Pendimethalin 30% EC @ 1.0 kg a.i./ha due to the fact there was minimum seed yield. Whereas, the minimum reduction were registered with T_2 (*PE*–Pendimethalin 30% EC @ 0.75 kg a.i./ha + 1 Hoeing (30-40 DAS) +1 Hand Weeding (40-50 DAS). Similar results were also reported by Pria *et al.*[11],

Table 1. **Weed density during 2015 at different time interval as affected by IWM practices in soybean + pigeonpea**

Tr. No.	Treatments	Monocots				Dicots			
		30 DAS	60 DAS	90 DAS	At Harvest	30 DAS	60 DAS	90 DAS	At Harvest
T_1	*PE*- Pendimethalin 30% EC @ 1.0 kg a.i./ha	17.78	40.18	50.37	58.11	13.39	21.25	26.50	28.77
T_2	*PE*–Pendimethalin 30% EC @ 0.75 kg a.i./ha + 1 Hoeing (30-40 DAS) +1 Hand Weeding (40-50 DAS)	10.43	16.11	23.57	27.68	6.36	10.84	14.79	18.74
T_3	*PE*- Pendimethalin 30% EC @ 0.75 kg a.i./ha +*POE* - Imazethapyr 35% + Imazamox 35% WG @ 0.01 kg a.i /ha + 1 Hoeing (40-50 DAS)	7.69	14.05	20.41	24.17	4.50	8.42	11.28	16.02
T_4	*PE* - Pendimethalin 30% EC @ 0.75 kg a.i./ha + *POE* - Imazethapyr 10% SL@ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i. /ha + 1 Hoeing (40-50 DAS)	5.24	12.95	18.27	22.31	3.51	7.63	10.02	15.47
T_5	Stale seed bed technique + 1 Hoeing (25-30 DAS) + Mulching (30 DAS)	15.06	27.74	38.24	43.37	11.74	16.29	22.48	24.41
T_6	Stale seed bed technique + 1 Hoeing (25-30 DAS) +1 Hand Weeding (40-50 DAS)	14.57	25.66	35.08	40.48	10.83	14.90	20.85	23.11
T_7	Stale seed bed technique + *POE*- Imazethapyr35% + Imazamox 35% WG @ 0.01 kg a.i./ha	12.22	18.19	26.66	30.33	8.56	12.88	16.74	20.81
T_8	Stale seed bed technique + *POE*-Imazethapyr 10% SL @ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i./ha	11.50	17.26	25.47	28.39	7.14	11.27	15.97	19.77
T_9	Weed free	0.00	6.22	12.72	18.57	0.11	4.20	7.51	11.07
T_{10}	Weedy check	21.26	46.83	61.63	71.78	16.78	24.56	33.47	37.11
SE ±		0.43	0.91	1.14	1.46	0.37	0.58	0.82	0.93
C.D. at 5%		1.27	2.71	3.39	4.34	1.08	1.74	2.43	2.77
General mean		**11.58**	**22.52**	**31.24**	**36.51**	**8.29**	**13.22**	**17.96**	**21.53**

Table 2. Weed density during 2016 at different time interval as affected by IWM practices in soybean + pigeonpea

Tr. No.	Treatments	Monocots				Dicots			
		30 DAS	60 DAS	90 DAS	At Harvest	30 DAS	60 DAS	90 DAS	At Harvest
T_1	*PE*- Pendimethalin 30% EC @ 1.0 kg a.i./ha	22.47	43.88	52.88	60.44	17.13	22.31	28.43	34.65
T_2	*PE*–Pendimethalin 30% EC @ 0.75 kg a.i./ha + 1 Hoeing (30-40 DAS) +1 Hand Weeding (40-50 DAS)	12.17	28.02	34.26	40.78	10.04	14.10	19.25	23.34
T_3	*PE*- Pendimethalin 30% EC @ 0.75 kg a.i./ha +*POE* - Imazethapyr 35% + Imazamox 35% WG @ 0.01 kg a.i /ha + 1 Hoeing (40-50 DAS)	9.94	25.62	30.58	36.11	8.87	13.14	17.02	20.11
T_4	*PE* - Pendimethalin 30% EC @ 0.75 kg a.i./ha + *POE* - Imazethapyr 10% SL@ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i. /ha + 1 Hoeing (40-50 DAS)	7.04	23.58	29.12	34.71	7.60	11.78	15.69	19.78
T_5	Stale seed bed technique + 1 Hoeing (25-30 DAS) + Mulching (30 DAS)	18.92	37.88	44.68	51.77	14.46	19.48	24.98	31.04
T_6	Stale seed bed technique + 1 Hoeing (25-30 DAS) +1 Hand Weeding (40-50 DAS)	17.98	36.65	43.36	49.84	13.89	18.19	23.04	29.78
T_7	Stale seed bed technique + *POE*-Imazethapyr35% + Imazamox 35% WG @ 0.01 kg a.i./ha	14.47	30.61	37.79	44.11	11.51	15.15	20.18	25.98
T_8	Stale seed bed technique + *POE*-Imazethapyr 10% SL @ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i./ha	13.61	29.12	35.52	42.78	10.32	14.77	19.88	24.25
T_9	Weed free	0.00	16.32	24.09	28.78	0.00	8.37	12.21	15.08
T_{10}	Weedy check	30.53	50.79	64.75	74.98	23.46	27.40	35.42	41.48
SE ±		0.77	1.46	1.64	1.83	0.54	0.73	0.91	1.10
C.D. at 5%		2.29	4.34	4.88	5.42	1.62	2.17	2.71	3.25
General mean		**14.71**	**32.25**	**39.70**	**46.43**	**11.73**	**16.47**	**21.61**	**26.55**

Table 3. Weed dry matter (g) during 2015 at different time interval as affected by IWM in soybean + pigeonpea

Tr. No.	Treatments	Monocots				Dicots			
		30 DAS	60 DAS	90 DAS	At Harvest	30 DAS	60 DAS	90 DAS	At Harvest
T_1	*PE*- Pendimethalin 30% EC @ 1.0 kg a.i./ha	9.1	20.73	28.38	33.71	6.38	11.38	18.11	23.38
T_2	*PE*–Pendimethalin 30% EC @ 0.75 kg a.i./ha + 1 Hoeing (30-40 DAS) +1 Hand Weeding (40-50 DAS)	4.59	10.02	13.31	19.11	3.10	5.18	8.10	11.72
T_3	*PE*- Pendimethalin 30% EC @ 0.75 kg a.i./ha +*POE* - Imazethapyr 35% + Imazamox 35% WG @ 0.01 kg a.i /ha + 1 Hoeing (40-50 DAS)	2.38	8.92	11.91	16.72	2.37	4.11	7.36	9.16
T_4	*PE* - Pendimethalin 30% EC @ 0.75 kg a.i./ha + *POE* - Imazethapyr 10% SL@ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i. /ha + 1 Hoeing (40-50 DAS)	1.20	7.72	10.57	15.32	1.32	3.89	6.75	8.83
T_5	Stale seed bed technique + 1 Hoeing (25-30 DAS) + Mulching (30 DAS)	7.29	16.10	20.43	29.18	4.98	8.27	12.88	17.77
T_6	Stale seed bed technique + 1 Hoeing (25-30 DAS) +1 Hand Weeding (40-50 DAS)	6.96	14.65	18.30	26.22	4.86	7.87	11.33	16.18
T_7	Stale seed bed technique + *POE*-Imazethapyr35% + Imazamox 35% WG @ 0.01 kg a.i./ha	5.39	11.37	15.27	22.16	3.98	6.28	9.29	13.11
T_8	Stale seed bed technique + *POE*-Imazethapyr 10% SL @ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i./ha	4.77	10.98	14.43	20.10	3.42	5.95	8.35	12.38
T_9	Weed free	0.00	2.76	6.81	11.77	0.00	1.73	4.52	6.32
T_{10}	Weedy check	11.93	23.44	40.24	55.79	9.50	14.61	24.27	28.11
SE ±		0.29	0.55	0.91	1.10	0.21	0.27	0.55	0.73
C.D. at 5%		0.86	1.63	2.71	3.25	0.63	0.81	1.63	2.17
General mean		**5.36**	**12.67**	**17.97**	**25.01**	**3.99**	**6.93**	**11.10**	**14.70**

Table 4. Weed dry matter (g) during 2016 at different time interval as affected by IWM in soybean + pigeonpea

Tr. No.	Treatments	Monocots				Dicots			
		30 DAS	60 DAS	90 DAS	At Harvest	30 DAS	60 DAS	90 DAS	At Harvest
T_1	*PE*- Pendimethalin 30% EC @ 1.0 kg a.i./ha	12.29	24.38	42.71	48.32	10.38	19.71	20.11	24.40
T_2	*PE*–Pendimethalin 30% EC @ 0.75 kg a.i./ha + 1 Hoeing (30-40 DAS) +1 Hand Weeding (40-50 DAS)	6.78	16.09	21.91	27.18	5.66	9.75	11.92	15.65
T_3	*PE*- Pendimethalin 30% EC @ 0.75 kg a.i./ha +*POE* - Imazethapyr 35% + Imazamox 35% WG @ 0.01 kg a.i /ha + 1 Hoeing (40-50 DAS)	4.57	13.64	18.55	23.77	4.13	7.35	10.86	13.68
T_4	*PE* - Pendimethalin 30% EC @ 0.75 kg a.i./ha + *POE* - Imazethapyr 10% SL@ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i. /ha + 1 Hoeing (40-50 DAS)	2.73	11.13	17.87	22.72	3.10	6.22	9.33	12.98
T_5	Stale seed bed technique + 1 Hoeing (25-30 DAS) + Mulching (30 DAS)	10.48	20.83	29.76	36.71	8.42	15.62	17.43	20.32
T_6	Stale seed bed technique + 1 Hoeing (25-30 DAS) +1 Hand Weeding (40-50 DAS)	10.15	19.59	27.61	34.42	8.04	14.22	16.22	20.32
T_7	Stale seed bed technique + *POE*-Imazethapyr35% + Imazamox 35% WG @ 0.01 kg a.i./ha	8.58	17.08	23.68	29.88	6.82	11.15	13.04	16.30
T_8	Stale seed bed technique + *POE*-Imazethapyr 10% SL @ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i./ha	7.29	16.88	22.48	28.42	6.07	10.37	12.29	15.98
T_9	Weed free	0.00	7.27	14.12	18.30	0.00	3.50	7.31	10.77
T_{10}	Weedy check	15.12	29.25	49.36	58.11	13.12	25.30	24.39	33.38
SE $\pm$		0.43	0.78	1.21	1.28	0.37	0.55	0.62	0.91
C.D. at 5%		1.27	2.31	3.60	3.80	1.08	1.63	1.84	2.71
General mean		**7.80**	**17.61**	**26.81**	**32.78**	**6.57**	**12.32**	**14.29**	**18.38**

Table 5. Weed control efficiency (WCE %), weed index (%), as affected by integrated weed management practices in soybean + pigeonpea

Tr. No.	Treatments	2015-16		2016-17	
		Weed Index (%)	Weed control efficiency (%) at harvest	Weed Index (%)	Weed control efficiency (%) at harvest
T_1	*PE*- Pendimethalin 30% EC @ 1.0 kg a.i./ha	52.06	31.95	48.87	20.54
T_2	*PE*–Pendimethalin 30% EC @ 0.75 kg a.i./ha + 1 Hoeing (30-40 DAS) +1 Hand Weeding (40-50 DAS)	13.64	63.25	12.74	53.19
T_3	*PE*- Pendimethalin 30% EC @ 0.75 kg a.i./ha +*POE* - Imazethapyr 35% + Imazamox 35% WG @ 0.01 kg a.i /ha + 1 Hoeing (40-50 DAS)	26.87	69.15	24.77	59.07
T_4	*PE* - Pendimethalin 30% EC @ 0.75 kg a.i./ha + *POE* - Imazethapyr 10% SL@ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i. /ha + 1 Hoeing (40-50 DAS)	21.55	71.22	21.45	60.98
T_5	Stale seed bed technique + 1 Hoeing (25-30 DAS) + Mulching (30 DAS)	38.76	44.04	34.79	37.67
T_6	Stale seed bed technique + 1 Hoeing (25-30 DAS) + 1 Hand Weeding (40-50 DAS)	44.79	49.46	41.14	40.17
T_7	Stale seed bed technique + *POE*-Imazethapyr35% + Imazamox 35% WG @ 0.01 kg a.i./ha	25.49	57.96	24.00	49.52
T_8	Stale seed bed technique + *POE*-Imazethapyr 10% SL @ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i./ha	21.74	61.29	20.87	51.47
T_9	Weed free	--	78.44	--	68.23
T_{10}	Weedy check	64.02	--	60.84	--
General mean		**34.32**	**58.53**	**32.16**	**48.98**

Table 6. Seed , Straw yield and Soybean Equivalent Yield (kg ha^{-1}) of soybean and pigeon pea as influenced by different treatments

Tr. No.	Treatments	Soybean				Pigeonpea				SEY	
		2015		2016		2015		2016		2015	2016
		Seed yield	Straw yield	Seed yield	Straw yield	Seed yield	Straw yield	Seed yield	Straw yield	--	--
T_1	*PE*- Pendimethalin 30% EC @ 1.0 kg a.i./ha	583	983	714	1166	391	1126	443	1223	1279	1521
T_2	*PE*–Pendimethalin 30% EC @ 0.75 kg a.i./ha + 1 Hoeing (30-40 DAS) +1 Hand Weeding (40-50 DAS)	1178	1704	1314	1890	633	1689	704	1783	2304	2596
T_3	*PE*- Pendimethalin 30% EC @ 0.75 kg a.i./ha +*POE* - Imazethapyr 35% + Imazamox 35% WG @ 0.01 kg a.i /ha + 1 Hoeing (40-50 DAS)	740	1186	890	1437	681	1791	741	1874	1951	2238
T_4	*PE* - Pendimethalin 30% EC @ 0.75 kg a.i./ha + *POE* - Imazethapyr 10% SL@ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i. /ha + 1 Hoeing (40-50 DAS)	781	1211	925	1490	738	1904	776	1957	2093	2337
T_5	Stale seed bed technique + 1 Hoeing (25-30 DAS) + Mulching (30 DAS)	832	1286	968	1528	451	1273	534	1439	1634	1940
T_6	Stale seed bed technique + 1 Hoeing (25-30 DAS) +1 Hand Weeding (40-50 DAS)	612	1016	750	1220	484	1348	550	1462	1473	1751
T_7	Stale seed bed technique + *POE*- Imazethapyr35% + Imazamox 35% WG @ 0.01 kg a.i./ha	967	1473	1101	1685	574	1582	637	1644	1988	2261
T_8	Stale seed bed technique + *POE*- Imazethapyr 10% SL @ 0.100 kg a.i./ha + Quizalofop ethyl 10 EC @ 0.075 kg a.i./ha	1030	1546	1157	1714	595	1632	658	1687	2088	2354
T_9	Weed free	1272	1781	1427	1943	785	2019	851	2087	2668	2975
T_{10}	Weedy check	433	780	529	919	294	921	349	1036	960	1165
SE ±		39	51	43	60	24	56	28	59	94	101
C.D. at 5%		115	151	127	179	72	166	82	174	278	300
General mean		**843**	**1297**	**978**	**1499**	**563**	**1529**	**624**	**1619**	**1844**	**2114**

REFERENCES

1. Dalal, R.C., Sahrawat, K.L. and Myers, R.J., Inclusion of nitrate nitrite in the Keldhal nitrogen determination of soils and plant materials using sodium thiosulphate. Coom. *In soil sci and plant anlaysis*.**15:** 1453-1461 1984.
2. Dhaker, S.C., Mundra, S.L., Dhaker, R.C. and Sumeriya,H.K., Effect of weed management and sulphur on nutrient content and uptake by weeds and soybean. *Legume Res*., **38(3):** 411-414 (2016).
3. Habimana, S., Murthy, K.N.K., Shankaralingappa, B.C., Sanjay, M.T. and Ramachandra, C., Efficiency and economics of weed control with pre and post emergence herbicides in soybean. Asian J. Plant Sci. and Res., **3(4):** 18-20 (2013).
4. Jadon, C.K., Dashora, L.N, Singh, P., Mundra, S.L. and Singh, R., Evaluating the effect of weed management practices and fertility levels on weed dynamics and productivity of soybean. In: Proceedings of Biennial Conference on "Doubling Farmers' Income by 2022: The Role of Weed Science", 1-3 March, 2017, Udaipur. *Indian Society of Weed Science, Jabalpur, India*.pp:127 (2017).
5. Kamble, A.B., Nagre, B.S. and Dhonde, M.B., Effect of crop geometry and weed management practices on weed dynamics

and yield of soybean. In: Proceedings of Biennial Conference on "Doubling Farmers' Income by 2022: The Role of Weed Science", 1-3 March, 2017, Udaipur. *Indian Society of Weed Science, Jabalpur, India.*pp:127 (2017).

6. Mani, V.S., Malee, M.L., Gautam, K.C. and Bhagwandas., Weed killing chemicals in potato cultivation. PANS **23:** 17-18 (1973).
7. Nainwal, R.C., Saxena, S.C. and Singh, V.P., Effect of Pre and post emergence herbicides on weed infestation and productivity of Soybean. *Ind. J. Weed Sci.*, **42(1and2):** 17-20 (2010).
8. Nepalia, V., Meena, K.K. and Singh, D., Efficacy of herbicidal weed control and sulphur on soybean production. In: Proceedings of Biennial Conference on "Doubling Farmers' Income by 2022: The Role of Weed Science", 1-3 March, 2017, Udaipur. *Indian Society of Weed Science, Jabalpur, India*.pp:159 (2017).
9. Olsen, S.R., Cole, C.V., Watanabe, F.S.and Dean, L.A., Estimation of available P by extraction with sodium bicarbonate. *United States Dpet. Of Agril Circular*.,pp.:939 (1954).
10. Panse, V.G. and Sukhatme, P.V., Statistical methods for agricultural workers. *ICAR, New Delhi*, pp. 381 (1967).
11. Pria, G. Thomas, G.and Jaykumar, R., Effect of weed control practices in soybean crop production. *Ind. J. Weed Sci*., **42(1and2):** 58-64 (2009).
12. Rai, C.L., Tiwari, R.K. and Pandey, S., Intercropping and weed management effects on weed dynamics, productivity and economics of pigeonpea. *Indian J. Weed Sci.*, **48(1):** 44-47 (2016).
13. Reddy, A.S., Rao, PV. Satesh babu, J. and Rao, Y.K., Response of IWM on growth and yield of pigeonpea. Int. J. of Current Micro. and Appl. Sci., **5(3):** 610-616 (2016).
14. Subbiah, B.V. and Asija. G.L., A rapid procedure for estimation of available nitrogen in soils. *Cuurent Science*. **25:** 259-260 (1956).
15. Willey, R.W., Intercropping - its importance and research needs part 1. Competition and yield advantage. *Field Crop Abstracts*. **32(1):** 1-10 (1979).