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Mahesh Keer
RAK College of Agriculture, Sehore, Madhya Pradesh, India

G.K. Nema
RAK College of Agriculture, Sehore, Madhya Pradesh, India

M.D. Vyas
RAK College of Agriculture, Sehore, Madhya Pradesh, India

Mansingh Baghel
Krishi Vigyan Kendra, near Kothi bagh, Rajgarh Madhya Pradesh, India

Akhilesh Shrivastava
Krishi Vigyan Kendra, Rajgarh Madhya Pradesh, India

Corresponding Author:
Mansingh Baghel
Krishi Vigyan Kendra, near Kothi bagh, Rajgarh Madhya Pradesh, India

Comparative efficacy of pre and post emergence herbicides on weed control and productivity of pigeonpea (*Cajanus cajan* (L.) Millsp)

Mahesh Keer, GK Nema, MD Vyas, Mansingh Baghel and Akhilesh Shrivastava

Abstract
The study entitled "Comparative Efficacy of Pre and Post Emergence Herbicides on Weed Control and Productivity of Pigeonpea [*Cajanus cajan* (L.) Millps.]" was conducted in "field no. 26 at the Research Farm of R.A.K. college of Agriculture, Sehore (Madhya Pradesh), during *Kharif* 2015. Experiment was laid out in randomized block design with four replications. Among the monocot weeds *Echinochloa crusgalli* Link., *Degiteria sanguinalis*, *Dinebra arabica*, *Cyperus rotundus* Linn. and *Commelina benghalensis* while the dicot weeds *Acalypha indica* Linn., *Digera arvensis*, *Euphorbia geniculata* and *Phyllanthus niruri* were observed in the field. Application of imazethapyr 35%+imazemox35% 70 WG 70g a.i/ha gave lowest weed dry weight and higher weed control efficiency (88.31%). Application of imazethapyr35%+imazamox35% 70 WG 70g a.i./ha recorded highest grain yield(1288 kg/ha) of Pigeonpea and effectively reduced weed population.

Keywords: Weed control efficiency, weed dry weight, Monocot weeds, Dicot weeds

Introduction
Pigeonpea [*Cajanus cajan* (L.) Millsp] commonly known as red gram, tur, arhar, gungopea, no eye pea belongs to genus *Cajanus* and species *cajan* under family leguminosae.It is an important grain legume crop of rainfed agriculture in the tropical and sub-tropical regions. Its grain is highly nutritious and rich in protein (20-22%), carbohydrate, fibre and mineral. Due to rainy season, slow initial growth and sowing at wider row spacing, severe infestation of weeds is observed in pigeonpea resulting in low grain yield.

In our country, it is cultivated during *kharif* (rainy season) in the month of June-July under assured rainfall condition. Due to rainy season, slow initial growth and sowing at wider row spacing, severe infestation of weeds is observed in pigeon pea which results in low grain yield. Reduction in seed yield due to weeds in pigeon pea to the tune of 80% has been reported (Talnikar *et al*. 2008) [15]. Some of the most important weeds commonly noticed in most of the pigeon pea growing areas are *Amaranthus viridis*, *Commelina benghalensis*, *Phyllanthus niruri*, *Euphorbia hirta* and *Digera arvensis* among the broad leaved weeds and *Cyperus rotundus*, *Dactyloctenium aegyptium*, *Setaria glauca*, *Digitaria sanguinalis* and *Echinochloa* spp among the grassy weeds.

Pigeonpea due to its slow initial growth is a poor competitor of weed, particularly in kharif season where several spells of rain triggers the several flushes of weeds. In pigeonpea, initial 7-8 weeks period is the critical period of the crop-weed competition. Therefore, weeds must be controlled during this period for obtaining high seed yields. Weeds in pigeon pea can be controlled effectively with hand weeding twice at 3 and 6 weeks after sowing of crops. However, due to frequent rains it becomes difficult to do hand weedings at proper time. Further non-availability of labour for hand weeding is another problem. Manual and mechanical methods of weed control are quite effective, but they are costly and time consuming (Ram *et al*. 2011) [11]. So there is a need to find out effective weed control technique using herbicides. For controlling weeds in pigeon pea many herbicides have been recommended as pre emergence such as Alachlore (Pardeshi *et al*. 2008) [9], Metalachlore (Nagaraju and Kumar 2009) [7] and Pendimethalin (Singh *et al*. 2010) [13] to control weeds effectively. These herbicides provide effective weed control during initial growth period only up to 30 days after sowing. Reduction in yield due to weeds in pigeonpea is 31 – 52.8% (Singh and Sekhon 2013) [13]. It is imperative to control weeds at proper time and with suitable methods to obtain high grain yield of pigeonpea.

Chemical method is an effective tool to control the weeds. As Pigeonpea is a long duration crop, many flushes of weeds germinate at the later stages which compete with the crop. Therefore, it is necessary to incorporate weedicides in weed management for reducing the weed load during crop growth period for sustained yield.

Material and Methods

The present investigation was planned and taken up within the scope of the Agronomy and the objectives framed out to realize the answers for the problem identified (as discussed in the introduction) during the *kharif* season of 2015 under edaphic and climatic conditions of Sehore (M.P.). The materials used and the methods employed during the course of investigation are discuss here that the experiment was laid out in field no. 26 at the Research Farm of R.A.K. college of Agriculture, Sehore (Madhya Pradesh), during *Kharif* 2015 on 838.53 m^2 area having fairly uniform topography, normal fertility status and soil homogeneity. The selected field was naturally infested with location specific weeds. Sehore is situated in sub-tropical zone of Vindhyan Plateau of Madhya Pradesh, North of 27^0 12' latitude and East of 77^0 05' longitude with an altitude of 498.77 m from mean sea level. The average annual rainfall varies from 1000 to 1200 mm, concentrated mostly from June to September. The mean annual maximum and minimum temperatures are 42.16^0 C and 20.5^0 C, respectively. The summer months are hot and May is the hottest month having a maximum temperature up to 46.12^0 C. Winter month experienced mild cold with an average temperature from 7.70 ^{0} C to 14.44^0 C. January is the coldest month as temperature reaches up to 3^0 C.

The weekly meteorological data *viz*., rainfall, temperature, relative humidity and number of rainy days during crop season were recorded in meteorological observatory of R.A.K. College of Agriculture, Sehore. The doses of different herbicides were determined as per treatment according to their active ingredient present in the commercial products. The measure dose of herbicides and water for each plot was mixed thoroughly before spraying by hand compression sprayer with flat fan nozzle. Fresh solution for individual plot was prepared for each time separately.

After completing, the spray of one herbicide in all the replication, than the sprayer was washed thoroughly with detergent powder and finally rinsed with fresh water before using another herbicides. Experiment was laid out in randomized block design with four replications. The treatments were Imazethapyr 10% SL @ 75g a.i./ ha (PoE) at 30 DAS (T_1), imazethapyr 10% SL @ 100g a.i./ ha (PoE) at 30DAS (T_2) pendimethalin 30% EC @ 1000g a.i./ ha (PE) (T_3), pendimethalin 30% EC @ 1000g a.i./ ha (PE) followed by imazethapyr 10% SL @ 75g a.i./ ha (PoE) at 30 DAS (T_4), pendimethalin 30% EC @ 1000g a.i./ ha (PE)+ One hand weeding at 40 DAS (T_5), imazethapyr 35%+ imazamox35% 70% WG @ 70g a.i/ha (PoE) at 30 DA (Combi product) (T_6) and Weedy check (T_7). The soil of the experimental field was medium black, clay loam in texture, low in available nitrogen, medium in available phosphorus and high in available potassium with pH 7.78.The experimental crop was sown on 07/07/15 with test variety TJT- 501 using seed rate of 20kg/ha and maintaining the row spacing of 60 cm. A basal dose of 20:60:20:20 (N: P_2O_5: K_2O: S) kg/ha was applied at the time of sowing.

Weed Studies

Weed flora

The important weed species associated with the pigeonpea crop in the experimental area were grouped according to nature of cotyledons as monocot and dicot weeds.

Weed occurrence and intensity

The weed occurrence and intensity of different weed species were studied on 30, 60,90 and 120 DAS(Days After Sowing) stages. The weed study was done in each plot at randomly selected spots and for this purpose quadrate was used. Counting of weeds was done according to species and total numbers of weeds were recorded in $1m^2$. The competition of weeds flora was estimated from unwedded plots and occurrence of dominant weeds at different intervals.

The relative density of weed was worked out as per formula proposed by Mishra (1968).

$$\text{Relative density} = \frac{\text{No. of individual of the same species}}{\text{No. of individual of the all species}} \text{ x } 100$$

Weed bio mass

The dry weight of weed was recorded at 60 and 120 DAS by taking samples of weeds from an area of $1m^2$ selected at random spots in each of the plots. These samples of weeds were kept in paper and dried in an oven at 80˚C till their weight become constant.

Weed control efficiency

It is the efficiency of treatment expressed in percent for controlling weeds in comparison to weedy check. It was worked out on the basis of the following formula as suggested by Reddy S.R. (1999)

$$WCE = \frac{DWC - DWT}{DWC} \text{x } 100$$

Where
WCE = weed control efficiency
DWC =dry weight of weeds in weedy check plot
DWT = dry weight of weeds in treated plot

Grain yield

The harvested produce from each plot was tied in bundles separately sun dried and bundle weight (biological yield) was recorded with the help of spring balance.

The weight of cleaned grains obtained from each net plot after threshing and thereafter converted into kilograms per hectare by using appropriate factor.

Result and Discussion

Uncontrolled weeds caused 31.0 to 52.8 per cent reduction in yield of Pigeonpea crop (Singh and Sekhon 2013) [13]. For obtaining high yields, weed control is a must using different strategies as weeds can cause upto 80% reduction in grain yield of pigeonpea (Singh *et al.* (2010) [13]. Weeds compete with Pigeonpea crop and utilize considerable amount of soil moisture, nutrient, sunlight, space in rhizoshere and photosphere and deprive opportunities for the crop to express its potential yield. The weather condition during the crop season and sowing of pigeonpea was done timely because optimum soil moisture was at the time of sowing. There after

the rains were not normal due to that reduction in yield was noted.

Effect on Weeds

Table 1: Dominant weed flora of the experimental area

S. No	Name of weeds	Weed density (no/m^2)	Relative density (%)
1	*Echinochloa crusgalli* (L.) Beauv	12.98	5.14
2	*Dinebra arebica* (L.)	12.92	5.11
3	*Commelina benghalensis* (L.)	17.92	7.10
4	*Digitaria sanguinalis* (L.)	9.71	3.84
	Total monocot weeds	53.53	21.19
a)	*Acalypha indica* Linn	18.75	7.43
b)	*Digera arvensis* Forsk	13.16	5.21
c)	*Euphorbia geniculata* (L.)	7.91	3.13
d)	*Phyllanthus niruri*	9.00	3.56
	Total dicot weeds	48.82	19.33
	Sedges (*Cyperus rotundus* (L.)	150	59.44
	Total weeds	252.35	100

a) Monocot weeds

The weeds sharing 21.19 per cent of total weed density. Among monocot weeds *Commelina benghalensis* was the most dominant weed and contributes 7.10 percent to total weed population. *Echinochloa crusgalli* Link. *Dinebra Arabica* Linn and *Digitaria sanguinali* Linn were other dominant weeds which accounted for 5.14, 5.11 and 3.84 per cent of total weed density, respectively. The different weed control treatments significantly reduced the density of total monocot weed over pendimethalin @ 1kg a.i/ha and weedy check treatments (Table-1).

It was revealed that at 30 DAS intensity of monocot weeds influenced by the treatments. The population of monocot was minimum in treatments pendimethalin 30% EC (PE) followed by imazethapyr 10 SL (PoE) @ 75 g a.i/ha (T_4). Which was at par with imazethapyr 10 SL @ 75 g a.i/ha (T_1), imazethapyr 10 SL @ 100g a.i/h a (T_2), pendimethalin 30 EC @ 1000 a.i/ha (T_3), pendimethalin 30 EC @ 1kg a.i/ha + 1 hand weeding (T_5), imazethapyr35%+imazamox35% 70 WG 70g a.i/ha (T_6) (Table-2).

At 60 DAS treatment imazethapyr35%+imazamox35% 70WG 70g a.i./ha (T_6) recorded minimum count of monocot weeds which was significantly at par with imazethapyr 10 SL @ 75 g a.i/ha (T_1), and imazethapyr 10 SL @ 100g ai/ha(T_2), 60 and 90 DAS and pendimethalin 30% EC (PE) followed by imazethapyr 10 SL @ 75 g a.i/ha (T_4). 60, 90 and 120 DAS. Whereas, at 90 and 120 DAS monocot were recorded minimum in imazethapyr 35%+imazemox 35% 70WG (T6) followed by application pendimethalin 30% EC (PE) followed by imazethapyr 10 SL @ 75 g a.i/ha (T_4). Weedy check recorded highest density of monocot weeds at all observation stages (Table-2).

The intensity of total monocot weeds was minimum under (imazethapyr35%+imazemox35%) 70 WG 70g a.i/ha (T_6), pendimethalin 30% EC (PE) followed by imazethapyr 10 SL @ 75 g a.i/ha (T_4) and imazethapyr 10 SL @ 100g a.i/ha (T_2). The less intensity of monocot weeds with post-emergence application of imazethapyr may be due to readily absorbed through the roots and foliage, translocated in the xylem and phloem and accumulated in growing points. It kills the weeds by inhibition of acetohydroxy acid. This inhibition causes a disruption in protein synthesis. Similar, findings were also reported by Vyas and Jain (2003) [16] in soybean, Jadhav (2015) [3] and Padmja *et al*. (2013)

Table 2: Density of different weeds/m^2 at different stages as influenced by weed control treatments

Treatment	Monocot weeds				Dicot weeds				Sedges				Total Weeds			
	30 DAS	60 DAS	90 DAS	120 DAS	30 DAS	60 DAS	90 DAS	120 DAS	30 DAS	60 DAS	90 DAS	120 DAS	30 DAS	60 DAS	90 DAS	120 DAS
T_1- Imazethapyr 10 SL (PoE) 75 g a.i./ha	23.16 (4.86)	17.09 (4.18)	14.49 (3.87)	11.76 (3.50)	21.41 (4.66)	14.91 (3.91)	17.32 (4.22)	8.15 (2.93)	120.90 (11.02)	49.58 (7.07)	14.91 (3.89)	12.25 (3.56)	165.42 (12.88)	81.58 (9.05)	46.72 (6.86)	32.16 (5.71)
T_2- Imazethapyr 10 SL (PoE) 100 g a.i./ha	23.41 (4.88)	16.80 (4.14)	13.08 (3.68)	9.06 (3.09)	21.28 (4.65)	13.82 (3.77)	15.62 (4.01)	5.49 (2.71)	119.75 (10.96)	45.58 (6.77)	12.66 (3.60)	9.75 (3.18)	164.44 (12.84)	74.70 (8.66)	41.36 (6.74)	24.30 (4.97)
T_3- Pendimethalin 30 EC (PE)1kg a.i./ha	24.24 (4.96)	39.16 (6.29)	51.23 (7.19)	39.63 (6.33)	19.81 (4.50)	34.57 (5.92)	38.32 (6.22)	29.15 (5.44)	118.75 (10.92)	127.83 (11.13)	35.42 (5.97)	25.00 (5.05)	162.97 (12.78)	201.56 (14.21)	124.96 (11.19)	93.78 (9.71)
T_4- T_3 followed byImazethapyr 10 SL (PoE) 75 g a.i./ha	20.41 (4.57)	14.94 (3.92)	12.53 (3.56)	6.98 (2.27)	19.60 (4.47)	12.99 (3.67)	12.90 (3.65)	4.99 (2.32)	117.25 (10.85)	45.58 (6.77)	9.17 (3.06)	9.0 (3.07)	157.25 (12.56)	73.51 (8.89)	34.59 (5.90)	20.97 (4.63)
T_5- T_3 + Hand weeding at 40 DAS	23.02 (4.84)	25.67 (5.11)	34.76 (5.94)	31.41 (5.65)	20.23 (4.54)	14.74 (3.83)	26.24 (5.17)	20.81 (4.61)	118.25 (10.90)	42.08 (6.51)	29.92 (5.44)	19.00 (4.37)	161.50 (12.73)	81.91 (9.06)	90.92 (9.54)	71.22 (8.47)
T_6Imezathyper35%+Imazamox35% 70 WG 70g a.i./ha	22.73 (4.82)	14.07 (3.80)	10.09 (3.24)	5.52 (2.43)	22.36 (4.77)	13.24 (3.69)	10.95 (3.37)	4.36 (2.16)	122.50 (11.08)	41.50 (6.43)	7.50 (2.79)	8.25 (2.93)	167.58 (12.96)	69.39 (8.35)	28.54 (5.38)	18.12 (4.28)
T_7- Weedy check	34.48 (5.91)	53.52 (7.34)	61.24 (7.85)	54.43 (7.41)	27.90 (4.77)	48.82 (7.02)	53.82 (7.37)	39.15 (6.29)	126.58 (11.27)	150.00 (12.28)	107.5 (10.37)	38.00 (6.15)	188.96 (13.76)	252.84 (15.91)	222.57 (14.93)	131.58 (11.47)
S.Em±	(0.15)	(0.20)	(0.15)	(0.13)	(0.18)	(0.18)	(0.14)	(0.15)	(0.11)	(0.27)	(0.34)	(0.26)	(0.14)	(0.24)	(0.24)	(0.23)
C.D.at 5%	(0.45)	(0.60)	(0.46)	(0.40)	(NS)	(0.55)	(0.43)	(0.45)	(NS)	(0.82)	(1.02)	(0.79)	(0.43)	(0.73)	(0.72)	(0.69)

Note: Figures in parenthesis are $\sqrt{X + 0.5}$ transformed values.

b) Dicot weeds

The dicot weeds had 19.33 per cent share in the total weed density *Acalypha indica* (L.) was found to be most dominating weed among the total dicot with 7.43% infestation followed by *Digera arvensis* Forsk, *Phyllanthus niruri* and *Euphorbia geniculata* (L.) with percent infestation of 5.21, 3.56 and 3.13 respectively.

It is evident from data given in table 2, revealed that at 30 DAS intensity of total dicot weeds was minimum in treatments pendimethalin 30% EC (PE) followed by imazethapyr 10 SL @ 75 g a.i/ha (T_4). All treatments are non-significant in this stages At 60 DAS intensity of dicot weeds was minimum pendimethalin 30% EC (PE) followed by imazethapyr 10 SL @ 75g ai/ha (T_4). Amongst the herbicides, imazethapyr35%+imazamox35% 70WG (T6) was recorded minimum population of dicot weeds at 90 and 120 DAS treatment imazethapyr35%+imazamox35% 70 WG (T6), which was at par with treatment pendimethalin 30% EC(PE) followed by imazethapyr 10 SL @ 75 g a.i/ha (T_4). The weedy check recorded highest weed population at all stages of observation (Table-2).

(Imazethapyr35%+imazemox35%) 70 WG 70g a.i/ha control both emerged multiple and flush of shallow germinating weeds, absorbed from the leaf surface, with translocation throughout the plant, moving in both the xylem and phloem, and accumulating in the meristematic tissues were more effective to dicot weeds. Similar findings were obtained by application of imazethapyr35%+imazamox35% 75, 87.5 g/ha,) and imazamox (350ml/ha) as early post-emergence produced better yield attributing characters compared to weedy check an account of maximum reduction in weed growth coupled with no inhibitory effects on soybean plants reported by Kothawade *et al.* (2007) [4], whereas similar findings reported in pigeonpea jadhav (2015) [3] and Vyas and Jain (2003) [16] In soybean.

Application pendimethalin 30% EC (PE) followed by application of imazethapyr 10 SL @ 75 g ai/ha was more effective to control dicot weeds. Similar results with high WCE, in urdbean Gupta *et al*. (2013) and Pigeonpea Rao *et al.* (2015) [12].

c) Sedges

The sedges (*Cyperus rotundus*) had 59.44% share in the total weed density. The different weed control treatments significantly reduced the density of *Cyperus rotundus* it was significantly minimum weds under imazethapyr 35% + imazamox 35% 70 WG 70g a.i/ha treatment and pendimethalin 30% EC (PE) followed by application of imazethapyr 10 SL @ 75 g a.i/ha, was similar findings was reported by Patel *et al*. (2011) [10] and Basu and Sengupta (2011) [1] in soybean.

It is evident from data given in table-2 revealed that the intensity of *Cyperus rotundus* was influenced non significantly at 30 DAS observation stages. At 30 DAS minimum population of *Cyperus rotundus* was noted in pendimethalin 30% EC (PE) followed by imazethapyr 10 SL @ 75 g a.i/ha (T_4).

At 60 DAS minimum *Cyperus rotundus* count was recorded (imazethapyr35%+imazamox35%) 70WG 70g a.i./ha (T6) which was at par with imazethapyr 10 SL @ 75 g ai/ha (T_1), and imazethapyr 10 SL @ 100 g a.i./ha (T_2), pendimethalin 30% EC(PE) followed by imazethapyr 10 SL @ 75 g ai/ha (T_4) and pendimethalin 30 EC @ 1kg a.i/ha + 1 hand weeding (T_5).

At 90 and 120 DAS treatment imazethapyr35% +imazamox 35% 70WG 70 g a.i./ha (T6) was reported minimum sedges count which was at par with imazethapyr 10 SL @ 100g a.i./ha(T_2), pendimethalin 30% EC (PE) followed by imazethapyr 10 SL @ 75g a.i./ha (T_4). Treatment weedy check (T7) recorded highest *Cyperu srotundus*p opulation at all observation stages.

d) Total weeds

The effect of various weed control treatments on total weed population at all stages was significant. Treatment pendimethalin 30% EC (PE) followed by application of imazethapyr 10 SL @ 75 g a.i/ha. At 30 DAS recorded minimum weed population but at 60, 90 and 120 DAS treatment imazethapyr35%+imazamox35% 70 WG 70g a.i/ha recorded minimum weed Population. Similar result reported by Pandya *et al.* (2007) in soybean.

Except 60 and 120 DAS, it was at par with application of pendimethalin 30% EC (PE) followed by imazethapyr 10 SL @ 75 g a.i/ha and imazethapyr 10 SL @ 100 g a.i/ha. Among all the herbicidal treatments imazethapyr10 SL @ 75 g a.i/ha effectively controlled all weed *spp*. and recorded minimum weed population at all the stages. Similar result was opined by Padmaja *et al*. (2013) [8] and Rao *et al.* (2015) [12].

Effect on dry weight of weeds, weed control efficiency, weed index and grain yield

Weed dry matter is a better parameter to measure the competition than weed number since, it precisely measures the quantity of growth related factors utilized by the weeds and also the computational stress of weed on crop can be understood. It is evident from data given in table 3. The maximum biomass was recorded under weedy check and it was reduced when different herbicides and cultural practices *viz*. hand weedings were applied. Application pendimethalin 30% EC (PE) followed by application of imazethapyr 10 SL @ 75 g a.i/ha was recorded minimum weed shoot biomass at 60 DAS. At 90 and 120 DAS imazethapyr 35%+ imazamox 35% 70 WG 70g a.i/ha recorded minimum weed shoot biomass. The maximum biomass was recorded under weedy check. Similar result was opined by Mishra *et at.* (2013) [6] in soybean and Padmaja *et al.* (2013) [8] in pigeonpea.

Weed control efficiency (WCE) at 120 DAS stage was highest in imazethapyr35%+imazamox35% 70 WG 70g a.i/ha (88.31%) and application of pendimethalin 30 EC (PE) 1kg a.i/ha followed by imazethapyr 10 SL @ 75 g ai/ha (87.70%), were shown very effective in controlling broad leaf, grasses and sedges have arrested growth of most of the weeds, resulting in higher weed control efficiency and thus allowed the crop to grow more vigorously. The present findings are in close agreement with the observation reported by Kothewade *et al.* (2007) in soybean crop and Malik *et al.* (2014) [5].

Weed index or weed competition index expressing the per cent reduction in yield due to the presence of weeds in comparison with weed free situations. Minimum weed index indicated maximum yield. Treatment imazethapyr 35% + imazamox 35% 70 WG 70g a.i/ha nil weed index followed by pendimethalin 30% EC (PE) followed by imazethapyr 10 SL @ 75 g a.i/ha (2.28%). Among the herbicides imazethapyr 10 SL @ 100 g a.i/ha recorded minimum weed index (10.17) and maximum crop yield similar result found Girothia and Thakur (2006) [2] in soybean.

Grain yield is an important parameter, which decides the efficiency superiority or stability of a particular treatment

over treatments. The data presented in table 3 reveals that all weed control treatments except pendimethalin 1kg a.i/ha, produced significantly higher grain yield over weedy check. Weed control at early stage in the season, reduced crop weed competition at the lowest possible limit and provided almost weed free environment. Differences in pigeonpea yield were attributed to differences in weed control, more the weeds present in treatment lesser will be the grain yield.

It may probably the reason for higher yield in imazethapyr35% + imazamox35% 70 WG 70g a.i/ha (1288 Kg/ha) and was at par with pendimethalin 30% EC (PE) followed by imazethapyr 10 SL @ 75g a.i/ha and application of imazethapyr 10 SL @ 100 g a.i/ha. Similar result was opined by Jadhav (2015) [3].

Table 3: Weed shoot biomass (g/m^2), Weed control efficiency (WCE %), Weed index (%) and Grain yield (kg/ha)at different stages as influenced by weed control treatments.

Treatment	Weed shoot biomass (g/m^2)			Weed control efficiency (WCE %)			Weed index (%)	Grain yield (kg/ha)
	60 DAS	90 DAS	120 DAS	60 DAS	90 DAS	120 DAS		
T_1- Imazethapyr 10 SL (PoE) 75 g a.i./ha	37.75	47.71	38.25	78.02	81.57	83.17	14.36	1103
T_2- Imazethapyr 10 SL (PoE) 100 g a.i./ha	34.80	42.00	31.75	79.67	83.71	86.08	10.17	1157
T_3- Pendimethalin 30 EC (PE)1kg a.i./ha	123.25	202.25	90.75	28.15	21.53	59.96	50.31	640
T_4- T_3 followed by Imazethapyr 10 SL (PoE) 75 g a.i./ha	31.15	41.50	28.00	81.80	83.88	87.70	2.25	1259
T_5- T_3 + Hand weeding at 40 DAS	45.30	101.25	63.25	73.63	60.62	72.33	17.31	1065
T_6 - Imazethyper35%+Imazamox35%70 WG 70g a.i./ha	31.76	38.25	26.75	81.44	85.15	88.31	-	1288
T_7- Weedy check	171.50	258.00	228.25	-	-	-	59.86	517
S.Em±	4.00	3.47	3.80					64
C.D.at 5%	11.86	10.31	11.28					189

Conclusion

As result of present study, it could be concluded that application imazethapyr35%+imazamox35% 70 WG 70g a.i/ha recorded higher yield (1288 kg/ha) of Pigeonpea and effectively reduced weed population.

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