

Original Research Article

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Integrated Weed Management in Chilli (*Capsicum Annum L.*)

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ABSTRACT

A field experiment was conducted at Main Agricultural Research Station Farm, University of Agricultural Sciences, Raichur in Hyderabad Karnataka region, to study integrated weed management in chilli (*Capsicum annum L.*). An experiment comprising ten treatments viz. Propaquizafop 10% EC PoE (postemergence) @ 500 ml ha⁻¹ (50 g a.i.), Propaquizafop 10% EC PoE @ 625 ml ha⁻¹ (62.5 g a.i.), Propaquizafop 10% EC PoE @ 750 ml ha⁻¹ (75 g a.i.), Propaquizafop 10% EC PoE @ 1250 ml ha⁻¹ (125 g a.i.), Pendimethalin 30% EC PRE (preemergence) @ 4160 ml ha⁻¹ (1250 g a.i.), Pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) -1 IC at 30 DAT, Propaquizafop 10% EC PoE @ 625 ml ha⁻¹ (62.5 g a.i.) fb (followed by) 1 intercultivation at 30 DAT, Pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb 10% EC PoE @ 625 ml ha⁻¹ (62.5 g a.i.) at 2-7 leaf stage, weedy check and control (Hand weeding). All the weed control treatments resulted significant reduction in weed growth in terms of density and dry weight compared to weedy check. Hand weeding thrice at 35, 50 and 65 days after transplanting (DAT) recorded lowest density and dry weight of weeds (12.52 m⁻² and 19.99 g m⁻², respectively) and higher weed control efficiency (WCE) at 45 days after spraying (88.17 %). The application of pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) propaquizafop 10% EC PoE @ 625 ml ha⁻¹ and propaquizafop 10% EC PoE @ 1250 ml ha⁻¹ has not recorded any phyto-toxicity on chilli and succeeding fodder cowpea. The maximum green chilli yield (23.2 t ha⁻¹) was recorded three hand weedings at 35, 50 and 65 DAT and lowest green chilli yield was recorded with weedy check (13.5 t ha⁻¹). Maximum benefit cost ratio was recorded with pre emergence application of pendimethalin 30% EC @ 4160 ml ha⁻¹ (1250 g a.i.) followed by Propaquizafop 10% EC @ 625 ml ml (62.5 g a.i.) ha⁻¹ (2.60).

Keywords

Pendimethalin, Propaquizafop, Intercultivation, density of weeds, dry weight, chilli

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Introduction

There are several constraints in chilli production. Weed infestation is one of the major factors for loss in yield under irrigated conditions as chilli is usually planted at wider spacing and it grows very slowly during early

growth stages. Weeds which emerge and become established during early stages of chilli growth can be very competitive and reduce the chilli yield potential significantly. Weeds are one of the major limiting factors in the production of chilli and one of the important spices as well as vegetable crops of

the country grown over an area of 37,958 ha with a production of 5.54 lakh tonnes with a productivity of 14.59 t ha⁻¹ in Karnataka (Anon., 2012). But, the extent of yield reduction caused by weeds vary from 30 to 80 % depending on type of weeds, season, variety, soil type, rainfall, duration and time of weed competition.

Mechanical methods of weed control are become laborious; time consuming and expensive on account of scarcity, of labour and the use of herbicides appears to be better substitute for this age old practice and a viable and effective method of weed control. The prolonged and indiscriminate use of recommended herbicides is observed to result in increased accumulation of their residues in soil with negative impact on crop growth factors and resulted in weed shift in some areas.

Thus, there is need to have alternate herbicides which may provide wide range of weed management to avoid weed shift also possible development of herbicide –resistant weeds. Propaquizafop is one of the most promising post emergence herbicides for effective weed management in chilli against complex graminaceous weed flora. Thus, keeping the above facts in view, the present investigation was carried out to evaluate the post emergence application of propaquizafop coupled with other herbicide and intercultivation for weed management in chilli.

Materials and Methods

The field experiment was conducted at Main Agricultural Research Station Farm, University of Agricultural Sciences, Raichur in Hyderabad Karnataka region in chilli. The soil was clayey with alkaline pH (8.00) having 0.75% OC, 269.0 kg ha⁻¹ available N, 17.75 kg ha⁻¹ available P₂O₅ and 458.40 kg

ha⁻¹ K₂O. The study was conducted to know the bio-efficacy and selectivity of different herbicides for weed control in chilli. An experiment comprising ten treatments viz. Propaquizafop 10% EC PoE (postemergence) @ 500 ml per ha (T₁: 50 g a.i.), Propaquizafop 10% EC PoE @ 625 ml ha⁻¹ (T₂:62.5 g a.i.), Propaquizafop 10% EC PoE @ 750 ml ha⁻¹ (T₃:75 g a.i.), Propaquizafop 10% EC PoE @ 1250 ml ha⁻¹ (T₄:125 g a.i.), Pendimethalin 30% EC PRE (preemergence) @ 4160 ml ha⁻¹ (T₅: 1250 g a.i.), Pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) -1 IC at 30 DAT (T₆), Propaquizafop 10% EC PoE @ 625 ml ha⁻¹ (62.5 g a.i.) fb (followed by) 1 intercultivation (IC) at 30 DAT (T₇), Pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb T₂ at 2-7 leaf stage (T₈), weedy check (T₉) and control (T₁₀: Hand weeding) laid out in Randomized complete block design (RCBD) with three replications.

Chilli crop was planted at a spacing of 75 cm X 45 cm and the recommended package of practices was performed during the crop period as per need. Pre emergent (PRE) application of pendimethalin 30% EC was carried out on the day of transplanting and post emergent (PoE) spray of propaquizafop 10% EC was applied at 2-7 leaf stage of weed (20 days after transplanting). Data on weed population species wise were recorded at pre treatment, 15, 30 and 45 days after spraying using quadrants of 0.5 m x 0.5 m, and likewise weed dry weight was recorded. Weed control efficiency (WCE) was worked out taking weed count into consideration. Further, data on weed density and dry weight was subjected to square root transformation before analysis.

The observation on phyto-toxicity of the chemical at higher dosages was also recorded separately. The field experiment was laid out in Randomized Block Design with prescribed

treatments. The observation of phyto-toxicity on chilli and fodder cowpea plants were done on the basis of phytotoxicity rating scale (PRS) for the applied testing herbicide Propaquizafop 10% EC at 1, 3, 5, 7 and 10 DAA. The parameters on phytotoxicity were taken as vein clearing, leaf epinasty and hyponasty, necrosis (leaf tips and margins) and wilting. The observation on the level of phytotoxicity through visual assessment of crop response was rated in the scale of 0-10 (0 = No adverse effect of herbicide on cotton and 10= 100% adverse effect of herbicide on cotton).

The cost of production, gross returns, net returns and benefit cost ratio was worked out on the basis of actual production cost and yield of green chilli. All the parameters were subjected for statistical analysis and interpretation as outlined by (Panse and Sukhatme, 1967).

Results and Discussion

Weed flora: The prominent weed flora observed during the investigation were *Dinebra retroflexa*, *Panicum flavidum*, *Panicum javanicum*, *Brachiaria reptans*, *Cynodon dactylon* among monocots; *Cyperus rotundus* among sedge and *Trianthema portulacastrum*, *Digeria aravensis*, *Amaranthus polygamus*, *Amaranthus viridis*, *Parthenium hysterophorus*, *Euphorbia hirta*, *Phyllanthus maderaspatensis*, *Portulaca oleracea*, *Sida acuta* and *Celosia argentia* among dicot weeds. These results are in line with Gare *et al.*, (2015).

Effect on weeds: All the weed control treatments resulted significant reduction in weed growth in terms of density and dry weight as compared to weedy check (Table 1 & 2). Among the different treatments, hand weeding thrice at 35, 50 and 65 days after

transplanting (DAT) recorded lowest density and dry weight of weeds (12.52 m⁻² and 19.99 g m⁻², respectively) followed by pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb one IC at 30 DAT (18.45 m⁻²) w.r.t. to density and pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb propaquizafop 10% EC PoE @ 625 ml ha⁻¹ (24.20 g m⁻²) with respect to dry weight.

Among the herbicidal treatments, the latter treatment i.e. pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb one IC at 30 DAT recorded least number of weeds and it was at par with pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb propaquizafop 10% EC PoE @ 625 ml ha⁻¹ (62.5 g a.i.) resulted in effective control of composite weed flora, thereby reduced the dry weight of weeds at 45 days after spraying (Table 1 & 2). These results are also in accordance with those of Hassan and Ahmad (2005) and Abid Khan *et al.*, (2012) who also found highest number of weeds and dry weight of weeds m⁻² in weedy check plots and lowest in hand weeded treatments.

Hand weeding thrice at 35, 50 and 65 DAT recorded higher weed control efficiency (WCE) at 45 days after spraying (88.17 %) followed by the treatment pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb one IC at 30 DAT (82.53 %) and it was on par with pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb propaquizafop 10% EC @ 625 ml ha⁻¹ (62.5 g a.i.) over other treatments (Table 3). The results are analogous to those reported by Mekki *et al.*, (2010), Arvadiya *et al.*, (2012) and Gare *et al.*, (2015).

Phytotoxicity on chilli and succeeding crop: The application of pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) propaquizafop 10% EC PoE @ 625 ml ha⁻¹ and propaquizafop 10% EC PoE @ 1250 ml ha⁻¹ has not recorded any phyto-toxicity on

chilli crop. After the harvest of chilli, fodder cowpea was grown to evaluate the herbicide carry over effect. Observations on germination, plant height and phyto-toxicity was recorded on succeeding fodder cowpea in those plots where different treatments of Pendimethalin 30% EC and Propaquizafop 10% EC was applied on Chilli crop in the previous season and data indicates no adverse effect of Propaquizafop 10 % EC treatment on cowpea as there was no significant difference on germination, plant height as well as no phyto-toxic symptoms like epinasty, hyponasty, necrosis, wilting and vein clearing were observed on cowpea crop.

The yield data also did not vary significantly among the treatments, where the testing herbicides were used in different doses 50, 62.5, 75 and 125 g a.i. ha⁻¹ in the previous chilli crop.

Effect weed control methods on growth and yield attributes and yield of chilli: In general, all weed control treatments had marked improvement on green chilli yield and the maximum green chilli yield (23.2 t ha⁻¹) was recorded with hand weeding three at 35, 50 and 65 DAT (Table 4) and it was on par with pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb propaquizafop 10% EC PoE @ 625 ml ha⁻¹ (22.5 t ha⁻¹) and pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb one IC at 30 DAT (20.8 t ha⁻¹) while the lowest green chilli yield was recorded with weedy check (13.5 t ha⁻¹).

This beneficial effect of weed control measures in increasing green chilli yield could be attributed to suppression of weeds and inturn reduced soil moisture and nutrient losses due to weeds and making available to

chilli crop. These finding are in agreement with the results of Deshpande *et al.*, (2006), Kunti and Singh (2012) and Gare *et al.*, (2015).

Economics

Economic evaluation of weed control measures indicated that thrice hand weeding at 35, 50 and 65 DAT recorded significantly higher gross returns (Rs. 1,97,200 ha⁻¹) over weedy check (Rs. 1,15,033). Significantly highest net returns and benefit cost ratio (Rs. 1,17,470 ha⁻¹ and 2.60, respectively) was recorded with pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb propaquizafop 10% EC PoE @ 625 ml ha⁻¹ and it was on par with that thrice hand weeding at 35, 50 and 65 DAT (Rs. 1, 16,675 ha⁻¹ and 2.45) and pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb one IC at 30 DAT (Rs. 1,00,518 ha⁻¹ and 2.31, respectively).

These improved monetary returns were attributed to higher green chilli yield as a consequence of effective weed management methods. Similar results are obtained by Gare *et al.*, (2015).

On the basis of experimentation, it was concluded that application of pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb propaquizafop 10% EC PoE at 2-7 leaf stage of weeds @ 625 ml ha⁻¹ (62.5 g a.i.) and pendimethalin 30% EC PRE @ 4160 ml ha⁻¹ (1250 g a.i.) fb one IC at 30 DAT in the labour scarce area instead of thrice hand weeding at at 35, 50 and 65 days after transplanting were more efficient, practically convenient and economically feasible method of weed control.

Table.1 Effect of Propaquizafop 10% EC and other treatments on density of weeds in chilli at different stages

Treatments	Density of weeds (No. m ⁻²)															
	Grasses				Sedges				Broad leaved				Total			
	BS	15 DAS	30 DAS	45 DAS	BS	15 DAS	30 DAS	45 DAS	BS	15 DAS	30 DAS	45 DAS	BS	15 DAS	30 DAS	45 DAS
T ₁	6.47 (41.67)	5.47 (29.67)	4.39 (19.00)	3.67 (13.18)	1.94 (3.50)	1.66 (2.50)	1.55 (2.17)	1.66 (2.50)	6.16 (37.67)	6.37 (40.33)	6.53 (42.33)	6.42 (41.00)	9.12 (82.83)	8.53 (72.50)	7.98 (63.50)	7.55 (56.68)
T ₂	6.68 (44.33)	5.24 (27.25)	4.07 (16.33)	3.54 (12.27)	1.94 (3.50)	1.53 (2.10)	1.38 (1.67)	1.44 (1.83)	6.13 (37.33)	6.29 (39.33)	6.37 (40.33)	6.37 (40.33)	9.24 (85.17)	8.30 (68.68)	7.65 (58.33)	7.39 (54.43)
T ₃	6.79 (45.80)	5.19 (26.67)	3.85 (14.58)	3.25 (10.30)	1.85 (3.17)	1.48 (1.93)	1.32 (1.50)	1.41 (1.75)	6.26 (39.00)	6.26 (39.00)	6.40 (40.67)	6.40 (40.67)	9.39 (87.97)	8.24 (67.60)	7.55 (56.75)	7.28 (52.72)
T ₄	6.46 (41.50)	4.90 (23.75)	3.64 (13.00)	3.03 (8.93)	1.67 (2.53)	1.39 (1.68)	1.29 (1.42)	1.38 (1.67)	6.16 (37.67)	6.29 (39.33)	6.45 (41.33)	6.32 (39.67)	9.05 (81.70)	8.06 (64.77)	7.48 (55.75)	7.11 (50.27)
T ₅	4.24 (17.73)	3.72 (13.62)	3.35 (10.97)	3.32 (10.77)	1.64 (2.43)	1.44 (1.83)	1.36 (1.60)	1.35 (1.58)	3.35 (11.00)	3.30 (10.67)	3.15 (9.67)	3.20 (10.00)	5.61 (31.17)	5.13 (26.12)	4.74 (22.23)	4.75 (22.35)
T ₆	4.31 (18.30)	3.46 (11.73)	2.97 (8.57)	2.74 (7.28)	1.47 (1.90)	1.28 (1.38)	1.22 (1.23)	1.19 (1.17)	3.50 (12.00)	3.25 (10.33)	2.99 (8.67)	3.20 (10.00)	5.71 (32.30)	4.87 (23.45)	4.33 (18.47)	4.32 (18.45)
T ₇	6.35 (40.13)	3.93 (15.17)	3.10 (9.33)	2.89 (8.08)	1.68 (2.57)	1.38 (1.67)	1.37 (1.63)	1.24 (1.30)	5.12 (26.00)	4.03 (16.00)	3.82 (14.33)	3.82 (14.33)	8.29 (68.47)	5.75 (32.83)	5.05 (25.30)	4.90 (23.72)
T ₈	4.36 (18.80)	3.38 (11.17)	2.81 (7.65)	2.60 (6.53)	1.47 (1.90)	1.37 (1.63)	1.31 (1.47)	1.20 (1.20)	3.35 (11.00)	3.45 (11.67)	2.87 (8.00)	3.50 (12.00)	5.65 (31.70)	4.97 (24.47)	4.17 (17.12)	4.47 (19.73)
T ₉	6.80 (46.00)	7.42 (54.85)	7.75 (59.83)	7.62 (57.83)	1.61 (2.33)	1.85 (3.17)	1.89 (3.33)	1.94 (3.50)	6.21 (38.33)	6.45 (41.33)	6.63 (43.67)	6.68 (44.33)	9.32 (86.67)	9.98 (99.35)	10.35 (106.83)	10.29 (105.67)
T ₁₀	4.16 (17.03)	2.97 (8.58)	2.18 (4.48)	2.09 (4.10)	1.45 (1.87)	1.32 (1.50)	1.05 (0.85)	1.15 (1.08)	3.55 (12.33)	3.10 (9.33)	2.57 (6.33)	2.75 (7.33)	5.61 (31.23)	4.43 (19.42)	3.45 (11.67)	3.57 (12.52)
S.Em±	0.09	0.11	0.10	0.11	0.05	0.08	0.11	0.09	0.22	0.16	0.14	0.12	0.17	0.15	0.14	0.10
C.D@ 5%	0.28	0.32	0.30	0.33	0.16	0.23	0.32	0.27	0.66	0.46	0.43	0.36	0.50	0.44	0.41	0.30
CV (%)	2.90	4.04	4.65	5.61	5.60	8.94	13.42	10.90	7.69	5.54	5.26	4.37	3.81	3.79	3.85	2.83

Note T₁: Propaquizafop 10% EC @ 500 ml ha⁻¹ (50 g a.i.) T₂: Propaquizafop 10% EC @ 625 ml ha⁻¹ (62.5 g a.i.) T₃: Propaquizafop 10% EC @ 750 ml ha⁻¹ (75 g a.i.)
T₄: Propaquizafop 10% EC @ 1250 ml ha⁻¹ (125 g a.i.) T₅: Pendimethalin 30% EC @ 4160 ml ha⁻¹ (1250 g a.i.) T₆: Pendimethalin 30% EC @ 4160 ml ha⁻¹ (1250 g a.i.)
-1 IC at 30 DAT
T₇: Propaquizafop 10% EC @ 625 ml ha⁻¹ (62.5 g a.i.) T₈: Pendimethalin 30% EC @ 4160 ml ha⁻¹ (1250 g a.i.) T₉: Weedy check T₁₀: Control (Hand weeding)
- 1 IC at 30 DAT - T₂ at 2-7 leaf stage **DAT**- Days after transplanting, **IC**- Intercultivation,
DAS- Days after spraying, **BS**- Before spraying, figures in parenthesis indicates original values and outside are transformed values[square root of (X+1)]

Table.2 Effect of Propaquizafop 10% EC and other treatments on weed dry weight at different growth stages in chilli

Treatments	Weed dry weight (g m ⁻²)							
	At 30 days after spraying				At 45 days after spraying			
	Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
T ₁ : Propaquizafop 10% EC @ 500 ml ha ⁻¹ (50 g a.i.)	5.36 (28.45)	1.85 (3.17)	7.62 (57.88)	9.47 (89.50)	5.45 (29.40)	1.81 (3.01)	8.02 (64.00)	9.83 (96.41)
T ₂ : Propaquizafop 10% EC @ 625 ml ha ⁻¹ (62.5 g a.i.)	4.99 (24.67)	1.66 (2.52)	7.58 (57.25)	9.20 (84.44)	5.02 (24.92)	1.64 (2.43)	7.90 (62.12)	9.47 (89.47)
T ₃ : Propaquizafop 10% EC @ 750 ml ha ⁻¹ (75 g a.i.)	4.69 (21.72)	1.56 (2.17)	7.54 (56.67)	8.99 (80.56)	4.80 (22.78)	1.61 (2.35)	8.00 (63.72)	9.44 (88.86)
T ₄ : Propaquizafop 10% EC @ 1250 ml ha ⁻¹ (125 g a.i.)	4.62 (21.09)	1.54 (2.12)	7.55 (56.75)	8.96 (79.96)	4.21 (17.47)	1.51 (2.02)	7.84 (61.18)	9.00 (80.67)
T ₅ : Pendimethalin 30% EC @ 4160 ml ha ⁻¹ (1250 g a.i.)	4.13 (16.81)	1.59 (2.27)	3.71 (13.50)	5.73 (32.58)	4.52 (20.19)	1.49 (1.98)	4.03 (15.97)	6.20 (38.14)
T ₆ : Pendimethalin 30% EC @ 4160 ml ha ⁻¹ (1250 g a.i.) -1 IC at 30 DAT	3.32 (10.76)	1.37 (1.62)	3.48 (11.87)	4.95 (24.26)	3.66 (13.15)	1.36 (1.61)	3.85 (14.61)	5.44 (29.37)
T ₇ : Propaquizafop 10% EC @ 625 ml ha ⁻¹ (62.5 g a.i.) - 1 IC at 30 DAT	3.67 (13.25)	1.49 (1.98)	4.41 (19.23)	5.89 (34.46)	3.90 (14.95)	1.40 (1.70)	4.66 (21.43)	6.19 (38.08)
T ₈ : Pendimethalin 30% EC @ 4160 ml ha ⁻¹ (1250 g a.i.) - T ₂ at 2-7 leaf stage	3.16 (9.76)	1.33 (1.53)	3.84 (14.50)	5.10 (25.79)	3.10 (9.33)	1.34 (1.53)	3.69 (13.33)	4.94 (24.20)
T ₉ : Weedy check	7.64 (58.10)	2.06 (3.99)	7.76 (60.00)	11.06 (122.09)	7.96 (63.08)	2.18 (4.52)	8.07 (64.92)	11.52 (132.51)
T ₁₀ : Control (Hand weeding)	2.93 (8.32)	1.22 (1.25)	3.04 (9.00)	4.34 (18.57)	2.71 (7.10)	1.21 (1.22)	3.45 (11.67)	4.50 (19.99)
S.Em_±	0.17	0.04	0.15	0.18	0.15	0.07	0.15	0.16
C.D@ 5%	0.50	0.13	0.45	0.53	0.44	0.21	0.44	0.47
CV (%)	6.62	4.88	4.59	4.16	5.61	8.03	4.28	3.61

Note: DAT- Days after transplanting, IC- Intercultivation, DAS- Days after spraying, BS- Before spraying and figures in parenthesis indicates original values and outside are transformed values [square root of (X+1)]

Table.3 Effect of Propaquizafop 10% EC and other treatments on weed control efficiency (%) at different growth stages in chilli

Treatments	Weed control efficiency (%)							
	At 30 days after spraying				At 45 days after spraying			
	Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
T ₁ : Propaquizafop 10% EC @ 500 ml ha ⁻¹ (50 g a.i.)	68.05	33.33	2.64	40.29	77.24	28.17	7.40	46.34
T ₂ : Propaquizafop 10% EC @ 625 ml ha ⁻¹ (62.5 g a.i.)	72.74	50.00	7.29	45.35	78.77	46.83	8.83	48.43
T ₃ : Propaquizafop 10% EC @ 750 ml ha ⁻¹ (75 g a.i.)	75.61	52.78	6.48	46.74	82.17	48.61	8.19	50.10
T ₄ : Propaquizafop 10% EC @ 1250 ml ha ⁻¹ (125 g a.i.)	78.26	55.56	4.37	47.47	84.56	51.79	10.60	52.45
T ₅ : Pendimethalin 30% EC @ 4160 ml ha ⁻¹ (1250 g a.i.)	81.62	50.83	77.83	79.13	81.36	54.17	77.43	78.85
T ₆ : Pendimethalin 30% EC @ 4160 ml ha ⁻¹ (1250 g a.i.) -1 IC at 30 DAT	85.66	63.06	80.01	82.67	87.38	66.27	77.48	82.53
T ₇ : Propaquizafop 10% EC @ 625 ml ha ⁻¹ (62.5 g a.i.) - 1 IC at 30 DAT	84.35	49.72	66.69	76.15	86.00	61.67	67.79	77.57
T ₈ : Pendimethalin 30% EC @ 4160 ml ha ⁻¹ (1250 g a.i.) - T ₂ at 2-7 leaf stage	87.24	55.28	81.60	83.98	88.65	65.48	72.95	81.33
T ₉ : Weedy check	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T ₁₀ : Control (Hand weeding)	92.52	73.89	85.41	89.08	92.93	67.56	83.51	88.17
S.Em_±	1.32	5.91	3.82	1.83	1.10	4.93	2.81	1.14
C.D@ 5%	3.91	17.55	11.34	5.43	3.28	14.64	8.35	3.40
CV (%)	3.14	21.11	16.04	5.35	2.52	17.39	11.75	3.27

Note: DAT- Days after transplanting, IC- Intercultivation, DAS- Days after spraying and BLWS- Broad leaved weeds

Table.4 Ancillary characters, yield and economics of chilli as influenced by different weed control treatments

Treatments	Ancillary characters and yield			Economics			
	Plant height (cm)	No of branches	Yield (t/ha)	Cost of Cultivation	Gross returns	Net returns	B:C
T ₁ : Propaquizafop 10% EC @ 500 ml ha ⁻¹ (50 g a.i.)	81.8	16.3	17.5	70797	148750	77953	2.10
T ₂ : Propaquizafop 10% EC @ 625 ml ha ⁻¹ (62.5 g a.i.)	83.3	17.0	17.9	71020	152150	81130	2.15
T ₃ : Propaquizafop 10% EC @ 750 ml ha ⁻¹ (75 g a.i.)	84.2	17.2	18.2	71243	154417	83174	2.16
T ₄ : Propaquizafop 10% EC @ 1250 ml ha ⁻¹ (125 g a.i.)	84.8	17.4	18.5	72134	157533	85399	2.20
T ₅ : Pendimethalin 30% EC @ 4160 ml ha ⁻¹ (1250 g a.i.)	87.1	19.2	20.4	72133	173400	101267	2.40
T ₆ : Pendimethalin 30% EC @ 4160 ml ha ⁻¹ (1250 g a.i.) -1 IC at 30 DAT	87.4	20.4	20.8	76565	177083	100518	2.31
T ₇ : Propaquizafop 10% EC @ 625 ml ha ⁻¹ (62.5 g a.i.) - 1 IC at 30 DAT	85.1	19.1	19.2	75674	163200	87526	2.16
T ₈ : Pendimethalin 30% EC @ 4160 ml ha ⁻¹ (1250 g a.i.) - T ₂ at 2-7 leaf stage	87.5	20.6	22.5	73497	190967	117470	2.60
T ₉ : Weedy check	69.0	15.8	13.5	64905	115033	50128	1.77
T ₁₀ : Control (Hand weeding)	88.0	22.2	23.2	80525	197200	116675	2.45
S.Em±	1.81	1.33	1.24	1247	10563	10364	0.14
C.D@ 5%	5.39	3.95	3.69	3706	31386	30793	0.42
CV (%)	3.75	12.44	11.23	2.97	11.23	19.92	11.10

Note: DAT- Days after transplanting, IC- Intercultivation, DAS- Days after spraying, B:C- Benefit-cost ratio, Men and women labour @ Rs. 236 each, FYM @Rs. 600 kg⁻¹, Urea @Rs. 5.72 kg⁻¹, DAP @Rs. 25.32 kg⁻¹, MoP @Rs. 18.22 kg⁻¹, Pegasus 500 SC @ Rs. 3868 kg⁻¹, Chloropyriphos @ Rs. 480 l⁻¹, Spinosad @Rs.1250 per 75ml and Green chilli @ Rs 8.50 kg⁻¹.

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