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Anil Kumar Jangade
Department of Agronomy, Indira Gandhi Krishi Vishwavidhyalaya, Raipur, Chhattisgarh, India

GP Banjara
Department of Agronomy, Indira Gandhi Krishi Vishwavidhyalaya, Raipur, Chhattisgarh, India

Bodhish Kumar Sahu
Department of Agronomy, Indira Gandhi Krishi Vishwavidhyalaya, Raipur, Chhattisgarh, India

Birendra Tigga
Department of Agronomy, Indira Gandhi Krishi Vishwavidhyalaya, Raipur, Chhattisgarh, India

Corresponding Author:
GP Banjara
Department of Agronomy, Indira Gandhi Krishi Vishwavidhyalaya, Raipur, Chhattisgarh, India

Effect of different herbicides on nutrient uptake by weeds and chickpea crop (*Cicer arietinum* L.)

Anil Kumar Jangade, GP Banjara, Bodhish Kumar Sahu and Birendra Tigga

Abstract
The present investigation entitled "Effect of different herbicides on nutrient uptake by weeds and chickpea crop (*Cicer arietinum* L.)" was carried out at the Instructional cum Research Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur, (C.G.) during *rabi* season 2017-18. Results indicated that higher significant seed yield and stover yield was obtained under treatment weed free (hand weeding at 20 and 40 DAS) (T_{10}) and it was followed by Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7) and Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_3). The higher N, P, and K uptake by seed and stover was obtained under treatment weed free (hand weeding at 20 and 40 DAS) (T_{10}) and it was followed by Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7). The highest value N, P and K content was recorded under treatment weed free (hand weeding at 20 and 40 DAS) (T_{10}) and it was followed by Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7). The lowest N, P and K content and uptake by weeds obtained under treatment weedy check (T_{11}).

Keywords: Content and uptake, N P K, pendimethalin, imazethapyr and yield

Introduction
Chickpea (*Cicer arietinum* L.) is an important pulse crop of India. It occupies prime position among pulses by virtue of its short growth period, huge tonnage capacity and outstanding nutrient value as food, feed, and forage. Chickpea valued for its nutritive seeds with high protein content 18-22%, carbohydrate 52-70%, fat 4-10%, minerals (Calcium, Phosphorus and Iron) and Vitamins. It is cultivated in area of 139.81 *lakh ha* with a total production of 137.31 *lakh tones* and average productivity of 982 kg ha^{-1} (FAO, 2017) [17]. Weed competition for qualitative growth and nutrient in general and for nitrogen in particular has been reported to be most serious factor in limiting the crop yield reported from crop weed competition studies in chickpea, weeds removed 132.2 kg nitrogen, 17.6 kg phosphours and 130.1 kg potassium/ha in unweeded control, whereas the crop could utilize only 12.4 kg nitrogen, 5.3 kg phosphours and 10.3 kg potassium/ha (Kumar, 1985) [7]. Fertilizers being warrant their judicious use for obtaining maximum efficiency. Control of weeds can increase fertilizer use efficiency of the crop by way of checking wasteful removal of nutrients by weeds. The present investigation, was, therefore, carried out to study the effect of various weed management practices such as manual weeding, chemical weeding and cultural practices in chickpea on protein and nutrient utilization by the crop and associated weeds.

Chickpea also plays a main role in increasing soil fertility due to its nitrogen fixing ability. Chickpea can fix up to 140 kg N ha^{-1} in a growing period (Poonia and Pithia, 2013) [9]. It leaves substantial amount of residual nitrogen for subsequent crops and adds plenty of organic matter to maintain and improved soil health and fertility.

In chickpea production, one of the major constraints is weed infestation. Weeds compete with crop plants for space, water and nutrients and hence, it causes considerable yield losses. Thus, weeds are one of the major constraints to obtain high grain yield of improved crop cultivars if they are not controlled timely and properly. Chickpea is poor competitor to weeds because of slow growth rate and limited leaf development at early stage of crop growth and establishment, if weed management is neglected under these conditions, resulting in yield loss of 40 to 87% (Ratnam *et al*., 2011) [10]. Weeds emerge with the winter sown crop and create severe competition unless controlled timely and effectively. Yield losses due to weed competition vary considerably depending on the level of weed infestation and weed species prevailing.

Materials and Methods

The present investigation entitled "Effect of different herbicides on nutrient uptake by weeds and chickpea crop (*Cicer arietinum* L.)" was carried out during *rabi* season of 2017-18 (November to March) at Instructional Cum Research Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, with the objective to find out suitable weed management practices for chickpea under the agro-climatic condition of Chhattisgarh plain. The soil of the experimental field was clayey (*Vertisols*) nature with low, medium and high in N, P and K, respectively. The climate of the region is sub humid to semiarid. Experiment was laid out in Randomized Block Design with three replications. The treatments comprised of eleven weed management practices viz, Pendimethalin 30 EC @ 1.0 kg ha^{-1} PE + One hand weeding at 30 DAS (T_1), Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE (T_2), Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_3), Sulfenotrazon 39.6 EC @ 50g ha^{-1} PE + one hoeing at 30 DAS (T_4), Fenoxaprop -p-ethyl 9.3 EC @ 60g ha^{-1} POE at 25 DAS (T_5), Pendimethalin 30 EC + Imezethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE (T_6), Pendimethalin 30 EC + Imezethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7), Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE + Imazethapyr 2% (tank mix) @1.0 kg ha^{-1} (T_8), hand weeding at 30 DAS (T_9), weed free (hand weeding at 20 and 40 DAS) (T_{10}) and weedy check (T_{11}). The chickpea variety vaibhav was sown as test crop on November 15, 2017 with a seed rate of 80 kg ha^{-1}. The crop was harvested on March 07, 2018.

Results and Discussion

Nutrient content in seed and stover (%)

The data related to nitrogen content in seed and stover of chickpea is presented in Table 1. Significant difference was found between the different weed management practices. Significantly the highest nitrogen content in seed and stover was obtained under weed free (hand weeding at 20 and 40 DAS) (T_{10}), in case of seed it was found at par to treatments Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7) and Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE (T_6) and in case of stover it was found at par to treatments Pendimethalin 30 EC @ 1.0 kg ha^{-1} PE + One hand weeding at 30 DAS (T_1). Lowest value was recorded under weedy check (T_{11}).

The highest significantly phosphorus content in seed and stover was recorded under treatment weed free (hand weeding at 20 and 40 DAS) (T_{10}), which nitrogen content in stover was found at par to treatment Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7) and Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE +one hoeing at 30 DAS (T_3). Lowest value was recorded under weedy check (T_{11}).

Significant highest value of potassium content in seed and stover was recorded under treatment weed free (hand weeding at 20 and 40 DAS) (T_{10}) superior to others. However, treatments Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7), Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE +one hoeing at 30 DAS (T_3) and Pendimethalin 30 EC @ 1.0 kg ha^{-1} PE + One hand weeding at 30 DAS (T_1) also recorded comparable potassium content in seed and stover. Lowest value was recorded weedy check (T_{11}).

Seed and stover yield (kg ha^{-1})

Data related to seed yield as affected by various weed management practices on chickpea are presented in Table 1. The finding revealed that amongst weed management practices, weed free (hand weeding at 20 and 40 DAS) (T_{10}) registered significantly higher grain yield (2004.63 kg ha^{-1}), however, it was statistically at par with the treatment of Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7) and Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_3). The minimum seed yield was recorded under control treatment (T_{11}) due to unhindered growth of weeds. Similar results also reported by Butter *et al*. (2008) [1], Singh *et al*. (2008) [13], Sharma (2009) [11], Kumar *et al*. (2011) [6] and Chaudhary *et al*. (2011) [3]. The capacity of plants to produce seed yield depends not only on 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. Higher seed yield under above treatments might be due to the proper utilization of moisture, nutrients light and space by the chickpea crop in the absence of weed competition.

The results indicated that significantly higher stover yield was obtained under Sulfenotrazon 39.6 EC @ 50g ha^{-1} PE + one hoeing at 30 DAS (T_4), which was statistically at par with the treatment of weed free (hand weeding at 20 and 40 DAS) (T_{10}) and Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7) and were significantly superior over weedy check (T_{11}). Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE (T_2), Fenoxaprop-p-ethyl 9.3 EC @ 60g ha^{-1} POE at 25 DAS (T_5), Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE + Imazethapyr 2% (tank mix) @ 1.0 kg ha^{-1} (T_8), Hand weeding at 30 DAS (T_9), Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE (T_6) and Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_3), respectively. The lowest stover yield was recorded under weedy check (T_{11}). The higher stover yield in above treatments might be due to lesser weeds during early crop growth period, higher yield attributes and pod yield which lead to higher stover yield. While in control plot reverse trend was observed and therefore, the lowest stover yield was noted under this treatment. Similar findings reported by Patel *et al*. (2006) [8].

Table 1: Nutreint content (seed and stover) of chickpea as influenced by different weed control measures

Treatment	N Content (%)		P Content (%)		K Content (%)		Seed yield (kg ha^{-1})	Stover yield (kg ha^{-1})
	Seeds	Stover	Seeds	Stover	Seeds	Stover		
T_1- Pendimethalin 30 EC @ 1.0 kg ha^{-1} PE + One hand weeding at 30 DAS	3.20	1.32	0.67	0.19	0.79	1.36	1709.17	2917.07
T_2 - Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE	3.14	1.17	0.69	0.19	0.74	1.30	1214.87	2527.93
T_3 - Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE +one hoeing at 30 DAS	3.11	1.23	0.70	0.21	0.80	1.37	1847.17	2902.93
T_4 - Sulfenotrazon 39.6 EC @ 50g ha^{-1} PE + one hoeing at 30 DAS	3.20	1.01	0.61	0.17	0.72	1.22	1636.00	2935.77
T_5 - Fenoxaprop -p-ethyl 9.3 EC @ 60g ha^{-1} POE at 25 DAS	2.95	0.99	0.67	0.20	0.74	1.32	1236.23	2581.27
T_6 - Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE	3.36	1.13	0.64	0.20	0.67	1.28	1511.13	2855.37
T_7 - Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0	3.67	1.29	0.74	0.22	0.81	1.40	1971.87	2922.67

kg ha^{-1} PE + one hoeing at 30 DAS								
T_8 Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE + Imazethapyr 2% (tank mix) @ 1.0 kg ha^{-1}	3.23	1.22	0.65	0.18	0.75	1.22	1370.70	2693.43
T_9 - Hand weeding at 30 DAS	3.30	1.17	0.65	0.19	0.79	1.33	1505.13	2782.17
T_{10} - Weed free (hand weeding at 20 and 40 DAS)	3.90	1.36	0.88	0.23	0.82	1.42	2004.63	2937.10
T_{11} - Weedy check	2.80	0.86	0.49	0.16	0.65	1.15	498.67	1994.67
SEm±	0.18	0.03	0.02	0.006	0.024	0.04	65.24	109.95
CD (P=0.05)	0.55	0.10	0.06	0.019	0.071	0.123	192.4	324.36

Nutrient uptake by seed and stover (kg ha^{-1})

The nitrogen uptake by seed and stover was determined at harvest. The data in respect to the effect of different treatments on nitrogen uptake by chickpea seed and stover are presented in Table 2.

Significantly the highest nitrogen uptake by seed and stover was observed under weed free (hand weeding at 20 and 40 DAS) (T_{10}) which was at par with Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7). The lowest nitrogen uptake by seed as well as stover was exhibited under weedy check (T_{11}). Among herbicides, significantly higher nitrogen uptake by seed and stover was noted under Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7), which was at par with Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE +one hoeing at 30 DAS (T_3), and Pendimethalin 30 EC @ 1.0 kg ha^{-1} PE + One hand weeding at 30 DAS (T_1). The minimum uptake of nitrogen by seed and stover was noted under Fenoxaprop-p-ethyl 9.3 EC @ 60g ha^{-1} POE at 25 DAS (T_5) followed by Sulfenotrazon 39.6 EC @ 50g ha^{-1} PE + one hoeing at 30 DAS (T_4). Similar results were observed in chickpea by Singh *et al*., (2014) [12].

Phosphorus uptake by chickpea seed and stover was significantly highest under weed free (hand weeding at 20 and 40 DAS) (T_{10}) which was at par with Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7). The lowest phosphorus uptake by seed as well as stover was exhibited under weedy check (T_{11}).

Among herbicides, significantly highest phosphorus uptake by seed and stover was recorded under Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7) which was at par with Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE +one hoeing at 30 DAS (T_3), and Pendimethalin 30 EC @ 1.0 kg ha^{-1} PE + One hand weeding at 30 DAS (T_1). The minimum uptake of phosphorus by seed was noted with Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE (T_6) followed by Fenoxaprop - p-ethyl 9.3 EC @ 60g ha^{-1} POE at 25 DAS (T_5), stover Pendimethalin 30 EC @ 1.0 kg ha^{-1} PE + One hand weeding at 30 DAS (T_1) and Sulfenotrazon 39.6 EC @ 50g ha^{-1} PE + one hoeing at 30 DAS (T_4).

The Potassium uptake by chickpea seed and stover was significantly highest under weed free (hand weeding at 20 and 40 DAS) (T_{10}), which was at par with Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7). The lowest phosphorus uptake by seed as well as stover was exhibited under weedy check (T_{11}).

Among herbicides, significantly highest potassium uptake by seed and stover was observed under Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @ 1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7) which was at par with Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE +one hoeing at 30 DAS (T_3), and Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE + Imazethapyr 2% (tank mix) @ 1.0 kg ha^{-1} (T_8).

The minimum uptake of potassium by seed was noted under Pendimethalin Fenoxaprop-p-ethyl 9.3 EC @ 60g ha^{-1} POE at 25 DAS (T_5) followed by Sulfenotrazon 39.6 EC @ 50g ha^{-1} PE + one hoeing at 30 DAS (T_4) and in stover under Sulfenotrazon 39.6 EC @ 50g ha^{-1} PE + one hoeing at 30 DAS (T_4) followed by Pendimethalin 30 EC @ 1.0 kg ha^{-1} PE + One hand weeding at 30 DAS (T_1).

Nutrient content in weeds (%)

The data on content of nitrogen in weeds as influenced by different weed management practices in chickpea are presented in Table 3. The highest nitrogen content was recorded in weedy check (T_{11}), which was significantly superior over others. The lowest value was recorded under treatment weed free (hand weeding at 20 and 40 DAS) (T_{10}).

Significantly the highest phosphorus content was recorded in weedy check (T_{11}), which was at par to hand weeding at 30 DAS (T_9), Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE (T_6) and Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE +Imazethapyr 2% (tank mix) @ 1.0 kg ha^{-1} (T_8). The lowest value was recorded under treatment weed free (hand weeding at 20 and 40 DAS) (T_{10}).

Significantly the highest potassium content was recorded in check (T_{11}),while it was found at par Fenoxaprop-p-ethyl 9.3 EC @ 60g ha^{-1} POE at 25 DAS (T_5) and Sulfenotrazon 39.6 EC @ 50g ha^{-1} PE + one hoeing at 30 DAS (T_4). The lowest value was recorded under treatment weed free (hand weeding at 20 and 40 DAS) (T_{10}).

Table 2: Nutrient uptake (seed and stover) of chickpea as influenced by different weed control measures

Treatment	N uptake (kg ha^{-1})		P uptake (kg ha^{-1})		K uptake (kg ha^{-1})	
	Seeds	Stover	Seeds	Stover	Seeds	Stover
T_1- Pendimethalin 30 EC @ 1.0 kg ha^{-1} PE + One hand weeding at 30 DAS	61.97	32.22	8.72	4.21	10.39	28.67
T_2 - Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE	54.82	29.85	12.09	5.55	13.01	33.02
T_3 - Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE +one hoeing at 30 DAS	68.45	34.82	13.52	5.87	13.96	38.02
T_4 - Sulfenotrazon 39.6 EC @ 50g ha^{-1} PE + one hoeing at 30 DAS	47.41	22.27	11.91	4.25	10.35	26.81
T_5 - Fenoxaprop -p-ethyl 9.3 EC @ 60g ha^{-1} POE at 25 DAS	47.11	30.36	8.86	4.39	10.12	34.15
T_6 - Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE	55.83	29.78	8.32	4.77	11.01	33.70
T_7 - Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS	69.15	35.05	13.68	5.90	14.22	38.12
T_8 - Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE + Imazethapyr 2% (tank mix) @ 1.0 kg ha^{-1}	61.62	31.25	11.26	5.64	13.35	34.12
T_9 - Hand weeding at 30 DAS	65.20	33.25	12.35	4.45	11.22	28.96
T_{10} - Weed free (hand weeding at 20 and 40 DAS)	71.25	38.02	14.26	6.33	15.32	39.56
T_{11} - Weedy check	45.89	21.00	8.06	4.07	9.45	25.89
SEm±	2.00	1.01	1.01	0.18	0.40	1.15
CD (P=0.05)	5.92	2.98	3.25	0.55	1.19	3.41

Nutrient uptake by weeds (kg ha^{-1})

The data on nitrogen uptake by weeds as affected by different weed management practices in chickpea have been presented in Table 3. The data reveals that there was significant variation in nitrogen uptake by weeds. Significantly the highest nitrogen uptake by weeds was recorded in weedy check (T_{11}) followed by hand weeding at 30 DAS (T_9). The lowest value was recorded under treatment weed free (hand weeding at 20 and 40 DAS) (T_{10}) followed by Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7). Similar finding were reported by Patel *et al*., 2006 [8]; Ratnam *et al*., 2011 [10]; Goud *et al*., 2013 [5].

Significantly the highest phosphorus uptake by weeds was recorded in weedy check (T_{11}). However, it was found at par with treatment hand weeding at 30 DAS (T_9). The lowest uptake was recorded under treatment weed free (hand weeding at 20 and 40 DAS) (T_{10}) and Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7).

Significantly the highest potassium uptake by weeds was recorded in weedy check (T_{11}). However, it was found at par with treatment hand weeding at 30 DAS (T_9). The lowest value was recorded under treatment weed free (hand weeding at 20 and 40 DAS) (T_{10}) and Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7).

The findings revealed that NPK content and their uptake by weeds was lowest in treatment weed free (hand weeding at 20 and 40 DAS) (T_{10}) and Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS (T_7), whereas it was highest in weedy check (T_{11}) due to more weed competition and higher weed dry matter more nutrients were uptake by the weed in weedy check as compared to herbicidal and hand hoeing treatment.

Table 3: Nutreint content and uptake by weeds in chickpea as influenced by different weed control measure

Treatment	Nutrient content (%)			Uptake (kg ha^{-1})		
	N	P	K	N	P	K
T_1- Pendimethalin 30 EC @ 1.0 kg ha^{-1} PE + One hand weeding at 30 DAS	1.64	0.24	1.34	3.37	0.49	2.76
T_2 - Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE	1.64	0.25	1.33	3.56	0.54	2.89
T_3 - Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE +one hoeing at 30 DAS	1.33	0.23	1.58	2.97	0.51	3.53
T_4 - Sulfenotrazon 39.6 EC @ 50g ha^{-1} PE + one hoeing at 30 DAS	1.35	0.23	1.62	3.11	0.53	3.73
T_5 - Fenoxaprop -p-ethyl 9.3 EC @ 60g ha^{-1} POE at 25 DAS	1.48	0.25	1.75	3.65	0.62	4.31
T_6 - Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE	1.65	0.31	1.42	4.13	0.77	3.53
T_7 - Pendimethalin 30 EC + Imazethapyr 2 % (Ready mix) @1.0 kg ha^{-1} PE + one hoeing at 30 DAS	1.31	0.22	1.32	2.11	0.35	2.13
T_8 - Pendimethalin 38.7 CS @ 1.0 kg ha^{-1} PE + Imazethapyr 2% (tank mix) @ 1.0 kg ha^{-1}	1.72	0.31	1.43	4.47	0.81	3.71
T_9 - Hand weeding at 30 DAS	1.71	0.34	1.41	5.81	1.22	4.79
T_{10} - Weed free (hand weeding at 20 and 40 DAS)	0.82	0.17	1.23	0.82	0.17	1.22
T_{11} - Weedy check	1.81	0.36	1.81	9.11	1.81	9.11
SEm±	0.04	0.008	0.04	0.14	0.02	0.12
CD (P=0.05)	0.14	0.02	0.14	0.41	0.07	0.37

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