

Original Research Article

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Studies on Effect of Integrated Weed Management on Growth, Fruit and Seed Yield of Dry Chilli (*Capsicum annuum* L.) Var. LCA-334

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ABSTRACT

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To study the effect of integrated weed management on growth and yield of chilli, an experiment was laid out in randomized block design with nine different treatments for weed management using weedicides, mulches (straw, black polythene) and hand weeding at VRS, SKLTSU, Rajendranagar, Hyderabad. The data recorded for the different parameters showed significant variation among the treatments. It was observed that dry fruit yield and seed yield per ha was maximum in Weed free check- treatment T₈ (53.18 q/ha and 15.95 q/ha respectively) which was followed by treatment T₇ - Hand weeding at 20,40 and 60 DAT recorded 41.15 q/ha of fruit yield and 12.34 q/ha of seed yield and minimum was observed in treatment T₉ (27.22 q/ha and 8.17 q /ha) i.e., week check (No weeding-control) which is due to non-availability of water and nutrients to main crop.

Introduction

Chilli (*Capsicum annuum* L.) is an important commercial crop of India grown for its green fruits as vegetable and riped dried form as spice. In India dry chilli occupies an area of 809 thousands hectare with an annual production of 2310 thousand MT (2017-18 3rd advanced estimates). It is largely grown in Andhra Pradesh, Telangana, Maharashtra, Karnataka, Tamilnadu, Bihar, Rajasthan, Punjab, Haryana and Madhya Pradesh. It is an indispensable spice essentially used in every

Indian cuisine, due to its pungency, taste, colour and aroma. Chilli fruits are rich sources of vit C, A and E. Pungency of chilli is due to crystalline volatile alkaloid called capsaicin present in the placenta of fruit, which has diverse prophylactic and therapeutic uses in allopathic and ayurvedic medicine. It is also a good source of oleoresin, which has varied uses in processed food and beverage industries. Because of this there is a tremendous demand for Indian chillies in the international market that provides wide scope to increase export.

Chilli is a long duration crop, usually infested with a large number of broad-leaf and grassy weeds, which emerge simultaneously, but establish earlier than the crop. Practice of adopting wide spacing, liberal supply of organic manures, fertilizers and frequent irrigations contribute to severe weed infestation and their luxurious growth (Singh *et al.*, 1993).

Weeds emerge fast and grow rapidly competing with the crop severally for growth resources viz., nutrients, moisture, sunlight and space during entire vegetative and early reproductive stages of chilli. They also transpire lot of valuable conserved moisture and absorb large quantities of nutrients from the soil. Further, wide space provided to the chilli, allows fast growth of variety of weed species causing a considerable reduction in yield by affecting the growth and yield components.

Weeds offer severe competition throughout the crop growth. Owing to inherent characteristics of chilli such as upright nature of crop, wide spaced, slow initial growth and less canopy, control of weeds is vitally important not only to check the losses caused by them but also to increase input use efficiency. Thus, the extent of reduction in fruit yield of chilli has been reported to be in the range of 60 to 70 per cent depending on the intensity and persistence of weed density in standing crop (Sharma *et al.*, 1988; Narayana Rao, 1990).

To get effective control of complex weed flora, integrated approach of weed management is the best choice. In the present investigation, an attempt was made to test the feasibility of Pendimethalin, Glyphosate herbicides alone and in combination with one hand weeding, mulching with straw and black polythene and hand weeding practices were evaluated to develop an effective and viable weed management practice for chilli.

Materials and Methods

The experiment was conducted during the Rabi season of 2014-15, 2015-16 and 2016-17 at the *Vegetable Research Station, Sri Konda Laxman Telangana State Horticulture University, Rajendranagar, Hyderabad*. The experiment was laid out in Randomized Block Design with nine treatments and three replications. The treatments comprises of

- T₁: Pre emergence application of Pendimethalin @ 0.75 kg a.i. /ha,
- T₂: Pre emergence application of Pendimethalin @ 0.75 kg a.i. /ha followed by one hand weeding at 40DAT,
- T₃: Stale seed bed by glyphosate @1.00 kg a.i. /ha at 15 days before transplanting,
- T₄: Stale seed bed by glyphosate @1.00kg a.i./ha at 15 days before transplanting followed by one hand weeding at 40DAT,
- T₅: Mulching with black polythene,
- T₆: Straw mulch,
- T₇: Hand weeding at 20,40, and 60DAT,
- T₈: Weed free check (Irrespective of specific intervals) and
- T₉: Weed check (No weeding, control) in plot size of 4.2 X 3.5 m with an spacing of 60 X 45 cm and the variety used is LCA-334.

The observations were recorded for the parameters such as plant height (cm), No. of branches/plant, fruit length (cm), fruit girth (cm), No. of fruits per plant, average weight of 5 dry fruits, average yield of dry fruits/plant (g), dry fruit yield (q/ha) and seed yield (q/ha).

Results and Discussion

Analysis of variance of treatments revealed that there is significant amount of variation among the different weed control treatments.

Growth parameters

Plant height (cm) was recorded highest for the treatment T₈ –weed free check (77.79 cm) which was followed by T₇ – hand weeding at 20, 40 and 60 DAT (77.19 cm) and minimum plant height was recorded for the T₉ -weed check control (51.79 cm) (Table 1). No. of branches/plant was maximum for the treatment T₈ –weed free check (9.34) and T₇ – hand weeding at 20, 40 and 60 DAT (9.04) which were on par with each other followed by treatment T₅ i.e., Mulching with black polythene (8.69) and minimum was recorded for the treatment T₉ -weed check control (4.38) (Table 1). This may be due less competition for nutrients and other available resources in hand weeding plots resulted in higher plant height and No. of branches/plant of chilli when compared to the other treatments. The above findings were in conformity with Singh *et al.*, (2009) and Rahman *et al.*, (2012) who also reported that hand weeding is the most effective weed control method in radish and garlic crops respectively.

Fruit Parameters

Fruit length was recorded maximum for the T₈ treatment -weed free check (8.37 cm) and T₇ - hand weeding at 20, 40 and 60 DAT (8.27) which are on par with each other which was followed by T₅ i.e., Mulching with black polythene (8.00 cm) and minimum was recorded for the T₉ -weed check (7.21 cm) (Table 1). Fruit girth was recorded maximum for the treatment T₈ i.e., weed free check (4.32 cm) (Table 2) and T₇ i.e., hand weeding at 20, 40 and 60 DAT (4.21 cm) which are on par with each other and followed by treatment with black polythene mulch T₅ (4.06 cm) whereas the minimum fruit girth was recorded for the control - treatment T₉ (3.15 cm). No. of fruits/plant was recorded maximum for the treatment T₈ i.e., weed free check (220.25)

(Table 2) which was followed by hand weeding at 20, 40 and 60 DAT -T₇ (208.87) and minimum was recorded in control –no weeding -T₉ (168.77).

Yield parameters

Average dry weight of five fruits (g) was recorded maximum for the weed free check - treatment T₈ (3.52 g) followed by hand weeding at 20, 40 and 60 DAT- treatment T₇ (3.02 g) whereas minimum was recorded under weed check control for the treatment T₉ (2.33 g) (Table 2). Dry fruit yield per plant was recorded maximum for the treatment T₈ (154.96 g) which was followed by T₇ (114.23 g) and minimum was recorded for the weed check treatment T₉ (78.81 g) (Table 3). Similarly, dry fruit yield per hectare was recorded maximum for the treatment T₈ (53.18 q/ha) which was followed by T₇ (41.15 q/ha) and minimum was recorded for the treatment T₉ (27.22 q/ha). Presence of weeds reduces the photosynthetic efficiency, dry matter production and its distribution to economical parts and there by reduces sink capacity of crop resulting in poor fruit yield (Table 3). Seed yield was found superior in treatment T₈ (15.95 q/ha) i.e., weed free check which was followed by hand weeding treatment T₇ (12.34 q/ha) and minimum was recorded for the treatment T₉ (8.17 q/ha) i.e., weed check (Table 3).

In conclusion, hand weeding was the most effective weed control method in enhancing the growth and yield parameters of chilli. The weed density, weed biomass were drastically reduced as compared to weedy check. Similarly, the number of fruits/plant, fruit length and yield of chilli were also recorded highest in weed free check followed by hand weeding at 20, 40 and 60 DAT. Though hand weeding is time consuming, expensive and tedious, it was found to be much effective for weed suppression.

Table.1 Effect of integrated weed management on growth parameters of chilli at VRS, Rajendranagar, Hyderabad (2014-2017)

S. No	TREATMENTS	Plant Height (cm)				No. of branches / plant				Fruit length (cm)			
		2014-15	2015-16	2016-17	pooled	2014-15	2015-16	2016-17	pooled	2014-15	2015-16	2016-17	pooled
1	T1	61.26	63.33	61.26	61.95	5.07	5.27	5.45	5.26	7.64	7.27	7.46	7.46
2	T2	67.18	69.00	67.18	67.79	6.87	6.50	6.72	6.70	7.84	7.33	7.54	7.57
3	T3	62.22	64.00	62.22	62.81	6.33	6.40	6.58	6.44	7.87	7.20	7.51	7.53
4	T4	68.38	70.33	68.38	69.03	6.67	7.30	7.53	7.17	7.93	7.67	7.95	7.85
5	T5	71.26	73.00	71.26	71.84	8.87	8.50	8.70	8.69	8.03	7.87	8.10	8.00
6	T6	53.19	55.00	53.19	53.79	4.67	4.63	4.84	4.71	7.38	7.10	7.45	7.31
7	T7	76.45	78.67	76.45	77.19	9.40	8.77	8.96	9.04	8.39	8.10	8.33	8.27
8	T8	77.19	79.00	77.19	77.79	9.80	9.00	9.23	9.34	8.44	8.20	8.47	8.37
9	T9	51.19	53.00	51.19	51.79	4.40	4.27	4.46	4.38	7.23	7.10	7.30	7.21
CD @5%		1.22	3.14	1.22	0.16	1.15	0.40	0.07	0.44	N.S	0.38	0.22	0.17
CV %		1.08	2.67	1.08	0.14	0.38	3.42	0.58	3.70	0.47	2.93	1.59	1.30

Table.2 Effect of integrated weed management on yield parameters of chilli at VRS, Rajendranagar, Hyderabad (2014-2017)

S. No	TREATMENT	Fruit girth (cm)				No. of fruits/ plant				Average fruit weight/5 fruits			
		2014-15	2015-16	2016-17	pooled	2014-15	2015-16	2016-17	pooled	2014-15	2015-16	2016-17	pooled
1	T1	3.80	3.60	3.88	3.76	191.74	181.14	185.64	186.17	2.60	2.25	2.50	2.45
2	T2	4.08	3.83	3.97	3.96	179.89	187.91	181.68	183.16	2.30	2.65	2.45	2.47
3	T3	3.99	3.67	3.84	3.83	167.58	176.47	172.67	172.24	2.20	2.45	2.55	2.40
4	T4	4.05	3.97	4.14	4.05	187.64	189.25	183.36	186.75	2.75	2.45	2.65	2.62
5	T5	4.41	3.80	3.97	4.06	194.26	201.25	199.31	198.27	3.00	2.70	2.90	2.87
6	T6	3.87	3.53	3.72	3.71	187.67	194.74	186.00	189.47	2.55	2.95	2.7	2.73
7	T7	4.01	4.20	4.42	4.21	204.34	208.64	213.64	208.87	3.05	3.15	2.85	3.02
8	T8	4.35	4.17	4.43	4.32	224.64	219.64	216.47	220.25	3.65	3.40	3.50	3.52
9	T9	3.25	3.00	3.21	3.15	170.64	166.52	169.14	168.77	2.40	2.10	2.50	2.33
CD @5%		0.47	0.32	0.11	0.23	3.17	3.35	4.46	7.28	0.78	0.81	0.56	0.31
CV %		6.85	5.02	1.57	3.36	1.01	1.01	1.36	2.21	5.36	6.31	6.25	6.62

Table.3 Effect of integrated weed management on yield parameters of chilli at VRS, Rajendranagar, Hyderabad (2014-2017)

S. No	TREATMENT	Dry fruit yield per plant (kg)				Dry Fruit yield (q/ha)				Seed yield (q/ha)			
		2014-15	2015-16	2016-17	pooled	2014-15	2015-16	2016-17	pooled	2014-15	2015-16	2016-17	pooled
1	T1	99.70	81.51	92.82	91.35	28.53	32.49	31.97	31.00	8.56	9.75	9.59	9.30
2	T2	82.75	99.59	89.02	90.45	34.86	31.16	31.66	32.56	10.46	9.35	9.50	9.77
3	T3	73.74	86.47	88.06	82.76	30.26	30.82	28.96	30.02	9.08	9.25	8.69	9.01
4	T4	103.20	92.73	97.18	97.71	32.46	34.01	34.20	33.56	9.74	10.20	10.26	10.07
5	T5	116.56	108.68	115.60	113.61	38.04	40.46	39.76	39.42	11.41	12.14	11.93	11.83
6	T6	114.48	122.69	106.02	114.39	42.94	37.11	40.04	40.03	12.88	11.13	12.01	12.01
7	T7	104.21	123.10	115.37	114.23	43.08	40.38	39.98	41.15	12.93	12.11	11.99	12.34
8	T8	163.99	149.36	151.53	154.96	52.27	53.04	54.23	53.18	15.68	15.91	16.27	15.95
9	T9	81.91	69.94	84.57	78.81	24.48	29.60	27.58	27.22	7.34	8.88	8.27	8.17
CD @5%		4.72	3.47	2.37	13.82	2.07	2.34	2.36	3.32	1.26	1.43	1.30	1.00
CV %		2.61	1.93	1.31	7.62	3.29	3.69	3.75	5.26	6.65	7.43	6.86	5.25

Less competition for nutrients and other available resources in hand weeding plots resulted in higher yield of chilli in these plots. Similar results were found with Adhikary *et al.*, (2014) that, yield increase may be attributed to more favorable soil moisture and nutrient utilization. Next to hand weeding, the treatment using black polythene mulch was found effective as the plastic mulch prevents the sunlight from reaching the soil inhibiting the weed emergence. Weedy check recorded significantly lowest pod yield/ha (27.63 q/ha). These results are in agreement with Khan *et al.*, (2012) and Rajkumara (2009) on fruit weight of chilli against different control measures,

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