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EFFECT OF INTEGRATED WEEDS MANAGEMENT FOR GROWTH AND YIELD OF CHILLI (*CAPSICUM ANNUUM* L.) CV K-2

Sha K., Ajish Muraleedharan, Gnanasekaran Seerangan and A. Prasanth
Department of Horticulture, Faculty of Agriculture, Annamalai University,
Annamalai Nagar-608002, Tamil Nadu, India
Corresponding author: shahorticulture@gmail.com

Abstract

A field experiment was conducted at vegetable unit, Department of Horticulture, Faculty of Agriculture, Annamalai University during 2007-2008 to study the effect of integrated weed management on growth and yield of chilli (*Capsicum annuum* L.) herbicides (alachlor, pendimethalain and fluchloralin) The herbicides was tested alone and supplemented with one hand weeding at 30 DAT. One cultural treatment of hand weeding twice (30 and 60 DAT) and mulching treatment sugarcane trash @12 t ha^{-1} and one treatment of un weeded control were also included in the study. and growth and yield of chilli (*Capsicum annuum* L). The major weed flora recorded in the experiment field comprised *Cyperus rotandus, Cynoden dactylon, Trianthema portulacastrum, Echinochloa crusgalli and Amaranthus viridis.* All the treatments significantly reduced the weed population and their dry weight. Significantly lowest weed dry weight and maximum weed-control efficiency were recorded with the treatment combination of fluchloralin 1.5 kg ha^{-1} + 12 t ha^{-1} sugarcane trash mulching + one hand weeding on 30 DAT after transplanting. Maximum plant height, number of branches per plant number of flowers per plant, number of fruits per plant , fruit yield per plant, and estimated yield per hectare the treatment combination of fluchloralin 1.5 kg ha^{-1} + 12 t ha^{-1} sugarcane trash mulching + one hand weeding on 30 DAT.

Keywords : Growth, Yield, *Capsicum annuum* L.

Introduction

Chilli (*Capsicum annuum*.L) belongs to the family Solanaceae is an important spice and vegetable crop grown in India and other parts of the world. Chilli is a common ingredient in Indian curry in the form of paste , powder broken splits or whole form. The dried pods and its value added products like oleoresin curry powder are chiefly exported to Middle East countries. It contains rich source of vitamin A,C,E and P .The Russian Scientist identified vitamin "P" available in green chilli from secondary radiation injury.

India is the largest producer of chilli with 3 percent share in the global production. In India, chilli is cultivated in an area of 8,34,310 hectares with an annual production of 8,47,106 tonnes. In Tamilnadu covering the area of 68,566 hectere with an annual production of 40,646 tonnes, the average productivity is being 0.73 tonnes per hectare. Among the various technologies for boosting the productivity, weed management assumes greater significance in realizing the yield potential of choice varieties in all crops in the cropping sequence. In this view, weed control techniques in the field before and after planting through integrated approaches have claimed to be an integrated method of improving soil fertility plant health, Plant growth and yield of chilli.

Materials and Methods

The experiment was conducted during rabi season of the year 2007 and 2008. at vegetable unit, Department of Horticulture , Faculty of Agriculture, Annamalai University. The soil of the experimental field was clay loam with P^H and EC values of 7.6 and 7.7 m mhos cm^{-1} respectively. The Experiment was laid in randomized block design with three replication and 12 treatment combination comprised of three herbicides *viz*., Alachlor, Pendimethalin and Fluchloralin . For each herbicides @1.5 lit ha^{-1} were applied .The herbicides was tested alone and supplemented with one hand weeding at 30 DAT. One cultural treatment of hand weeding twice (30 and 60 DAT) and mulching treatment sugarcane trash@12 t ha^{-1} and one treatment of unweeded control were also included in the study. T_1- Unweeded check,T_2-Hand weeding twice on 30 and 60 DAT , T_3- Sugarcane trash mulching @ 12 t ha^{-1}, T_4-Alachlor @ 1.5 kg ha^{-1} , T_5- Pendimethalin @ 1.5 kg ha^{-1}, T_6-Fluchloralin @1.5 kg ha^{-1}, T_7- Alachlor @ 1.5 kg ha^{-1} +one hand weeding on 30 DAT ,T_8-Pendimethalin @1.5 kg ha^{-1} + one hand weeding on 30 DAT, T_9-Fluchloralin @ 1.5 kg ha^{-1} + one hand weeding on 30 DAT, T_{10}-alachlor @1.5kg ha^{-1}+sugarcane trash mulching @12tha^{-1}+one hand weeding on 30 DAT, T_{11}-Pendimethalin @ 1.5 kg ha^{-1}+ sugarcane trash mulching @ 12 t ha^{-1} + one hand weeding on 30 DAT,T_{12}-

Fluchloralin @ 1.5 kg ha^{-1} + sugarcane trash mulching @ 12 t ha^{-1} + one hand weeding on 30 DAT

All the herbicides were applied before transplanting of chilli seedlings as a pre-emergence treatment 45 days old seedlings of chilli were transplanted at a spacing of 60 X 45 cm in the beds. The observations were recorded in (both weeds and crop) plant height, number of branches, flowers plant $^{-1}$, fruits $plant^{-1}$, yield ha^{-1}, Ascorbic acid content and capsaicin content, crop dry matter production, nutrient uptake by crop.

Results and Discussion

The data on the growth, yield and quality components of the test crop. Weed efficacy and weed control were recorded. The data obtained are presented in the Table-1.weed flora observed in this experimental field were coordinated by *Cyperus rotandus,Cynodan dactylon, Trianthema portulacastrum, Echinochloa crusgalli and Amaranthus viridis.*

Among the integrated weed management practices tried, the treatment combination of fluchloralin 1.5 kg ha^{-1} + 12 t ha^{-1} sugarcane trash mulching + one hand weeding on 30 DAT was very effectively preventing the weed establishment in comparison with the other treatments pendimethalin, alachlor and fluchloralin application of mulching alone could not effectively suppressed the weeds because the weeds emerged late in general due to fresh enrichment in the field through irrigation water and *Trianthema portulacastrum, Amaranths viridi* like weeds multiplied very fast particularly by virtue of its vegetative propagules and hence performed inferior. Unweeded control due to absence of any weed control measure recorded the highest weed infestation. The results indicated that the integration of fluchloralin@ 1.5 kg ha^{-1} along with sugarcane trash mulching 12 t ha^{-1} and hand weeding on 30 DAT performed the best followed by two hand weeding on 30 and 60 DAT. The best performance of integrated weed management over the hand weeding might be due to the herbicidal action on 30 DAT and further suppression of weeds through mulching throughout the cropping period. In chilli, the growth parameter, plant height and number of branches was directly influenced the economic yield .The importance of this growth attribute has been emphasized by Farskii *et al* (2005). In the present study, the unweeded treatment recorded the minimum plant height which could be due to weed competition suffer nutrients and moisture with main crop plant this reducing the crop growth. Similar finding was also reported by Nandal and Pandita (1988).

The number of flowers per $plant^{-1}$, number of fruits per plant, fruits set percentage and yield per plant were influenced by different weed management treatment. The yield characters of chilli were observed to be the maximum in T_{12} (Fluchloralin 1.5 kg ha^{-1} + sugarcane trash mulching 12 t ha^{-1} + one hand weeding on 30 DAT). Followed by T_2 (two hand weeding on 30 and 60 DAT).Reduced yield in case of the control plant may be attributed due to reduced plant growth because of the competition of weeds with crop for nutrient and moisture. The dry weight of weeds correlated with most of the growth and yield parameters of chilli. Similar findings on increased yield due to weed control have been reported by Ajaikumar and Thakaral (1993) in chilli . However, it is interesting that ascorbic acid content could be increased due to the better weed management practices. Ascorbic acid content showed significant variation in the treatment T_{12} the amount of capsaicin is one of the important quality parameter in chilli, which responsible for the pungency. In the present experiment, the higher level of capsaicin was recorded when the plants were provided with combination of the treatment T_{12}. Table-2 The capsaicin content of chilli was significantly influenced by nutrient Patel. (2004). The uptake of major nutrients N, P and K were highly influenced by different weed management practices. The nutrient uptake was the maximum in the treatment T_{12} Followed by T_2 . This might be due to the effective controlling of weeds which reduced the competition of nutrients with the crop plants. This was consonance with the finding of Irin vethamani and Balakrishnan (1990) and Patil (2004) in chilli.

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Table 1 : Integrated Weed management on weeds, growth and yield of chilli (*Capsicum annuum*.L)

Treatments	Weed characters			Growth characters				Yield characters		
	Weed population 120 DAT	Weed dry mater production 120 DAT	Weed control index	Plant height (cm)	Number of branches per plant	Number of flowers per plant	Number of fruits per plant	Fruit set percentage	Dry fruit yield g plant^{-1}	yield kg ha^{-1}
T^1 - Unweeded check	12.79 (163.24)	1024.17	-	75.48	20.52	89.43	41.15	46.01	144.02	1080.15
T^2 - Hand weeding twice	8.95 (79.64)	514.37	44.86 (49.77)	125.87	30.59	136.19	85.06	62.00	331.73	2488.00
T^3 - Sugarcane trash mulching 12 t ha-1	12.20 (148.40)	862.21	23.42 (15.81)	92.24	23.32	96.49	56.32	58.36	219.64	1647.36
T^4 - Alachlor 1.5 kg ha-1	11.56 (133.18)	865.10	23.20 (15.53)	103.51	25.14	111.28	60.44	54.31	235.71	1767.87
T^5 - Pendimethalin 1.5 kg ha^{-1}	10.94 (119.24)	780.61	29.18 (23.78)	103.79	25.51	112.74	61.53	54.45	239.96	1799.75
T^6 - Fluchloralin 1.5 kg ha-1	9.41 (88.19)	750.12	31.14 (26.75)	105.36	25.78	113.51	62.07	54.68	242.07	1815.54
T^7 - Alachlor 1.5 kg ha-1 + one hand weeding	8.67 (74.84)	689.13	34.88 (32.71)	109.13	26.83	117.64	66.42	56.46	259.03	1942.78
T^8 - Pendimethalin 1.5 kg ha-1 + one hand weeding	8.42 (70.42)	652.52	37.03 (36.28)	112.82	27.79	121.36	70.87	58.39	276.39	2072.94
T^9 - Fluchloralin 1.5 kg ha-1 + one hand weeding	8.05 (64.39)	648.23	38.46 (38.70)	116.53	28.70	126.53	75.21	59.44	293.31	2199.89
T^{10} - Alachlor 1.5 kg ha-1 + sugarcane trash mulching 12 t ha-1 + one hand weeding	7.06 (58.28)	302.52	39.90 (41.16)	120.45	29.56	131.12	78.64	60.00	306.69	2300.22
T^{11} - Pendimethalin 1.5 kg ha-1 + sugarcane trash mulching 12 t ha-1 + one hand weeding	7.20 (51.40)	562.41	42.17 (45.08)	122.14	29.70	132.48	80.72	60.92	314.80	2361.06
T^{12} - Fluchloralin 1.5 kg ha-1 + sugarcane trash mulching 12 t ha-1 + one hand weeding	6.13 (37.18)	370.27	53.03 (63.84)	129.68	31.44	140.24	99.68	71.43	344.64	2584.82
SED	**2.45**	**5.37**	**0.63**	**1.81**	**0.41**	**1.76**	**1.62**	**0.39**	**3.15**	**2.82**
CD (p=0.05)	**4.94**	**10.74**	**1.25**	**3.62**	**0.81**	**3.52**	**3.24**	**0.79**	**6.31**	**5.64**

Table 2 : Integrated Weed management on growth and yield of chilli (*Capsicum annuum* L.)

Treatments	Crop dry matter production (kg ha^{-1})	Total chlorophyll content (mg g^{-1})	Capsaicin content (µg g^{-1})	Nutrient Uptake (kg ha^{-1})		
				Nitrogen	Phosphorus	Potassium
T^1 - Unweeded check	1748.27	5.49	59.33	36.71	22.72	26.22
T^2 - Hand weeding twice	2920.52	8.44	86.17	61.33	37.96	43.80
T^3 - Sugarcane trash mulching 12 t ha^{-1}	1843.18	6.21	64.23	38.70	23.96	27.64
T^4 - Alachlor 1.5 kg ha^{-1}	2407.30	6.68	67.49	50.55	31.29	36.10
T^5 - Pendimethalin 1.5 kg ha^{-1}	2419.56	6.73	68.22	50.81	31.45	36.29
T^6 - Fluchloralin 1.5 kg ha^{-1}	2437.11	6.88	68.37	51.17	31.68	36.55
T^7 - Alachlor 1.5 kg ha^{-1} + one hand weeding	2618.26	7.14	71.66	54.98	34.03	39.27
T^8 - Pendimethalin 1.5 kg ha^{-1} + one hand weeding	2689.40	7.43	74.89	56.47	34.82	40.39
T^9 - Fluchloralin 1.5 kg ha^{-1} + one hand weeding	2760.13	7.78	78.14	57.96	35.88	41.40
T^{10} - Alachlor 1.5 kg ha^{-1} + sugarcane trash mulching 12 t ha^{-1} + one hand weeding	2832.41	8.07	81.27	59.48	36.82	42.48
T^{11} - Pendimethalin 1.5 kg ha^{-1} + sugarcane trashmulching 12 t ha^{-1} + one hand weeding	2847.53	8.19	83.85	59.79	37.01	42.71
T^{12} - Fluchloralin 1.5 kg ha^{-1} + sugarcane trash mulching 12 t ha^{-1} + one hand weeding	2987.64	8.72	88.47	62.74	38.83	44.81
SED	**17.29**	**0.11**	**1.09**	**0.31**	**0.40**	**0.26**
CD (p=0.05)	**34.57**	**0.23**	**2.19**	**0.62**	**0.81**	**0.52**