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EFFECT OF INTEGRATED WEED MANAGEMENT IN GROWTH AND FLOWERING ON DAISY (*CHRYSANTHEMUM CORONARIA* L.) UNDER CHHATTISGARH CONDITIONS

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ABSTRACT

The present experiment was conducted at the Department of Floriculture and Landscape Architecture, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) during winter season (2024-25) to evaluate the effect of weed management practices on the growth and flowering of Daisy (*Chrysanthemum coronaria* L.). The experiment consisted of thirteen treatments of different weed management practices comprising of hand weeding, herbicides and no weeding (control) replicated three times in randomized block design. Among the different weed management practices studied, treatment (T₅) one hand weeding fb pendimethalin @ 1.0 kg ai ha⁻¹ at 30 DAT significantly improved all the growth and flowering parameters and weed control efficiency under studied followed by (T₆) one hand weeding fb oxyfluorfen @ 0.2 kg ai ha⁻¹ at 30 DAT maximum plant height, plant spread and number of branches plant⁻¹ were recorded on application of one hand weeding fb pendimethalin @ 1.0 kg ai ha⁻¹ at 30 DAT followed by one hand weeding fb oxyfluorfen @ 0.2 kg ai ha⁻¹ at 30 DAT. Similarly highest weight of flowers plant⁻¹, number of flowers plant⁻¹, maximum flower diameter and earliest days to 50% first bud emergence were obtained with one hand weeding fb pendimethalin @ 1.0 kg ai ha⁻¹ at 30 DAT recorded *at par* with one hand weeding fb oxyfluorfen @ 0.2 kg ai ha⁻¹ at 30 DAT. Similar treatment also resulted minimum fresh weight, dry matter and highest weed control efficiency.

Key words: Daisy, hand weeding, herbicide, weeds, growth, flowering.

Introduction

Daisy (*Chrysanthemum coronaria* L.) is one of the most important winter annual flower crops. *Chrysanthemum coronarium* (Carl Linnaeus, 1753) (now classified as *Glebionis coronaria*), commonly known as the garland chrysanthemum or crown daisy, is an annual herbaceous plant belonging to the Asteraceae family. Native to the Mediterranean region and East Asia, it is widely cultivated for ornamental, culinary, and medicinal purposes. The estimated area under flower cultivation in India is about 2,85,000 ha (000 ha) and that of loose flower production is 22,84,000 tones (000mt). The total cut flower production from India is 9,47,000 tones (000mt) (2023-24), (National Horticultural database). It is supposed to be among the top flower in

terms of trade in Raipur market (Sharma, 2010). Weeds pose a significant challenge in agriculture and horticulture, competing with crops for essential resources such as nutrients, water, light, and space. In ornamental plants like Daisy (*Chrysanthemum coronaria* L.), weed infestation not only reduces plant growth and yield but also impacts the aesthetic value of the flowers, a key factor in their economic importance. Efficient weed management practices are, therefore, crucial to ensure optimum growth and quality of these ornamental plants. Integrated Weed Management (IWM) is a sustainable approach that combines multiple weed control methods—cultural, mechanical, chemical, and biological—while minimizing the negative impacts on the environment and crop health. unlike conventional weed control methods

that rely heavily on chemical herbicides, IWM seeks to balance effective weed suppression with environmental and economic sustainability. This study aims to evaluate the effect of Integrated Weed Management in Daisy (*Chrysanthemum coronaria* L.), focusing on its impact on weed suppression, plant growth, flower yield, and overall quality. By exploring a combination of strategies, this research seeks to provide insights into sustainable weed management practices for the cultivation of *Chrysanthemum coronaria*.

Material and Methods

The present investigation was carried out at Nursery, Horticulture Research Farm, Department of Floriculture and Landscape Architecture, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) to evaluate the effect of weed management practices on growth and flowerings of Daisy and weed dynamics. Raipur, the place of investigation, is situated in the central part of Chhattisgarh at 21°16' N latitude, 81°36' E longitude and at an altitude of 289.56 m from mean sea level. Good quality seedlings of Daisy was planted in the field having individual plot size of 1.2×1.2m with a spacing of 40×30 cm. All the recommended package of practice was followed to grow a good crop. The experiment was laid out in a randomized block design with three replication having thirteen treatments during Rabi season of 2024-25. The experiment consisted of 13 treatment combinations of different weed control treatments viz. One hand weeding at 30 DAP (T_1), Two hand weeding at 30 and 60 DAP (T_2), Pendimethalin (PE) 30%EC @ 1.0 kg ai /ha (T_3), Oxyflurofen (PE) 23.5%EC @ 0.2 kg ai /ha (T_4), One hand weeding fb Pendimethalin (PE) 30%EC @ 1.0 kg ai /ha (T_5), One hand weeding fb Oxyflurofen (PE) 23.5%EC @ 0.2 kg ai /ha (T_6), Metsulfuron methyl (PoE) 20%WP @ 8g/ha at 20 and 40 DAP (T_7), Quizalofop ethyl (PoE) 5% EC @ 0.05 kg ai /ha at 20 and 40 DAP (T_8), Metsulfuron methyl (PoE) 20%WP @ 8g/ha + quizalofop ethyl (PoE) 5%EC @ 0.05 kg ai /ha at 20 and 40 DAP (T_9), Fenoxaprop-p-ethyl (PoE) 9.3%EC @ 0.10 kg ai /ha at 20 and 40 DAP (T_{10}), Fenoxaprop-p-ethyl (PoE) 9.3%EC @ 0.10 kg ai /ha + metsulfuron methyl (PoE) 20%WP @ 8g/ha at 20 and 40 DAP (T_{11}), Fenoxaprop-p-ethyl (PoE) 9.3%EC @ 0.10 kg ai /ha + quizalofop ethyl (PoE) 5%EC @ 0.05 kg ai /ha at 20 and 40 DAP (T_{12}), No weeding (Control) (T_{13}). The treatments comprised of hand weeding, pre-transplanting treatments with, pendimethalin 30% EC @1.0 kg ai ha⁻¹, oxyflurofen 23.5 % EC @ 0.2 kg ai ha⁻¹, post-transplanting treatment with one hand weeding fb pendimethalin 30% EC @1.0 kg ai ha⁻¹ and no weeding (control). Spraying of herbicide was done by knap-sack

sprayer with flat fan nozzle using water as carrier @ 500 L ha⁻¹ according to treatment requirement. The required quantity of herbicide was dissolved in measured quantity of water and sprayed uniformly over the plot. The blanket spray of pendimethalin and oxyflurofen and directed spray of quizalofop, metsulfuron and fenoxaprop was made as per treatment requirement. Hand weeding was performed by mechanical removal of weeds when required.

The weed control efficiency was calculated by using the following formula

$$WCE(\%) = \frac{DWC - DWT}{DWC} \times 100$$

Where,

WCE: Weed control efficiency in percent

DWC: Dry matter weight (g) of weed in control plot,

DWT: Dry matter weight (g) of weed in treated plot.

Data on weed control efficiency, different growth and flowering parameter were recorded.

Result and Discussion

The results of experiment during course of time were statistically analyzed and presented here.

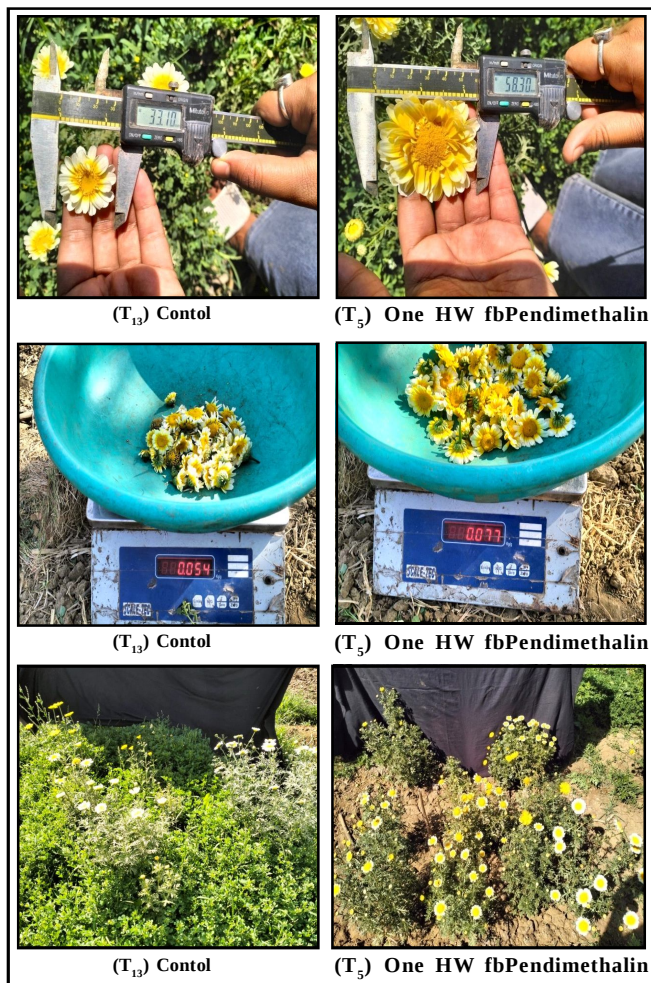


Table 1: Effect of different weed management practices on weeds in Daisy (*Chrysanthem coronaria*) field.

Treatment	WD		FWW		DWW		WCE	
	30 DAP	60 DAP	30 DAP	60 DAP	30 DAP	60 DAP	30 DAP	60 DAP
One hand weeding at 30 DAP	137.33	38.00	82.33	32.00	13.00	5.23	37.35	58.03
Two hand weeding at 30 and 60 DAP	138.00	32.66	83.33	26.66	14.00	4.50	44.84	63.85
Pendimethalin (PE) 30%EC @ 1.0 kg ai /ha	0.00	9.66	0.00	4.33	0.00	0.55	100.00	0.95
Oxyflurofen (PE) 23.5%EC @ 0.2 kg ai /ha	0.00	8.33	0.00	3.83	0.00	0.51	100.00	0.97
One hand weedingfb pendimethalin(PE) 30%EC @ 1.0 kg ai /ha	134.00	0.00	78.66	0.00	10.00	0.00	51.67	100.00
One hand weeding fb oxyflurofen (PE) 23.5%EC @ 0.2 kg ai /ha	134.33	0.00	79.33	0.00	11.00	0.00	45.29	100.00
Metsulfuron methyl (PoE) 20%WP @ 8g/ha at 20 and 40 DAP	138.66	96.66	83.66	71.66	14.66	9.33	28.20	25.25
Quizalofop ethyl (PoE) 5% EC @ 0.05 kg ai /ha at 20 and 40 DAP	136.66	84.66	81.66	60.66	12.00	7.00	41.57	44.04
Metsulfuron methyl (PoE) 20%WP @ 8g/ha + quizalofop ethyl (PoE) 5%EC @ 0.05 kg ai /ha at 20 and 40 DAP	136.66	94.33	81.66	69.66	12.00	8.66	42.11	30.48
Fenoxaprop-p-ethyl (PoE)9.3%EC @ 0.10 kg ai /ha at 20 and 40 DAP	136.00	85.33	80.66	61.66	11.66	7.16	43.13	42.60
Fenoxaprop- p- ethyl(PoE) 9.3%EC @ 0.10 kg ai /ha + metsulfuron methyl (PoE) 20%WP @ 8g/ha at 20 and 40 DAP	135.66	95.66	79.66	70.33	11.33	8.66	31.95	30.48
Fenoxaprop-p-ethyl (PoE) 9.3%EC @ 0.10 kg ai /ha + quizalofop ethyl (PoE) 5%EC @ 0.05 kg ai /ha at 20 and 40 DAP	137.00	92.33	82.00	67.33	12.66	8.33	41.64	33.46
No weeding (Control)	144.66	104.33	89.66	79.33	20.66	12.50	0.00*	0.00*
SEm±	1.39	1.46	1.31	1.42	1.13	0.34	5.53	2.69
C.D. at 5%	4.10	4.30	3.86	4.17	3.34	1.00	16.25	7.91

WD: Weed density 50 cm²; **FWW:** Fresh weight of weed (g.); **DWW:** Dry weight of weed (g.); **WCE:**Weed control efficiency (%)

Effect of weed management practices on weed parameters

Different types of weeds viz., barnyard grass (*Echinochloa colonum*), purple nut sedge (*Cyperus rotundus*), carrot grass (*Parthenium hysterophorus*), bathua (*Chenopodium album*), spinach (*Spinacia oleracea*), dayflower (*Comelina bengalensis*) and creeping wood sorrel (*Oxalis corniculata*) were found predominantly throughout the experimental period, different treatments differed significantly on weed growth aspects (Table 1). Perusal of data reveals that weed population reduced significantly in most of the chemical and cultural treatments as compared to no weeding (control). Weed count/50cm² was recorded lowest (0.00) after 30 DAT with application of pendimethalin 30% EC @1.0 kg ai ha⁻¹ and oxyflurofen 23.5 % EC @ 0.2 kg ai ha⁻¹. However, at 60 DAT it was observed to be the lowest (0.00 g. /50cm²) with the application of one hand weeding fb pendimethalin 30% EC @1.0 kg ai ha⁻¹ and one hand weeding fb oxyflurofen 23.5 % EC @ 0.2 kg ai ha⁻¹ (0.00) comparatively the highest weed count/50cm²

(104.33) was recorded in T₁₃ i.e. no weeding. With regard to fresh and dry weight of weeds, all treatments significantly reduced the fresh and dry weight of weeds as compared to no weeding (control). Maximum reduction in fresh weight of weeds (0.00 g./50cm²) was observed with pendimethalin 30% EC @1.0 kg ai ha⁻¹ and oxyflurofen 23.5 % EC @ 0.2 kg ai ha⁻¹ 30 DAT. Similarly, at 60 DAT, maximum reduction was reported (0.00 g. / 50cm²) with the application of one hand weeding fb pendimethalin 30% EC @1.0 kg ai ha⁻¹ and one hand weeding fb oxyflurofen 23.5 % EC @ 0.2 kg ai ha⁻¹. Fresh and dry weight of weeds was maximum in no weeding at all the stages of crop growth due to the unrestricted growth of weeds in these plots. It may be attributed to the differential efficacy of herbicides in suppressing the weed growth. The remarkable reduction in weed population at different stages might be due to effective weed control in respective treatments either manual or herbicidal control or both (Kumar *et al.*, 2017). Minimum weed dry weight in different weed management treatments with weed free condition might be due to

Table 2: Effect of different weed management practices growth and flowering in Daisy (*Chrysanthem coronaria*).

Treatment	PH		NBPP		PS				DBE	NFPP	WFPP	FD
	30 DAP	60 DAP	30 DAP	60 DAP	30 dap N-S	30 dap E-w	60 dap N-S	60 dap E-w				
One hand weeding at 30 DAP	28.52	47.20	0.63	8.06	9.18	7.72	36.93	30.73	51.33	125.60	190.40	3.95
Two hand weeding at 30 and 60 DAP	28.63	48.00	0.60	8.70	9.28	7.73	38.86	33.40	49.33	142.00	209.40	4.24
Pendimethalin (PE) 30%EC @ 1.0 kg ai /ha	28.25	33.86	0.53	6.46	8.67	7.49	30.86	29.00	49.66	99.46	167.26	3.84
Oxyflurofen (PE) 23.5% EC @ 0.2 kg ai /ha	28.50	35.73	0.60	7.00	8.69	7.52	32.80	29.86	50.00	118.86	186.00	3.86
One hand weeding fb pendimethalin(PE) 30% EC @ 1.0 kg ai /ha	29.23	54.00	0.70	10.40	10.58	8.36	40.73	36.66	45.66	166.73	236.20	4.99
One hand weeding fb oxyflurofen (PE) 23.5% EC @ 0.2 kg ai /ha	28.88	53.33	0.66	9.00	9.35	8.04	39.73	34.06	48.66	147.00	214.53	4.41
Metsulfuron methyl (PoE) 20%WP @ 8g/ha at 20 and 40 DAP	28.06	42.86	0.33	4.86	8.40	7.14	26.60	28.40	51.66	89.56	156.60	3.74
Quizalofop ethyl (PoE) 5% EC @ 0.05 kg ai /ha at 20 and 40 DAP	27.99	46.60	0.53	4.80	8.45	7.14	30.80	28.80	52.33	99.06	164.13	3.73
Metsulfuron methyl (PoE) 20%WP @ 8g/ha + quizalofop ethyl (PoE) 5%EC @ 0.05 kg ai /ha at 20 and 40 DAP	28.20	44.80	0.46	5.86	7.64	7.23	24.80	22.33	52.66	83.46	149.66	3.65
Fenoxaprop-p-ethyl (PoE)9.3%EC @ 0.10 kg ai /ha at 20 and 40 DAP	27.49	44.86	0.60	6.33	8.58	7.08	30.53	25.40	53.00	90.33	157.13	3.79
Fenoxaprop- p- ethyl (PoE)9.3%EC @ 0.10 kg ai / ha + metsulfuron methyl (PoE) 20%WP @ 8g/ ha at 20 and 40 DAP	27.42	44.33	0.43	5.46	7.66	7.44	27.93	25.60	52.00	87.00	152.13	3.72
Fenoxaprop-p-ethyl (PoE) 9.3%EC @ 0.10 kg ai / ha + quizalofop ethyl (PoE) 5%EC @ 0.05 kg ai /ha at 20 and 40 DAP	28.52	45.00	0.60	5.06	8.56	6.59	28.66	24.00	52.66	95.73	163.60	3.76
No weeding (Control)	27.08	35.40	0.26	4.13	6.74	5.64	24.73	22.20	56.00	68.13	128.46	2.92
SEm±	0.94	1.54	0.09	0.43	0.26	0.37	1.18	1.03	0.67	2.87	3.35	0.05
C.D. at 5%	N/A	4.52	N/A	1.28	0.77	1.09	3.48	3.03	1.99	8.42	9.85	0.17
PH: Plant height(cm); NBPP: Number of branches per plant; PS: Plant spread (cm); DBE: Days to 50% bud emergence; NFPP: Number of flowers per plant; WFPP: Weight of flowers per plant(g.); FD: Flower diameter (cm)												

effective weed control obtained under hand hoeing, hand weeding and pre-emergence application of herbicides at initial and early crop growth stage, which resulted into the lowest weed counts and finally reduced the total dry weight of weeds at harvest. The herbicides that showed slightly higher density of weeds and their dry weights may be due to lower herbicidal activity of these chemicals there by, could not be able to control newly emerged

weeds up to longer periods (Patel *et al.*, 2006). This enabled the crop plants to grow optimally without competition for space, nutrients, sunlight and moisture. The lower dry weight of weeds in pendimethalin 30% EC @1.0 kg ai ha⁻¹ and oxyflurofen 23.5 % EC @ 0.2 kg ai ha⁻¹ treatment at initial stages and in one hand weeding fb pendimethalin 30% EC @1.0 kg ai ha⁻¹ and one hand weeding fb oxyflurofen 23.5 % EC @ 0.2 kg

$ai\ ha^{-1}$ at later stages may be ascribed to lesser number of weeds, and rapid depletion of carbohydrate reserves of weeds through rapid respiration. The higher weed control efficiency recorded under weed management treatments might be due to periodical removal of weeds by hand weeding, hand hoeing or herbicidal control resulted in remarkable reduction in weed population and ultimately less dry weight of weeds. (Sharma *et al.*, 2014) also found reduction in fresh dry weight of weeds by using weedicides and hand weeding and results are also in agreement with the findings of Kunti *et al.*, (2011) and Markam *et al.*, (2020).

Effect of weed management practices on crop growth and flowering parameters of Daisy

The different applied weed management treatments were found to have significant effect on the vegetative growth parameters and flowering attributes as compared to no weeding control (Table 2). Maximum plant height (54.00 cm), plant spread N-S (40.73 cm), E-W (36.66 cm) and number of branches $plant^{-1}$ (10.40) were recorded on application of one hand weeding fb pendimethalin 30%EC @ 0.1 kg ha^{-1} , followed by one hand weeding fb oxyflurofen 23.5 % EC @ 0.2 kg $ai\ ha^{-1}$. Effective weed control may have increased the capacity of the crop in utilizing soil moisture, light, nutrients and carbon dioxide in building new tissues that accounted for improving the vegetative growth (Sharma *et al.*, 2014). Similarly, earliest days to 50% bud emergence (45.66 days) was recorded on application of one hand weeding fb pendimethalin 30%EC @ 0.1 kg ha^{-1} , followed by one hand weeding fb oxyflurofen 23.5 % EC @ 0.2 kg $ai\ ha^{-1}$ and delayed 50% bud emergence (56.00 days) was recorded in no weeding (control) this may be due to higher chlorophyll content and photosynthetic rate due to effective control of weeds at critical crop- weed competition stages (Sharma *et al.*, 2014). Highest number of flowers $plant^{-1}$ (166.73) was observed on application of one hand weeding fb pendimethalin 30%EC @ 0.1 kg ha^{-1} , followed by one hand weeding fb oxyflurofen 23.5 % EC @ 0.2 kg $ai\ ha^{-1}$ and lowest number of flowers $plant^{-1}$ (68.13) was recorded in no weeding (control) the effective weed suppression during the critical early growth stages, leading to reduced competition for nutrients, water, light, and space, thereby promoting better vegetative growth and ultimately enhancing flower production (Markam *et al.*, 2020). Maximum flower diameter (4.99 cm) was noted on application of one hand weeding fb pendimethalin 30%EC @ 0.1 kg ha^{-1} , followed by one hand weeding fb oxyflurofen 23.5 % EC @ 0.2 kg $ai\ ha^{-1}$ and minimum flower diameter (2.92 cm) was observed in no weeding (control) the increase in flower

diameter was due to better utilization of more photosynthates which were accumulated due to more number of branches because of better control of the weeds (Rao *et al.*, 2014). And highest weight of flowers $plant^{-1}$ (236.20 g.) was obtained with one hand weeding fb pendimethalin 30%EC @ 0.1 kg ha^{-1} , followed by one hand weeding fb oxyflurofen 23.5 % EC @ 0.2 kg $ai\ ha^{-1}$ and lowest weight of flowers $plant^{-1}$ (128.46 g.) was recorded in no weeding (control) this may be attributed to increase in flower yield per plant may be due to better control of weed population right from seedling transplanting to throughout growing stages of crop which ultimately resulted in better vegetative growth coupled with better production of photosynthates in source and accumulation of food materials in sink caused an increase in flower yield $plant^{-1}$ under these treatments (Shalini and Patil, 2006), respectively. The crop plants in the former treatments experienced good vegetative growth right from the early stages up to the end of cropping period because of less competition of weeds for nutrients, water, space and sunlight (Kumar *et al.*, 2012). Similar findings were also found by Shalini and Patil (2006). Markam *et al.*, (2020) also reported higher number of flowers, weight and better weed control in African marigold.

Conclusion

On the basis of results obtained from present investigation it may concluded that the application of one hand weeding fb pendimethalin 30% EC @ 1.0 kg $ai\ ha^{-1}$ at 30 DAT was found most suitable economical for obtaining highest yield as well as in controlling weed population with improved growth and flowering parameters in Daisy (*Chrysanthemum coronaria* L.) followed by one hand weeding fb oxyflurofen 23.5 % EC @ 0.2 kg $ai\ ha^{-1}$ at 30 DAT.

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