

## Integrated weed management in marigold under irrigated sub-tropical conditions of Jammu & Kashmir

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### ABSTRACT

A field experiment was conducted during the *rabi* seasons of 2007-08 to 2009-10 to find out the relative efficiency of weed management practices in marigold (*Tagetes erecta* Linn). The results indicated that a significantly higher weed control efficiency was achieved with the treatments of two hand weeding (20, 40 DAS) followed by trifluralin 1.0 kg/ha pre-plant incorporation (PPI) + 1HW. The data on yield and yield attributing characters *viz.*, plant height stem diameter, number of leaves/plant, number of flowers/plant and flower yield were significantly influenced by various weed management treatments. The highest flower yield 29140 kg/ha was recorded with the application of two hand weeding which was at par with trifluralin 1.0 kg/ha pre-plant incorporation *fb* 1HW. Significantly lowest flower yield of marigold was recorded in weedy check plots.

**Key words :** Marigold, Yield attributes, Trifluralin, Flower yield

Marigold is one of the most important annual flower crops cultivated commercially in India and in the state of Jammu & Kashmir for making garlands, religious offering and cut flower purposes. Marigold occupies special importance due to its hardiness, easy culture, wide adaptability to different soils and climatic conditions and easy transportation, hence attracts the attention of the flower growers for enhancing their livelihood. The coloured pigments extracted from its flowers are used in poultry feed to induce darkness of the colour of egg yolk. However, the weed flora in marigold lead to the reduction of yield which require efficient chemical weed control along with cultural practices in order to get targeted yield.

### MATERIALS AND METHODS

The experiment was carried out at the Research Farm, Division of Agronomy, FoA, SKUAST-J, Chatha, Jammu during 2007-2009. The soil of the experimental field was sandy clay loam, having pH value of 7.75, low in available N, P and medium in K content. Planting of marigold was done by dibbling at a spacing of 60 x 30cm. The NPK was applied 120, 100 and 100 kg/ha. The experiment was laid out in randomized block design with three replications. Comprising of treatments T<sub>1</sub>- One hand weeding (20 DAS), T<sub>2</sub>- Two hand weeding (20 and 40 DAS), T<sub>3</sub> - Local thatch grass mulching in the inter-row spaces, T<sub>4</sub> - One hand weeding + local thatch grass mulching, T<sub>5</sub> - Two directed burner Flaming in inter-rows, T<sub>6</sub>- Trifluralin 1.0 kg/ha pre-plant incorporation, T<sub>7</sub> - Pendimethalin 1.5 kg/ha pre-emergence application; T<sub>8</sub> - Trifluralin 2.5 kg/ha pre-emergence application; T<sub>9</sub>-

Fenoxaprop 0.25 kg/ha post-emergence over the top application, T<sub>10</sub>- Trifluralin 1.0 kg/ha pre-plant incorporation + 1HW, T<sub>11</sub>- Pendimethalin 1.5 kg/ha pre-emergence application + 1HW; T<sub>12</sub> - Fenoxaprop 0.25 kg/ha post-emergence over the top application + 1HW, T<sub>13</sub> - Weedy check and T<sub>14</sub> - Weed free. The conventional methods were employed to record the data on plant height, stem diameter, number of leaves/plant, number of flowers/plant. The data on dry weed weight (g/m<sup>2</sup>) at 60 days after transplanting (DAT) and the weed population number/m<sup>2</sup> of different species of weeds was collected from plots of different treatments. Flower yield was also recorded. The weed control efficiency and weed index were calculated as per standard method.

### RESULTS AND DISCUSSION

#### Weed population and weed dry weight

The data indicated that significant differences were recorded in weed population and weed dry weight at 60 days over control. The values of 3 years data showed lowest weed population of 5.7/metre<sup>2</sup> and weed dry weight 3.0 g/m<sup>2</sup> with two hand weeding (20, 40 DAT) which was statistically at par with application of trifluralin 1.0 kg/ha pre-plant incorporation *fb* 1 HW but were significantly superior from the rest of the treatments which recorded higher weed population and weed dry weight (Table 1).

#### Weed index and weed control efficiency

Weed control efficiency (WCE) in marigold showed pronounced superiority with two hand weeding (20, 40 DAT) followed by application of trifluralin 1.0 kg/ha pre-plant incorporation *fb* 1 HW and were comparatively

superior to all other treatments. Conversely, to the WCE, the weed index was recorded lower in case of two hand weedings (4.64 %) followed by trifluralin 1.0 kg/ha pre-plant incorporation *fb* 1 HW (5.81%) (Table 1). However, an increasing trend in weed index was observed with increase in weed population. Similar findings were reported by Shaikh *et al.* (2002).

### Yield attributes and yield

Plant height and stem diameter were significantly influenced by different weed management treatments during all the years. Significantly highest plant height and stem diameter of marigold were recorded with two hand weeding which was at par with the application of trifluralin 1.0 kg/ha pre-plant incorporation *fb* 1 HW during all the years. The number of leaves/plant, number of flowers/plant and flower yield were significantly

influenced by different weed management treatments. Significantly highest number of leaves/plant to the tune of 257.4, 259.2 and 260.7, number of flowers/plant of 40.1, 44.7 and 46.8 and flower yield of 27280, 28160 and 29140 kg/ha were observed during 2007, 2008 and 2009, respectively with two hand weeding which was followed by trifluralin 1.0 kg/ha pre-plant incorporation *fb* 1 HW though being at par were superior to all other weed management treatments during three years of study (Table 2).

Hence, it can be concluded that under sub-tropical irrigated conditions of Jammu & Kashmir, application of trifluralin 1.0 kg/ha pre-plant incorporation along with one hand weeding at 20 DAT can be a suitable option for effective weed control in marigold with enhanced flower yield.

**Table 1. Effect of integrated weed management strategies on weed population, weed dry weight, weed index and weed control efficiency of marigold**

Treatment	Weed population (no/m <sup>2</sup> )			Weed dry matter (g/m <sup>2</sup> )			Weed index (%)	Weed control efficiency (%)
	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10		
T <sub>1</sub> - One hand weeding (20 DAT)	9.9(96.7)*	9.9(96.4)	9.8(94.21)	5.02(24.20)	4.98(23.88)	4.46(20.74)	29.29	26.00
T <sub>2</sub> - Two hand weedings (20, 40 DAT)	5.9(33.3)	5.8(32.93)	5.7(31.25)	3.05(8.29)	2.99(7.94)	4.75(6.01)	4.64	56.48
T <sub>3</sub> - Local thatch grass mulching in the inter - row spaces	9.8(94.0)	9.7(93.86)	9.6(91.92)	4.93(23.40)	4.89(22.94)	2.50(21.37)	25.75	27.01
T <sub>4</sub> - One hand weeding + local thatch grass mulching	8.1(63.7)	8.0(63.35)	7.9(61.51)	4.07(15.57)	4.00(15.05)	4.72(13.82)	11.72	39.86
T <sub>5</sub> - Two directed burner flamings in inter rows	7.4(54.3)	7.4(53.83)	7.2(50.75)	3.88(14.05)	3.82(13.64)	3.84(12.72)	7.87	44.70
T <sub>6</sub> - Trifluralin 1.0 kg/ha pre-plant incorporation	8.9(78.0)	8.9(77.79)	8.5(71.85)	4.55(19.71)	4.50(19.24)	3.70(17.52)	16.74	34.04
T <sub>7</sub> - Pendimethaline 1.5kg/ha pre-emergence application	9.2(84.3)	9.2(84.11)	9.1(81.99)	4.70(21.10)	4.68(20.95)	4.30(18.97)	18.10	30.80
T <sub>8</sub> - Trifluralin 1.0 kg/ha 2.5 kg pre-emergence application	9.3(95.7)	9.8(94.94)	9.6(91.81)	4.88(22.77)	4.82(22.28)	4.46(20.74)	20.15	27.89
T <sub>9</sub> - Fenoxaprop 0.25 kg/ha post-emergence over the top application	9.6(91.3)	9.6(91.01)	9.5(88.62)	4.93(23.26)	4.90(23.04)	4.65(21.53)	23.43	28.06
T <sub>10</sub> Trifluralin 1.0 kg/ha pre-plant incorporation <i>fb</i> 1 HW	6.1(36.7)	6.1(36.43)	6.0(34.74)	3.26(9.64)	3.15(8.95)	4.74(7.97)	5.81	54.29
T <sub>11</sub> - Pendimethaline 1.5 Kg/ha pre-emergence application <i>fb</i> 1HW	6.5(41.3)	6.5(40.71)	6.3(38.82)	3.33(10.07)	3.25(9.62)	2.99(8.15)	8.32	51.66
T <sub>12</sub> Fenoxaprop 0.25 Kg/ha post-emergence over the top application <i>fb</i> 1 HW	8.5(71.7)	8.5(70.95)	8.3(68.06)	4.33(17.73)	4.25(17.13)	3.10(15.81)	14.93	36.45
T <sub>13</sub> - Weedy check	3.4(178.3)	13.4(177.46)	13.1(170.88)	13.31(176.26)	13.29(175.8)	13.21(173.5)	41.92	-
T <sub>14</sub> - Weed free	0.0(0.00)	1.0(0.00)	1.0(0.00)	1.00(0.00)	1.00(0.00)	0.00	-	100.00
LSD (P=0.05)	0.5	0.6	0.8	0.28	0.21	0.43	-	-

\* Indicate the meaning of the values given in parenthesis

Table 2. Effect of integrated weed management strategies on yield attributes and yield of marigold

Treatment	Plant height (cm)			Stem diameter(cm)			Number of leaves/plant			Number of flowers/plant			Flower yield (kg/ha)		
	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10
	T <sub>1</sub> - One hand weeding (20 DAT)	63.8	65.0	67.4	1.2	1.2	1.3	148.6	166.4	189.7	22.5	24.6	25.0	14520	15160
T <sub>2</sub> - Two hand weeding (20, 40 DAT)	72.0	72.7	74.0	1.3	1.4	1.4	257.4	259.2	260.7	40.1	44.7	46.8	27280	28160	29140
T <sub>3</sub> - Local thatch grass mulching in the inter - row spaces	67.1	68.3	70.1	1.2	1.3	1.3	232.3	192.0	193.7	24.4	25.3	28.6	16750	17670	18160
T <sub>4</sub> - One hand weeding + local thatch grass mulching	70.1	71.4	72.9	1.2	1.3	1.4	245.1	246.5	247.9	34.3	35.4	36.3	23980	24360	25510
T <sub>5</sub> - Two directed burner flammings in inter rows	70.9	72.0	74.6	1.3	1.3	1.4	249.7	147.9	148.8	35.3	36.6	37.7	25400	26090	27380
T <sub>6</sub> - Trifluralin 1.0 kg/ha pre-plant incorporation	68.9	70.3	72.0	1.3	1.3	1.3	234.9	235.8	236.5	29.3	30.3	33.2	21570	21970	22700
T <sub>7</sub> - Pendimethaline 1.5kg/ha pre-emergence application	69.6	71.0	72.8	1.2	1.3	1.3	218.5	234.4	235.2	28.3	29.8	32.2	20400	20840	22940
T <sub>8</sub> - Trifluralin 1.0 kg/ha 2.5 kg pre-emergence application	68.5	69.8	71.1	1.2	1.3	1.3	190.6	226.5	229.3	27.8	28.3	30.7	19720	19560	21790
T <sub>9</sub> - Fenoxaprop 0.25 kg/ha post- emergence over the top application	68.0	69.1	71.0	1.2	1.3	1.3	224.4	220.8	221.2	26.0	27.0	29.2	17400	18710	19990
T <sub>10</sub> - Trifluralin 1.0 kg/ha pre-plant incorporation /b I HW	71.7	72.3	73.8	1.2	1.4	1.4	247.9	250.3	252.3	40.9	42.3	43.3	26210	27840	28760
T <sub>11</sub> - Pendimethaline 1.5 kg/ha pre- emergence application /b IHW	71.2	72.1	73.1	1.2	1.4	1.4	235.4	249.8	250.1	36.1	37.4	38.2	25670	25920	27410
T <sub>12</sub> - Fenoxaprop 0.25 kg/ha post-emergence over the top application /b I HW	69.5	70.6	71.0	1.2	1.3	1.3	186.5	238.5	240.7	32.5	33.3	34.4	22570	22600	23820
T <sub>13</sub> - Weedy check	6.01	61.1	63.1	1.2	1.3	1.3	145.9	149.9	150.8	19.1	20.3	21.5	12420	19030	6610
T <sub>14</sub> - Weed free	72.5	73.5	74.8	1.3	1.4	1.4	258.2	261.4	263.1	45.2	48.0	48.8	29700	30200	31720
LSD (P=0.05)	2.8	2.3	3.0	0.9	0.7	0.9	18.4	19.5	18.7	9.8	8.6	9.4	2230	6610	2450

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