

# Influence of different weed management practices on growth of mango seedling

B.N. PATEL, N.N. PATEL AND V.C. RAJ

Accepted : March, 2010

See end of the article for authors' affiliations

Correspondence to:

**B.N. PATEL**  
Agricultural Experiment  
Station, Navsari  
Agricultural University,  
Paria, VALSAD  
(GUJARAT) INDIA

## ABSTRACT

For improving the productivity of quality mango seedlings, an experiment was conducted with eleven weed management treatments including control (unweeded). The experiment was laid out in randomized block design with three replications. The results of the experiment clearly indicated that the pre-emergence treatment of Atrazine 2 kg a.i. ha<sup>-1</sup> was found superior to minimize weed population, with minimum dry weight of weeds and higher weed control efficiency in mango seedling nursery. The cent per cent weed control efficiency was noted in weed free treatment with no weeds population. Regarding stone germination, growth parameters (plant height, stem girth and number of leaves) and survival percentage, maximum value of above parameters were recorded with Atrazine 2 kg a.i. ha<sup>-1</sup> as pre emergence followed by inter culturing at 30, 60 and 90 days after sowing and cover crop (cowpea crop up to fiber formation).

**Key words :** Mango seedlings, Weedicides, Cultural methods

**M**ango (*Mangifera indica* L.) is the oldest as well as National Fruit of India, occupies the largest area. India is a paradise of fruits. One of the problem faced by the farmers or nurserymen is of weed control in mango seedling nursery and are infested with a variety of weeds like monocots and dicots. Now a days large number of herbicides have been used for controlling weeds in fruit orchard and fruit nurseries (Moreira and Donadio, 1996). The weed species grow luxuriously and vigorously and if not controlled, they easily overgrow the nursery seedlings. In India, chemical weed control in fruit nurseries has not received any attention even though pre and post emergence herbicides such as Atrazine and Gramaxone, respectively were found to be useful in young and old vine gards for weed control (Dhuria and Leela, 1973). The present investigation was, therefore, planned and carried out to evaluate the alternative for weed management, to know the effect of weedicide, inter culturing, hand weeding, cover crop and mulching on growth of mango seedling.

## MATERIALS AND METHODS

The study on the effect of different weed management practices in mango (*Mangifera indica* L.) seedling nursery was carried out at Agricultural Experimental Station, N.A.U., Paria, Ta. Pardi, Dist-Valsad (Gujarat) during the *Kharif* season 2005-06. The herbicides viz., Butachlor, Atrazine and Pendimethalin @ 1.5, 2.0 and 2.0 kg a.i. ha<sup>-1</sup> were applied at pre-emergence stage, respectively. Inter culturing and hand weeding was done at an interval of 30, 60 and 90 days after planting. Weeding was done throughout the year in weed free

treatment. Mulching was done by sugarcane trash and paddy straw each of @ 10 t/ha. Cover crop of sun hemp and cowpea were broadcasted after sowing of mango stone and grown up to fiber formation of crop. The experiment was laid out in randomized block design with three replications. The plot size was 4.5m x 3.0m. and mango seeds (stone) were sown at 45cm x 10cm distance. The observations on germination of stone, height, stem girth and number of leaves per mango seedlings and survival percentage after uprooting were recorded. The weeds were counted per sq.m. and their dry weight and weed control efficiency were calculated after 90 days after planting. Weed control efficiency (WCE) was worked out by using the formula suggested by Kondap and Upadhyay (1975).

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

where,

DWC = Dry matter production of weeds in unweeded control.

DWT = Dry matter production of weeds in treated plot.

Nutrient uptake by weeds and mango seedling at uprooting was also analysed and calculated.

## RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarised under following heads:

**Weed population (m<sup>2</sup>):**

The results on weed population in mango seedling nursery at 90 days after planting are presented in Table 1. The population of monocot and dicot weeds at 90 DAP were significantly influenced by various weed management treatments. There were no weeds in weed free treatment (T<sub>8</sub>) due to frequent removal of weeds. Least number of monocot and dicot weeds were observed in treatment T<sub>2</sub> *i.e.* Atrazine 2 kg a.i.ha<sup>-1</sup> at pre emergence. The similar results were reported by Bajwa *et al.* (1988) in mango nursery and Josan *et al.* (2003) in citrus nursery. Second best treatment was hand weeding at 30, 60, and 90 days after planting (T<sub>7</sub>). Maximum weed count was noted in unweeded control (T<sub>11</sub>).

**Dry weight of weeds (g/m<sup>2</sup>) :**

The dry weight of weeds was found significant under different weed management treatments (Table 1). Dry weight of weeds was recorded comparatively minimum in treated plots as compared to unweeded control. Treatment of Atrazine @ 2 kg ai. at pre-emergence ranked first with minimum dry weight of weeds, which was at par with hand weeding (T<sub>7</sub>). Gautam and Chauhan (1982) also reported minimum dry weight of weeds due to herbicides treatment in Apricot nursery.

**Weed control efficiency (%) :**

From the Table 1, cent-per cent weed control

efficiency was noted in weed free treatment (T<sub>8</sub>) due to frequent removal of weeds. Higher weed control efficiency was recorded in T<sub>2</sub> (Atrazine-@ 2 kg a.i. ha<sup>-1</sup> (pre-mergence) and in hand weeding at 30, 60 and 90 DAP (T<sub>7</sub>). It may be due to the lower population of weeds in these treatments. Similar results were also reported by Pawar *et al.* (1985) and Kundu *et al.* (1997).

**Seed (Stone) germination (%) :**

Seed (stone) germination percentage was calculated on 15<sup>th</sup> and 25<sup>th</sup> day after sowing and are presented in Table 2. Germination percentage was significantly affected by various weed management treatments. Higher percentage of germination was registered with Atrazine - @ 2 kg a.i. ha<sup>-1</sup> (pre-emergence) (T<sub>2</sub>) and it was significantly at par with T<sub>1</sub> (Butachor @ 1.5 kg a.i. ha<sup>-1</sup>(pre-emergence), T<sub>4</sub> Inter culturing (at 30, 60 and 90 DAP) and T<sub>9</sub> Cover crop (cow pea crop up to fiber formation of crop). While the lower value of germination percentage (46.42% and 58.33%) was recorded under the treatment of Pendimethalin @ 2 kg a.i. ha<sup>-1</sup>, which was at par with T<sub>5</sub>, T<sub>6</sub>, T<sub>7</sub>, T<sub>8</sub>, T<sub>10</sub>, and T<sub>11</sub>, at both stages. However, Challa (1985) reported that germination percentage with Atrazine treatment was similar to control.

**Growth parameters :**

Regarding growth parameters, Atrazine @ 2 kg a. i.

**Table 1 : Weed population and dry weights of weeds as influenced by various weed management treatment in mango seedling nursery**

Treatments	Weed population m <sup>2</sup>			Dry weight of weeds g/m <sup>2</sup>
	Monocot	Dicot	Total	
T <sub>1</sub> - Butachor @ 1.5 kg a.i. ha <sup>-1</sup> (pre-emergence)	15.04 (226.66)	5.14 (26.66)	15.90 (253.32)	11.66
T <sub>2</sub> - Atrazine @ 2.0 kg a.i. ha <sup>-1</sup> (pre-emergence)	11.60 (134.66)	1.04 (1.66)	11.67 (136.32)	67.66
T <sub>3</sub> - Pendimethalin@ 2.0 kg a.i. ha <sup>-1</sup> (pre- emergence)	15.67 (246.66)	5.67 (33.33)	16.69 (279.99)	130.33
T <sub>4</sub> - Inter culturing (at 30,60and 90 DAP)	13.15 (173.33)	5.17 (27.00)	14.14 (205.33)	98.00
T <sub>5</sub> - Mulching (sugarcane trash @ 10t/ha)	14.44 (208.66)	4.64 (21.66)	15.17 (230.32)	111.33
T <sub>6</sub> -Mulching (paddy straw @10 t/ha)	13.72 (188.33)	4.34 (19.00)	14.39 (207.33)	107.33
T <sub>7</sub> - Hand weeding (at30,60and90 DAP)	12.05 (146.67)	2.79 (8.00)	12.38 (154.66)	70.66
T <sub>8</sub> -Weed free (throughout year)	0	0	0	0
T <sub>9</sub> - Cover crop (cow pea crop up to fiber formation of crop)	14.32 (205.33)	6.92 (48.33)	15.92 (253.66)	122.0
T <sub>10</sub> - Cover crop (sun hemp crop up to fiber formation of crop)	14.07 (198.33)	6.58 (43.33)	15.54 (241.66)	120.00
T <sub>11</sub> - Unweeded control	19.95 (398.33)	10.48(110.00)	22.54 (508.33)	211.33
S.E. ±	.036	0.35	0.40	4.93
C.D. (P=0.05)	1.08	1.04	1.20	14.54
C.V.%	4.84	12.73	5.03	8.09

Note : Figures in parenthesis refer to actual weed population

**Table 2 : Germination(%), and growth of mango seedling as influenced by various weed management treatment**

Treatments	Germination (%) after sowing		Plant height at uprooting (cm)	stem girth at uprooting (cm)	No. of leaves at uprooting
	15 <sup>th</sup> day	25 <sup>th</sup> day			
T <sub>1</sub> - Butachor @ 1.5 kg a.i. ha <sup>-1</sup> (pre-emergence)	63.69	67.85	130.66	6.20	32.00
T <sub>2</sub> - Atrazine @ 2.0 kg a.i. ha <sup>-1</sup> (pre-emergence)	73.80	77.38	157.00	7.36	47.33
T <sub>3</sub> - Pendimethalin@ 2.0 kg a.i. ha <sup>-1</sup> (pre-emergence)	46.42	58.33	129.00	5.93	32.66
T <sub>4</sub> - Inter culturing (at 30,60and 90 DAP)	65.47	70.83	142.00	6.23	31.00
T <sub>5</sub> - Mulching (sugarcane trash @ 10t/ha)	53.57	61.30	147.00	6.80	33.00
T <sub>6</sub> - Mulching (paddy straw @10 T/ha)	57.14	61.30	137.00	6.70	35.33
T <sub>7</sub> - Hand weeding (at30,60and90 DAP)	50.00	58.33	244.00	6.13	34.33
T <sub>8</sub> -Weed free (throughout year)	51.19	59.52	142.33	7.06	34.33
T <sub>9</sub> - Cover crop (cow pea crop up to fiber formation of crop)	63.09	70.83	131.00	6.83	33.00
T <sub>10</sub> - Cover crop (sun hemp crop up to fiber formation of crop)	54.76	60.71	142.00	6.36	33.00
T <sub>11</sub> - Unweeded control	54.76	58.92	111.33	5.16	26.00
S.E.±	4.08	3.33	1.67	0.11	1.17
C.D. (P=0.05)	12.04	9.85	4.92	0.33	3.46
C.V.%	12.28	9.02	2.10	3.06	6.00

per ha<sup>-1</sup> at pre emergence was ranked first with better growth respect to plant height, stem girth and number of leaves (Table 2). It may be due to lower population of weeds which resulted on better growth of seedlings. These results are in agreement with those of reported by Bajwa *et al.* (1988), Josan *et al.*(2003) and Gautam and Chauhan (1982). Whereas, significantly lesser plant height, stem girth and number of leaves was recorded in unweeded control.

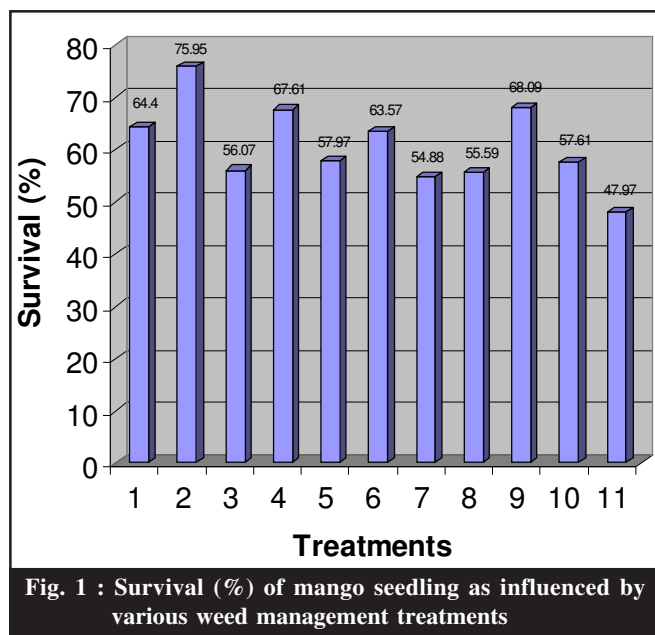
#### Survival percentage :

Mango seedling survival (%) was calculated at time of uprooting and it was significantly affected by various weed management practices (Fig. 1). Higher percentage of seedling survival was registered in T<sub>2</sub> treatment *i.e.* Atrazine - @ 2 kg a. i. ha<sup>-1</sup> (pre-emergence), which was at par with T<sub>9</sub> cover crop (cow pea crop up to fiber formation of crop) and T<sub>4</sub> Inter culturing (at 30, 60 and 90 DAP). It may be due to higher germination of mango stone and lower population of weeds. Least survival per cent was recorded in unweeded control.

#### Nutrient uptake by weeds :

Lower nutrient uptake by weeds was noted in all weed management treatments as compared to control and significantly lower value was noted in Atrazine treatment. On the other hand, the maximum uptake of nutrients was observed in unweeded control. This is due

[Asian J. Hort., June, 2010, Vol. 5 (1)]



to fact that, the weeds were allowed to grow throughout the crop season thus they accumulated maximum dry weight and removal maximum quantity of nutrients. These results are in close conformity with findings of Ramanamurthy and Rao (1998) and Nandal *et al.* (2006).

#### Nutrient uptake by mango seedlings :

Nutrient uptake by mango seedlings was significantly affected by different weed management treatments. All

**Table 3 : Nutrient uptake by weeds and by mango seedling (kg ha<sup>-1</sup>) at uprooting as influenced by various weed management treatment**

Treatments	Nutrient uptake by weeds (kg ha <sup>-1</sup> )			Nutrient uptake by mango seedling (kg ha <sup>-1</sup> )		
	N	P	K	N	P	K
T <sub>1</sub> - Butachor @ 1.5 kg a.i. ha <sup>-1</sup> (pre-emergence)	13.99	2.93	6.37	42.28	7.13	24.45
T <sub>2</sub> - Atrazine @ 2.0 kg a.i. ha <sup>-1</sup> (pre-emergence)	3.80	0.68	2.24	72.11	11.89	33.78
T <sub>3</sub> - Pendimethalin@ 2.0 kg a.i. ha <sup>-1</sup> (pre-emergence)	13.63	2.79	6.02	41.27	8.20	21.65
T <sub>4</sub> - Inter culturing (at 30,60and 90 DAP)	5.54	1.15	2.83	48.67	7.15	30.50
T <sub>5</sub> - Mulching (sugarcane trash @ 10t/ha)	8.42	1.51	3.81	57.67	9.21	28.48
T <sub>6</sub> - Mulching (paddy straw @ 10 T/ha)	8.16	1.55	3.83	59.03	9.27	21.64
T <sub>7</sub> - Hand weeding (at30,60and90 DAP)	9.80	2.19	4.67	66.23	8.16	27.65
T <sub>8</sub> - Weed free (throughout year)	3.81	0.70	2.25	73.67	12.13	35.80
T <sub>9</sub> - Cover crop (cow pea crop up to fiber formation of crop)	7.93	1.53	3.80	47.87	8.43	27.67
T <sub>10</sub> - Cover crop (sun hemp crop up to fiber formation of crop)	9.93	2.13	4.68	46.12	8.37	26.02
T <sub>11</sub> - Unweeded control	43.74	7.52	22.15	23.58	3.67	11.58
S.E. ±	0.10	0.05	0.08	0.37	0.14	0.20
C.D. (P=0.05)	0.30	0.13	0.23	1.08	0.42	0.58
C.V.%	1.52	3.49	2.41	1.21	2.92	1.29

weed management treatments were found superior with respect to nutrient uptake by mango seedlings as compared to control. Higher value of nutrients were noted in treatment T<sub>8</sub> (weed free throughout year) followed by treatment T<sub>2</sub> (Atrazine @ 2kg a.i. ha<sup>-1</sup>). Minimum uptake of nutrients was recorded under unweeded control (T<sub>11</sub>) Nandal *et al.* (2006) have reported similar result.

Authors' affiliations:

**N.N. PATEL**, Regional Horticulture Research Station, Navsari Agricultural University, NAVSARI (GUJARAT) INDIA

**V.C. RAJ**, Navsari Agricultural University, Athwa Farm, SURAT (GUJARAT) INDIA

## REFERENCES

**Bajwa, G.S.**, Bal, J.S., Brar, S.S. and Minhas, P.P.S. (1988). Study on chemical weed control in mango nursery. *Punjab Hort. J.*, **28** (1-2) : 40-43.

**Challa, P.** (1985). Study on the weed control in mango root stock nursery. *Tropical Pest Management*, **304** : 466-467.

**Dhuria, H.S.** and Leela, D. (1973). The chemical control of weeds in grapes var. Bangalore Blue. Viticulture in tropics working group on viticulture in S. E. Asia : pp. 308-311.

**Gautam, D.R.** and Chauhan, J.S. (1982). Chemical weed control in apricot nurseries. *Indian J. Agric Res*, **16** (1) : 10-14.

**Josan, J.S.**, Sharma, J.N. and Mongo, P.K. (2003). Effect of various herbicides on weed population in citrus nursery. *Indian J. Hort.*, **60** (1) : 45-26.

**Kondap, S.M.** and Upadhyay, U.C. (1975). *A Practical Manual on weed control*. Oxford and IBM Publ. Co. New Delhi.

**Kundu, S.**, Gautam, S.N., and Mitra, S.K. (1997), Chemical weed control in guava. *Hort. J.*, **10** (1) :49-58.

**Moreira, C.S.** and Donadio, L.C. (1996). The use of chemical weed control in citrus nursery. *Indian J. Weed Sci.*, **27** : 75-79.

**Nandal, T.R.**, Dhiman, N.K. and Sharma, R. (2006). Effect of different herbicides and their combinations on N, P and K uptake by the weeds and cabbage crop. *Crop Res.*, **31** (2): 283-287.

**Pawar, S.S.**, Gunjate, R.T. and Lad, B.L. (1985). Studies on the chemical weed control in mango budwood nursery. *Pesticides*, pp. 32-35.

**Ramanamurthy, K.V.** and Rao, A.S. (1998). Effect of weed management practices on nutrient uptake by summer green gram and its associate weeds. *Andhra agric. J.*, **45** (1-2) : 106-108.

\*\*\*\*\*