EFFECT OF HORTICULTURAL PRACTICES ON INCIDENCE OF ANTHRACNOSE ON YIELD AND QUALITY OF MANGO

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ABSTRACT

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An experiment was conducted to investigate the effect of different horticultural practices for controlling mango antharcnose with achieving higher yield and quality of mango cv. Amrapali at the Germplasm Centre of the Fruit Tree Improvement Project (GPC-FTIP), Department of Horticulture, Bangladesh Agricultural University, Mymensingh during the period from July 2000–July2002. It was found that application of different horticultural practices effectively reduced the mango anthracnose. P+W+S produced the highest (47.34) number of healthy fruits per plant and the lowest (27.17) was obtained from control plant. The highest (10.26 t/ha) yield was obtained from P+W+S treated plant and the lowest (4.97 t/ha) was found from control plant. Second year x P+W+S treated plant resulted the highest (11.04 t/ha) yield and the lowest (5.40 t/ha) was found from 2nd year x control treated plant.

Key words: Horticultural practices, anthracnose, quality and yield of Mango

INTRODUCTION

Mango (*Mangifera indica* L) is delicious fruit. It belongs to the family Anacardiaceae, originated in South Asia or Malayan archipelago. In Bangladesh in terms of total area and production of fruit crops, mango ranks first in area and third in production. It occupies 50990 hectares of land and total production is 242605 tons per annum with an average yield of 4.75 tons per hectare (BBS, 2005). But the yield is very low compared to that of India, Pakistan and many other mango growing countries in the world (Hossain and Ahmed, 1994). Anthracnose is the most common diseases of mango. Chemical control of anthracnose of mango is very expensive. However, it is also a difficult task for the common farmers to determine the precise dose of the chemical for its application to the field. In addition to this, harmful effect of the fungicide is responsible for air, soil and water pollution (Alam, 1987) and causes serious health hazards. More over indiscriminate use of chemicals disrupt the natural ecological balance by killing the beneficial and antagonistic soil microbes. Chemicals in controlling plant pathogens are being discouraging all over the world. Weeds and other undergrowth beneath the trees encourage the growth of fungus. Controlling of weeds and other undergrowth beneath the trees reduce humidity, increases ventilation, and discourages the growth of the fungus (Anonymous, 1994). Cultural practices are the best choice, but very little efforts have been made to see the usefulness of cultural practices in controlling mango anthracnose at farmers' field in Bangladesh (Rahman and Hossain, 1988). So, the effectiveness of cultural practices is required to be explored. Therefore, the present study was undertaken to investigate the effectiveness of some cultural practices and their integration on the prevention of mango anthracnose.

MATERIALS AND METHODS

The investigation was carried out in two years from July 2000 - July 2001 at Germplasm Centre (GPC), FTIP, Department of Horticulture, BAU, Mymensingh. The single-factor experiment was conducted in randomized complete block design (RCBD) with 3 replications. The treatments were pruning; weeding; spading; pruning + weeding (P+W); pruning + spading (P+S); weeding + spading (W+S); pruning + weeding + spading (P+W+S)and control. Infested twig, leaves, flowers, and fruits were removed after fruit harvest, before flowering and after fruit sets. Pruning, weeding and spading was done after fruit harvest, before flowering and after fruit sets. The plants were irrigated, weeded and fertilized regularly (as recommended in fertilizer recommendation guide, BARC, 1997) as and when necessary following a uniform and recommended dose. The recorded parameters were fruit retention per inflorescence and per plant (%); total number of healthy fruits per inflorescence and per plant (%); total number of diseased fruits per inflorescence and per plant (%); total number of diseased fruits per inflorescence and per plant (%); disease incidence (%); % surface area infected per fruit; fruit weight (g) fruit size (cm), yield/plant; yield (t/ha) and total soluble solids (TSS). The benefit-cost ratio (BCR) analysis was calculated. Recorded data were analyzed statistically according to Gomez and Gomez (1994).

RESULTS AND DISCUSSION

Fruit set per inflorescence was found significant effect due to different year (Table 1). The highest (14.67) fruit set was observed in 2nd year and the lowest (9.52) was recorded from 1st year. Fruit retention per inflorescence differed significantly due to the different year except 40, 50, and 60 days after fruit set (DAFS). The highest

(3.33) fruit retention was observed in 2nd year at 30 DAFS and the lowest (2.49) was recorded from 1st year at same DAFS. The variation in fruit retention per plant was significant due to effect of different year (Table 1) except 20 and 30 DAFS. The highest (15.06%) fruit retention per plant was observed 1st year. The lowest (12.29%) was recorded from 2nd year at 60 DAFS.

Different year showed significant variation in respect of number of healthy fruits per inflorescence 40 DAFS. In 2nd year gave higher (1.53) number of healthy fruits per inflorescence while 1st year gave the lowest (1.28) number of healthy fruits per inflorescence at 60 DAFS (Table 2). Number of healthy fruits per plant was insignificantly influenced by different year. Different year influenced in respect of number of diseased fruits per inflorescence. The lowest (0.22) number of diseased fruits per inflorescence were obtained from 1st year and the highest (0.25) was obtained from 2nd year at 60 DAFS. Number of diseased fruits per plant was insignificantly influenced by different year. Highly significant difference was observed due to different year in relation to the total number of fruits per plant (Table 3). The highest (45.13) number of fruits was found in 2nd year while, the lowest (36.60) fruits per plant was obtained from 1st year. Variation on the weight of individual fruit due to influence of years to be significant (Table 3). It was higher (183.13 g) in 2nd year than that of 1st year (171.08 g). Statistically significant variation was found in total number of healthy fruits per plant due to different year. The highest (38.75) number of healthy fruits was recorded from 2nd year and the lowest (31.79) was found from 1st year. Variation on the percentage of healthy fruits per plant due to the influence of different year was found to be insignificant. The highest percentage (87.09) of healthy fruits per plant was observed from 1st year and the lowest (86.07%) was recorded from 2nd year. This might be due to the age of the plant and environmental factor, which led to the highest fruit retention and the highest fresh fruit per inflorescence and per plant. In 2nd year increased the number of fruits per plant, number of healthy fruits per plant, and yield per plant and per hectare compared to 1st year. The results indicated that in 2nd year given higher fruit set and fruit retention which led to the more healthy fruits per plant.

Highly significant variation was found among the different year in respect of total number of disease fruits per plant (Table 3). The highest number of diseased (6.13) fruits per plant was observed from 2nd year and the lowest (4.79) was recorded from 1st year. There was significant difference in percentage of diseased fruits per plant. The highest percentage (13.93) of diseased fruits per plant was obtained from 2nd year and the lowest (12.87%) was recorded from 1st year. Healthy fruits yield per plant was found statistically insignificant due different year (Table 3). Insignificant variation was found in total soluble solids (TSS) of fruits due to year. After harvest ten healthy fruits were selected randomly from each treatment. Disease incidence was calculated at 6, 8 and 10 days after harvest (DAH). Disease incidence at different DAH showed significant variation due to different year (Table 4). The highest disease incidence (45.42%) was found in both years. Different year had a significant effect on disease severity (Table 25). In 2nd year showed higher (1.00%) fruit area diseased (FAD) than 1st year (1.08) at 10 DAH.

Different horticultural practices had significant effect on fruit set per inflorescence (Table 1). The highest (14.93) fruit set per inflorescence was obtained from P+W+S and the lowest (10.40) was found in control. Fruit retention per inflorescence was recorded at different DAFS. It was observed that effect of horticultural practices were highly significant in this respect (Table 1). At 60 DAFS, the highest (2.40) fruit retention per inflorescence was obtained from treatment P+W+S followed by pruning (2.13), P+W (1.70) and W+S (1.60). The lowest (0.94) was observed incase of control plants at same DAFS. Fruit retention per plant was highly significant at different DAFS due to the different horticultural practices. Fruit retention per plant was found in same trend as that of fruit retention per inflorescence (Table 1). P+W+S gave the highest (16.83%) fruit retention followed by pruning (15.90%) and P+W (14%) and the lowest (9.50%) from control. The variations in respect of number of healthy fruits per inflorescence among the different treatments were found highly significant (Table 2). It was observed that the highest number of healthy fruits per inflorescence was produced from P+W+S (2.11) and Pruning (1.84) treated plant and the lowest (0.79) from control plant at 60 DAFS. Different horticultural practices showed significant variation in respect of number of healthy fruits per plant. Number of healthy fruits per plant at various DAFS was found the highest in P+W+S treated plant than control at 60 DAFS. P+W+S treated plant gave the highest (87.09%) number of healthy fruits per plant and the lowest (84.00%) from control. These results indicated that the combined application of P + W + S was effective to reduce anthracnose intensity which led to more fruit set, fruit retention and healthy fruits per inflorescence and per plant. There are few literatures are available on the effect of horticultural practices like pruning, weeding and spading on anthracnose disease. However, this result was closely supported by the reports of Ann *et al.* (1998), Singh (1996) and Anonymous (1994). They stated that soil surface mulching, sanitation pruning and weeding ensure a positive

approach in the management of mango anthracnose. Control weeds and other undergrowth beneath the tree so as to reduce humidity, increase ventilation and discourage the growth of the fungus.

There was highly significant difference incase of number of diseased fruits per plant among the treatments (Table 2). Number of diseased fruits per plant in most of the cases was higher in control treated plant at different DAFS. The highest (16%) number of diseased fruits per plant was recorded from control and the lowest (12.92%) was found in P+W+S treated plant at 60 DAFS. The variations due to different treatments were highly significant in respect of number of diseased fruits per inflorescence (Table 2). The application of pruning produced the maximum (0.29) number of diseased fruits per inflorescence and the minimum (0.15) from control treated plant at 60 DAFS. There was significant difference in respect of total number of fruits per plant among different treatments (Table 3). It was found that P+W+S gave the maximum (54.00) number of fruits per plant followed by pruning (45.84), P+W (45.17) and P+S (40.50) and the lowest (32.67) was found incase of control. Total number of healthy fruits per plant was found significant by different in different horticultural practices. P+W+S produced the highest (47.34) number of healthy fruits per plant followed by pruning (40.17) and P+W (39.17) treated plant and the lowest (27.17) was obtained from control plant. These results might be due to plants ensured the highest fruit retention and less fruit infection, which possibly led to the highest yield per plant. There was highly significant variation in respect of weight of individual fruit as influenced by different treatments (Table 3). It was observed that control plant produced the highest (184.67 g) weight of individual fruit while P+W+S gave the lowest (167.17 g) in this regard. Weight of individual fruit was higher in control than Pruning + Weeding + Spading due to the higher yield per plant in this treatment than control which led to the lower individual fruit weight. Percentage of healthy fruits per plant was significant in respect of different horticultural practices. The highest percentage (88.67) of healthy fruits per plant was recorded from P+W+S followed by pruning (88.17%) treated plant. The lowest (83.41%) was recorded from control plant (Table 3). This result might be due to reduction of inocula (conidia) production and fruit infection in this treatment. Therefore, number and percentage of healthy fruits were higher and percentage of diseased fruits was less than control. Field sanitation like pruning, weeding and spacing discouraged the growth of the fungus as reported by Anonymous (1994).

Different horticultural practices had insignificant effect on total number of diseased fruits per plant. The highest (6.17) number of diseased fruits per plant was recorded from P+W+S treated plant and the lowest (4.67) from spading and weeding. Percentage of diseased fruits per plant varied significantly due to different horticultural practices. The highest percentage (16.09) of diseased fruits per plant was found in control plant and the lowest (11.34%) was recorded from P+W+S treated plant (Table 3). There was significant difference in healthy fruits yield per plant (Table 3). The highest (6.42 kg) healthy fruits yield per plant was obtained from P+W+S treated plant followed by P+W (5.36 kg), pruning (5.20 kg) and W+S (4.74 kg). The lowest (3.12 kg) yield per plant was obtained from control plant. Insignificant variation in respect of healthy fruits yield was observed among the different year. Highly significant variations in respect of per hectare yield were observed among the different horticultural practices (Table 3). The highest (10.26 t/ha) yield was obtained from P+W+S treated plant followed by P+W (8.57 t/ha), pruning (8.32 t/ha) and W+S (7.59 t/ha) and the lowest (4.97 t/ha) from control plant. In respect of healthy fruits yield per plant and per hectare, it was also found that P + W + S gave the highest healthy fruits per plant and per hectare than control because of this treatment produced the highest number of healthy fruits per plant which led to the highest yield per plant and per hectare. Among the horticultural practices there was insignificant difference in respect of total soluble solids (Table 3).

Disease incidence of anthracnose showed significant variation among the horticultural practices (Table 4). The highest (65%) incidence was found in control treated fruits and the lowest (25%) was recorded from P+W+S treated fruits at 10 DAH. Fruit area diseased at different DAH as influenced by different horticultural practices is shown in Table 4. The maximum (3.17%) fruit area diseased was found in control plant at 10 DAH. Minimum (0.50%) fruit area diseased was found in P+W+S treated plant at same DAH. In respect of disease incidence and severity (FAD %), it was revealed that the lowest disease incidence and severity was observed in P + W + S and the highest was recorded from control. P + W + S reduced the inoculum level of *Colletotrichum gloeosporioides* and resulted the less chance of fruits infection.

There was highly significant variation in respect of fruit set per inflorescence as influenced by different year and horticultural practices (Table 5). It was observed that P+W+S produced the highest (17.13) fruit set per inflorescence in 2nd year while control gave the lowest (13.33) in this regard. Fruit retention per inflorescence was recorded at different DAFS. It was found that the combined effect year and horticultural practices were highly significant in this regard (Table 18). At 60 DAFS, the highest (2.40) fruit retention per inflorescence was

obtained from the treatment of 2nd year x P+W+S followed by 1st year x pruning (2.33), 2nd year x pruning weeding (1.93) and 2nd year x weeding (1.90). The lowest (0.87) was observed in control plants at same DAFS. The combined effect of different year and treatments in terms of fruit retention per plant was highly significant at different DAFS. Fruit retention per plant was in same trend to that of fruit retention per inflorescence (Table 5). The treatment 1st year x P+W+S gave the highest (19.33%) retention followed by 1st year x pruning (18%). In 2nd year with P+W+S gave the highest fruit set and retention per inflorescence (Table 5). This results probably due to the influence of age of the plant and environment, which increased the fruit set and retention. The total number of fruits per plant was higher in 2nd year along with P+W+S than 1st year x control.

The variations in terms of number of healthy fruits per inflorescence among the different year x treatments were found to be highly significant (Table 6). It was observed that the highest (2.12) number of healthy fruits per inflorescence was found in 2nd year x P+W+S followed by 1st year x pruning (2.01) treated plant and the lowest (0.73) was obtained from control plant at 60 DAFS. Year and different horticultural practices showed insignificant variation in case of number of healthy fruits per plant (Table 6) except 40 DAFS. At 40 DAFS 2nd year x P+W+S treated plant gave the highest (88.68%) number of healthy fruits per plant and the lowest (84.26%) from 1st year x control. The variations due to different year and treatments were highly significant in respect of number of diseased fruits per inflorescence (Table 6). In 2nd year x weeding produced the maximum (0.29) number of diseased fruits per inflorescence and the lowest (0.14) from 1st year x control treated plant at 60 DAFS. There was highly significant difference in respect of number of diseased fruits per plant among the treatments. Number of diseased fruits per plant in most of the cases was higher in control plant at different DAFS. The highest (16%) number of diseased fruits per plant was recorded from 1st year x control plant followed by 2nd year x P + S (15.63%) and the lowest (12.50%) from 2nd year x P+W+S treated plant at 60 DAFS. There were significant combined effect was found in respect of total number of fruits per plant among different treatments (Table 7). From Table 7, it can be observed that 2nd year x P+W+S gave the highest (60.00) number of fruits per plant followed by 2nd year x P+W (55.00), and 2nd year x P+W+S (50) and the lowest (32.33) was found in 1st year x control. There was highly significant variation in respect of weight of individual fruit as influenced by different year and treatments. It was observed that 2nd year x control plant produced the highest (191 g) weight of individual fruit while 1st year x P+W+S gave the lowest (164.33 g) in this regard (Table 7). Total number of healthy fruits per plant was found significant variation due to the different year and horticultural practices. In 2nd year x P+W+S produced the highest (52.00) number of healthy fruits per plant followed by 2nd year x P+W (48.00) and 2nd year x pruning (44.00) treated plants and the lowest (27.00) from 2nd year x control plant. Percentage of healthy fruits per plant was significantly influenced by different year x horticultural practices. The highest percentage of (89) of healthy fruits per plant was recorded from 1st year x P+W+S treated plant followed by 2nd year x P+W+S (88.33%). The lowest (81.82%) was recorded from 2nd year x control plant (Table 7). Among the different year and horticultural practices, in 2nd year x P+W+S treated plant gave the highest (7.00 out of 60 fruits) number of diseased fruits per plant and the lowest (4.33 out of 34 fruits) number of diseased fruits per plant was found in 1st year x spading treated plant. Percentage of diseased fruits per plant varied significantly due to different year x horticultural practices. The highest percentage (18.18) of diseased fruits per plant was found in 2nd year x control treated plant followed by 2nd year x weeding (15.15 %), 2nd year x P+S (14.58%), and 2nd year x W+S (14.29%) and the lowest (11%) from 1st year x P+W+S treated plant (Table 7). There was significant combined effect was found on healthy fruits yield per plant (Table 7). The highest (6.90 kg) fresh fruit yield per plant was obtained from 2nd year x P+W+S treated plant followed by 2nd year x P+W (6.00 kg), 1st year x P+W+S (5.93 kg) and 2nd year x pruning (5.30 kg). The lowest (2.83 kg) yield per plant was obtained from 1st year x control treated plant. Highly significant variations in respect of per hectare yield were observed between the different year and horticultural practices (Table 7). The highest (11.04 t/ha) yield was obtained from 2nd year x P+W+S treated plant followed by 2nd year x P+W (9.60 t/ha), 1st year x P+W+S (9.48 t/ha) and 2nd year x pruning (8.48 t/ha) and the lowest (5.40 t/ha) from 2nd year x control treated plant. There was insignificant difference in respect of total soluble solids between the year and horticultural practices (Table 7). The highest (2.37) BCR was obtained from P+W+S treated plants and the lowest (1.43) BCR was obtained from control plant. The treatments which gave fewer yields naturally resulted lower net return and BCR.

Disease incidence of anthracnose showed significant variation between the different year and horticultural practices (Table 8). The highest (63.33%) incidence was found in 2nd year x control treatment and the lowest (23.33%) from 2nd year x P+W+S treatment at 10 days after harvest. Fruit area diseased at different DAH as influenced by different year and horticultural practices was shown in Table 8. The maximum (4.33%) fruit area

diseased was found in 2nd year x control plant at 10 DAH and minimum (0.33) fruit area diseased was observed in 1st year x P+W+S treated plant at same DAH.

Table 1. Single effect of horticultural practices on fruit set and fruit retention of mango

Treatments	FS/I	Fruit retention/inflorescence at different DAFS						Fruit retention/plant (%) at different DAFS					
		10	20	30	40	50	60	10	20	30	40	50	60
1st year	9.52	6.08	3.67	2.49	2.06	1.66	1.49	61.71	37.75	25.96	22.17	16.67	15.06
2nd year	14.67	8.43	5.09	3.33	2.43	1.89	1.80	57.92	35.12	22.79	16.50	12.92	12.29
LSD 5%	2.20	1.34	0.39	0.33	0.69	0.28	0.38	3.59	1.68	2.01	1.74	1.81	0.91
1%	3.64	2.22	0.64	0.54	1.15	0.47	0.62	5.95	2.78	3.33	2.89	3.01	1.51
Level of Significance	**	**	**	**	NS	NS	NS	*	NS	NS	**	**	**
Pruning	13.80	8.40	4.70	3.24	2.50	2.17	2.13	61.84	34.33	23.50	18.17	16.00	15.90
Weeding	10.90	6.87	3.67	2.64	2.00	1.62	1.49	63.84	32.50	24.50	19.67	15.67	14.00
Spading	10.83	5.70	3.54	2.30	1.87	1.60	1.43	55.17	36.00	23.17	19.50	13.84	13.00
P+W	11.73	8.04	5.14	3.07	2.44	1.78	1.70	65.50	41.17	25.33	20.17	15.00	14.00
P+S	11.50	7.20	4.00	2.64	1.97	1.60	1.47	60.67	36.00	23.84	18.33	14.83	13.33
W+S	12.64	6.50	4.50	2.90	2.17	1.67	1.60	52.84	36.83	23.00	17.83	13.17	12.83
P+W+S	14.93	10.00	6.37	4.27	3.40	2.62	2.40	67.50	43.84	29.00	23.33	18.17	16.83
Control	10.40	5.30	3.14	2.27	1.60	1.14	0.94	51.17	30.84	22.67	17.67	11.67	9.50
LSD 5%	1.62	0.75	0.60	0.50	0.44	0.31	0.17	2.27	2.12	2.26	1.67	1.65	1.12
1%	2.18	1.01	0.82	0.68	0.59	0.42	0.23	3.06	2.86	3.04	2.25	2.22	1.51
Level of Significance	**	**	**	**	**	**	**	**	**	**	**	**	**

Table 2. Single effect of horticultural practices on disease incidence of mango anthracnose

Treatments	No. of healthy fruits/Inflorescence at different DAFS			No. of healthy fruits/plant (%) different DAFS			No. of diseased fruits/Inflorescence at different DAFS			No. of diseased fruits/plant (%) at different DAFS		
	40	50	60	40	50	60	40	50	60	40	50	60
1st year	1.78	1.43	1.28	86.05	85.74	85.16	0.28	0.23	0.22	13.94	14.28	14.84
2nd year	2.09	1.64	1.53	86.02	85.85	85.33	0.33	0.26	0.25	13.98	14.13	14.67
LSD 5%	0.32	0.19	0.20	2.24	2.65	1.69	0.04	0.01	0.01	0.41	0.52	2.03
1%	0.53	0.31	0.34	3.71	4.40	2.79	0.07	0.01	0.01	0.67	0.31	3.36
Level of Significance	NS	*	*	NS	NS	NS	*	**	**	NS	NS	NS
Pruning	2.22	1.90	1.84	88.42	87.54	86.67	0.29	0.27	0.29	11.59	12.47	13.34
Weeding	1.71	1.42	1.27	85.52	85.11	85.16	0.29	0.24	0.23	14.48	14.89	14.85
Spading	1.62	1.39	1.19	86.62	86.42	85.00	0.25	0.22	0.21	13.38	13.59	15.00
P+W	2.07	1.53	1.44	84.98	85.00	84.41	0.37	0.27	0.27	15.03	15.00	15.59
P+S	1.67	1.36	1.24	84.73	84.81	84.67	0.30	0.24	0.23	15.27	15.19	15.34
W+S	1.86	1.43	1.36	85.72	85.86	84.99	0.31	0.24	0.25	14.29	14.15	15.01
P+W+S	2.99	2.28	2.11	87.68	87.11	87.09	0.42	0.34	0.25	12.32	12.94	12.92
Control	1.36	0.96	0.79	84.63	84.53	84.00	0.25	0.18	0.15	15.36	15.39	16.00
LSD 5%	0.20	0.20	0.14	2.30	3.21	3.47	0.04	0.04	0.04	1.93	2.15	1.67
1%	0.28	0.27	0.19	3.11	4.20	4.68	0.05	0.05	0.05	2.60	2.90	2.26
Level of Significance	**	**	**	**	NS	NS	**	**	**	**	**	**

FS/I = Fruit set/Inflorescence at the initial stage ** = Significant at 1% level

DAFS = Days after fruit set * = Significant at 5 % level

NS = Not significant

Table 3. Single effect of horticultural practices on yield and quality of mango

Treatments	TNF/ plant	Wt. of individual fruit (g)	TNHF/plant		TNDF/plant		Healthy fruits yield/ plant (kg)	Healthy fruits yield/ (t/ha)	TSS
			No.	%	No.	%			
1st year	36.60	171.08	31.79	87.09	4.79	12.87	4.42	7.08	25.13
2nd year	45.13	183.13	38.75	86.07	6.13	13.93	4.99	7.97	24.12
LSD 5%	4.52	7.55	1.02	3.55	0.48	0.68	0.76	1.17	3.98
1%	7.49	12.49	1.69	5.89	0.80	1.12	1.26	1.94	6.60
Level of Significance	**	*	**	NS	**	*	NS	NS	NS
Pruning	45.84	174.67	40.17	88.17	5.67	12.17	5.20	8.32	24.71
Weeding	34.22	181.50	29.00	86.26	4.67	13.74	3.83	6.13	24.77
Spading	36.50	178.17	31.84	87.09	4.67	12.91	4.46	7.14	24.85
P+W	45.17	173.67	39.17	86.64	6.00	13.37	5.36	8.57	24.52
P+S	40.50	177.67	34.67	85.71	5.84	14.29	4.52	7.23	24.38
W+S	38.00	179.34	32.84	86.69	5.17	13.31	4.74	7.58	24.52
P+W+S	54.00	167.17	47.34	88.67	6.17	11.34	6.42	10.21	24.80
Control	32.67	184.67	27.17	83.41	5.50	16.09	3.12	4.99	24.49
LSD 5%	2.33	9.81	2.55	1.76	1.04	1.89	0.63	1.34	1.97
1%	3.14	13.23	3.44	2.38	1.40	2.55	0.85	2.02	2.65
Level of Significance	**	**	**	**	**	**	**	**	NS

Table 4. Single effect of horticultural practices on disease incidence and severity of mango

Treatments	Incidence (%) at DAH			Severity/ FAD (%) at DAH		
	6	8	10	6	8	10
1st year	22.92	33.75	45.42	0.50	1.08	1.08
2nd year	19.58	34.13	45.42	0.58	0.96	1.88
LSD 5%	2.18	5.11	3.38	0.07	0.18	0.23
1%	3.61	8.47	5.60	0.11	0.29	0.39
Level of Significance	*	NS	NS	*	NS	**
Pruning	20.00	25.00	46.67	0.33	0.67	1.17
Weeding	23.34	43.33	53.33	0.67	1.00	1.50
Spading	33.33	53.34	61.67	1.00	1.50	2.00
P+W	15.00	19.84	33.33	0.17	0.67	0.84
P+S	16.67	28.34	36.67	0.67	1.00	1.34
W+S	20.00	31.67	41.67	0.33	1.17	1.33
P+W+S	10.00	16.67	25.00	0.00	0.33	0.50
Control	31.67	53.33	65.00	1.17	1.83	3.17
LSD 5%	2.65	1.10	2.99	0.10	0.13	0.17
1%	3.57	1.48	4.04	0.13	0.18	0.23
Level of Significance	**	**	**	**	**	**

TNF = Total no. of fruits
TNHF = Total no. of healthy fruits
TNDF = Total no. of diseased fruits
TSS = Total Soluble Solids
BCR= Gross return / Total cost of production
DAP = Days after harvest

* = Significant at 5% level
** = Significant at 1% level
NS = Not significant
Spacing = 2.5m X 2.5m
Note= Price of mango was considered to be TK 20/kg

Table 5. Combined effect of year and horticultural practices on fruit set and fruit retention of mango

Treatments	FS/I	Fruit retention/inflorescence at different DAFS						Fruit retention/plant (%) at different DAFS					
		10	20	30	40	50	60	10	20	30	40	50	60
1st year													
Pruning	13.27	7.60	4.07	3.07	2.60	2.40	2.33	57.00	30.33	23.00	19.67	18.33	18.00
Weeding	7.60	4.93	2.13	1.87	1.60	1.33	1.07	65.67	28.33	25.00	22.33	18.00	14.67
Spading	6.73	4.20	2.47	1.87	1.73	1.20	1.00	62.00	40.00	28.00	25.67	14.00	14.00
P+W	9.33	7.27	5.07	2.73	2.27	1.60	1.60	68.67	45.00	26.33	21.67	15.67	15.00
P+S	8.73	6.00	3.00	2.27	1.93	1.60	1.33	61.67	36.67	26.00	22.33	18.33	15.33
W+S	10.27	5.80	4.20	2.40	1.93	1.33	1.33	57.00	41.33	23.00	19.33	13.00	12.67
P+W+S	12.73	9.00	5.93	3.80	3.00	2.73	2.40	70.67	47.67	30.33	24.33	21.67	19.33
Control	7.47	3.80	2.47	1.93	1.40	1.07	0.87	51.00	32.67	26.00	22.00	14.33	11.33
2nd year													
Pruning	14.33	9.20	5.33	3.40	2.40	1.93	1.93	65.67	38.33	24.00	16.67	13.67	13.67
Weeding	14.20	8.80	5.20	3.40	2.40	1.90	1.90	62.00	36.67	24.00	17.00	13.33	13.33
Spading	14.93	7.20	4.60	2.73	2.00	2.00	1.80	48.33	32.00	18.33	13.33	13.67	12.00
P+W	14.13	8.80	5.20	3.40	2.60	2.00	1.80	62.33	37.33	24.33	18.67	14.33	13.00
P+S	14.27	8.40	5.00	3.00	2.00	1.60	1.60	59.67	35.33	21.67	14.33	11.33	11.33
W+S	15.00	7.20	4.80	3.40	2.40	2.00	1.87	48.67	32.33	23.00	16.33	13.33	13.00
P+W+S	17.13	11.00	6.80	4.73	3.80	2.50	2.40	64.33	40.00	27.67	22.33	14.67	14.33
Control	13.33	6.80	3.80	2.60	1.80	1.20	1.00	51.33	29.00	19.33	13.33	9.00	7.67
LSD 5%	2.29	1.05	0.85	0.71	0.62	0.44	0.24	3.25	3.00	3.19	2.36	2.33	1.58
1%	3.08	1.42	1.15	0.96	0.84	0.60	0.32	4.38	4.04	4.30	3.18	3.14	2.13
Level of significance	**	**	**	**	**	**	**	**	**	**	**	**	**

Table 6. Combined effect of year and horticultural practices on disease incidence of mango anthracnose

Treatments	No. of healthy fruits/Inflorescence at different DAFS			No. of healthy fruits/plant (%) different DAFS			No. of diseased fruits/Inflorescence at different DAFS			No. of diseased fruits/plant (%) at different DAFS		
	40	50	60	40	50	60	40	50	60	40	50	60
1st year												
Pruning	2.33	2.10	2.01	89.33	87.50	86.27	0.27	0.30	0.32	10.67	12.50	13.73
Weeding	1.37	1.13	0.91	85.62	84.96	85.05	0.23	0.20	0.16	14.38	15.04	14.95
Spading	1.50	1.03	0.85	86.74	85.83	85.00	0.23	0.17	0.15	13.26	14.17	15.00
P+W	1.94	1.36	1.35	85.33	85.00	84.37	0.33	0.24	0.25	14.67	15.00	15.63
P+S	1.63	1.37	1.13	84.46	85.62	84.96	0.30	0.23	0.20	15.54	14.38	15.04
W+S	1.66	1.14	1.13	86.01	85.71	84.96	0.27	0.19	0.20	13.99	14.29	15.04
P+W+S	2.60	2.36	2.10	86.68	86.22	86.67	0.40	0.37	0.30	13.32	13.88	13.33
Control	1.18	0.91	0.73	84.26	85.05	84.00	0.22	0.16	0.14	15.71	14.95	16.00
2nd year												
Pruning	2.10	1.69	1.68	87.50	87.57	87.05	0.30	0.24	0.25	12.50	12.43	12.95
Weeding	2.05	1.71	1.62	85.42	85.26	85.26	0.35	0.28	0.29	14.58	14.74	14.74
Spading	1.73	1.74	1.52	86.50	87.00	85.00	0.27	0.26	0.27	13.50	13.00	15.00
P+W	2.20	1.70	1.52	84.62	85.00	84.45	0.40	0.30	0.28	15.38	15.00	15.55
P+S	1.70	1.35	1.35	85.00	84.00	84.37	0.30	0.25	0.25	15.00	16.00	15.63
W+S	2.05	1.71	1.59	85.42	86.00	85.03	0.35	0.29	0.29	14.58	14.00	14.97
P+W+S	3.37	2.20	2.12	88.68	88.00	87.50	0.43	0.30	0.20	11.32	12.00	12.50
Control	1.53	1.01	0.84	85.00	84.00	84.00	0.27	0.19	0.16	15.00	15.83	16.00
LSD 5%	0.29	0.28	0.21	3.26	4.41	4.91	0.05	0.01	0.17	2.72	3.04	2.36
1%	0.39	0.38	0.28	4.40	5.94	6.62	0.07	0.02	0.02	3.67	4.10	3.19
Level of significance	**	**	**	**	NS	NS	**	**	**	**	NS	**

FS/I = Fruit set/Inflorescence at the initial stage ** = Significant at 1% level NS = Not significant
DAFS = Days after fruit set * = Significant at 5 % level

Table 7. Combined effect of year and horticultural practices on yield and quality of mango

Treatments	TNF/ plant	Wt. of individual fruit (g)	TNHF/plant		TNDF/plant		Healthy fruits yield/ plant (kg)	Healthy fruits yield/ plant (kg	Healthy fruits yield/ (t/ha)	TSS	BCR
			No.	%	No.	%					
1st year											
Pruning	41.67	168.33	36.33	87.67	5.33	12.33	5.09	25.30	8.15	25.30	2.19
Weeding	34.33	173.00	30.00	87.67	4.33	12.33	3.86	25.26	6.18	25.26	1.72
Spading	34.00	169.33	29.67	87.00	4.33	13.00	4.32	25.27	6.92	25.27	1.93
P+W	35.33	171.33	30.33	86.00	5.00	14.00	4.71	25.15	7.54	25.15	2.03
P+S	33.00	173.33	28.33	86.00	4.67	14.00	4.03	24.79	6.44	24.79	1.62
W+S	34.00	170.67	29.67	87.67	4.33	12.33	4.60	24.82	7.36	24.82	1.88
P+W+S	48.00	164.33	42.67	89.00	5.33	11.00	5.93	25.19	9.48	25.19	2.37
Control	32.33	178.33	27.33	85.00	5.00	14.00	2.83	25.26	4.53	25.26	1.43
2nd year											
Pruning	50.00	181.00	44.00	88.00	6.00	12.00	5.30	24.11	8.48	24.11	2.22
Weeding	34.00	190.00	28.00	84.85	5.00	15.15	3.80	24.27	6.08	24.27	2.19
Spading	39.00	187.00	34.00	87.18	5.00	12.82	4.60	24.42	7.36	24.42	1.99
P+W	55.00	176.00	48.00	87.27	7.00	12.73	6.00	23.89	9.60	23.89	2.57
P+S	48.00	182.00	41.00	85.42	7.00	14.58	5.00	23.97	8.00	23.97	1.97
W+S	42.00	188.00	36.00	85.71	6.00	14.29	4.88	24.21	7.81	24.21	1.92
P+W+S	60.00	170.00	52.00	88.33	7.00	11.67	6.90	24.40	11.04	24.40	2.70
Control	33.00	191.00	27.00	81.82	6.00	18.18	3.40	23.72	5.40	23.72	1.70
LSD 5%	3.30	13.87	4.86	2.49	1.47	3.61	0.89	2.78		2.78	-
1%	4.45	18.72	3.60	3.36	1.98	2.68	1.20	3.75		3.75	-
Level of significance	**	**	**	**		**	**	NS		NS	-

Table 8. Combined effect of year and horticultural practices on disease incidence and severity of mango

Treatments	Incidence (%) at DAH			Severity/ FAD (%) at DAH		
	6	8	10	6	8	10
1st year						
Pruning	23.33	23.33	43.33	0.33	0.67	0.67
Weeding	26.67	43.33	53.33	0.67	1.00	1.00
Spading	43.33	56.67	63.33	1.00	1.67	1.67
P+W	13.33	16.67	33.33	0.00	0.67	0.67
P+S	16.67	30.00	36.67	0.67	1.00	1.00
W+S	20.00	33.33	40.00	0.33	1.33	1.33
P+W+S	10.00	13.33	26.67	0.00	0.33	0.33
Control	30.00	53.33	66.67	1.00	2.00	2.00
2nd year						
Pruning	16.67	26.67	50.00	0.33	0.67	1.67
Weeding	20.00	43.33	53.33	0.67	1.00	2.00
Spading	23.33	50.00	60.00	1.00	1.33	2.33
P+W	16.67	23.00	33.33	0.33	0.67	1.00
P+S	16.67	26.67	36.67	0.67	1.00	1.67
W+S	20.00	30.00	43.33	0.33	1.00	1.33
P+W+S	10.0	20.00	23.33	0.00	0.33	0.67
Control	33.33	53.33	63.33	1.33	1.67	4.33
LSD 5%	3.74	1.55	4.23	0.14	0.19	0.24
1%	5.05	2.10	5.71	0.19	0.26	0.33
Level of significance	**	**	**	**	**	**

TNF = Total no. of fruits
TNHF = Total no. of healthy fruits
TNDF = Total no. of diseased fruits
TSS = Total Soluble Solids
* = Significant at 5% level
** = Significant at 1% level
NS = Not significant
Spacing = 2.5m X 2.5m
BCR= Gross return / Total cost of production
DAP = Days after harvest
Note= Price of mango was considered to be TK 20/kg

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