

## Effect of Organic Manures on Growth, Yield, Sigatoka Disease Intensity and Nematode Population of Banana

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### ABSTRACT

*In an experiment conducted during 2011-2012 on effect of organic manures on growth, yield, sigatoka disease intensity and nematode population of banana cv. Grand Naine, revealed that response of organic manures was significant for all the growth parameters. Significantly maximum values were recorded by the plants receiving FYM 10 kg/plant + Neem cake 1.25 kg/plant + Vermicompost 5 kg /plant + Wood ash 3.75 kg/plant i.e. T<sub>2</sub> while, minimum values in the plants with triple green manuring with Sun hemp + Cowpea + cowpea as intercrop T<sub>6</sub> for all the growth parameters. The treatment T<sub>11</sub>: 300:100:300 g NPK / plant AICRP (TF) Package recorded significantly maximum (63.87 t/ha) yield, while it was minimum in N<sub>0</sub> + P<sub>0</sub> + K<sub>0</sub> i.e. T<sub>5</sub> plots (51.09 t/ha). In vegetative stage, the lowest sigatoka leaf spot index (30.81%) was recorded in the treatments of T<sub>7</sub>, the sigatoka leaf spot intensity was highest (37.49%) in the treatment of T<sub>11</sub>. The nematode population was lowest (103.33/250cc soil) in the treatment of T<sub>12</sub>, while in 10 g roots the nematode population was lowest (21.33/10 g roots) in T<sub>8</sub>.*

**Key words:** Grand Naine, FYM, Neem cake, Vermicompost, wood ash, growth parameters, yield, sigatoka leaf spot, nematode

### INTRODUCTION

Banana is the second largest fruit crop, an important staple food commodity around the world. It is also the fourth most important commodity at global level next to rice, wheat and dairy products (Singh, 2002). The increase in productivity also increased the use of chemical fertilizers causing serious damage to environment and health. This has become a major concern where the consumers who aware of health hazards, started demanding

food grown organically without using chemicals. Organic farming is a method of farming which avoids or largely excludes the use of harmful chemical fertilizers and encourages use of natural resources. With this background, an experiment was carried out to know the effect of organic manures on yield and quality of banana cv. Grand Naine. Grand Naine is a popular variety grown mostly in all export oriented countries of Asia, South America and Africa.

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This is a superior selection of Giant Cavendish which was introduced to India in 1990's is tall mutant of dwarf Cavendish from Australia.

### MATERIAL AND METHODS

An experiment was conducted at farmer's field of Sri. Kallappa Harugeri of Raibag village, taluk Raibag in Belagavi district, during 2011-12 and was laid out in randomized block design on medium deep black soil. Plants were spaced at 1.8 x 1.8 m. So, this investigation included thirteen treatments as follows:

T<sub>1</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 1.75 kg/plant

T<sub>2</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 3.75 kg/plant

T<sub>3</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 0.625 kg/plant

T<sub>4</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 2.625 kg/plant

T<sub>5</sub>: N<sub>0</sub> + P<sub>0</sub> + K<sub>0</sub>

T<sub>6</sub>: T<sub>5</sub> + Triple green manuring with Sun hemp + Cowpea + cowpea as intercrop (45 + 10 + 30 + 10 + 30 + 10 days)

T<sub>7</sub>: AM @ 25g + *Azospirillum* @ 50g + PSB @ 50g + *T. harzianum* @ 50g/ plant

T<sub>8</sub>: T<sub>1</sub> + T<sub>6</sub>

T<sub>9</sub>: T<sub>1</sub> + T<sub>7</sub>

T<sub>10</sub>: T<sub>1</sub> + T<sub>6</sub> + T<sub>7</sub>

T<sub>11</sub>: 300:100:300g NPK / plant as inorganic to be maintained separately for comparison

T<sub>12</sub>: FYM @ 10 kg/p + NC @ 1.25 kg/p K + PM @ 10 kg/plant

T<sub>13</sub>: (RDF) 175:105:220g NPK/plant

Note: NC- Neem cake, VC- Vermicompost, WA- Wood ash

Five uniformly growing plants were selected in each treatment for recording growth parameters viz., plant height, pseudostem girth, number of functional leaves and leaf area. Vegetative growth parameters were recorded at different stages from 90 days (initial) to 10 months after planting. Yield per plot was calculated by multiplying respective mean bunch weight with number of plants (10) in a plot and was expressed in kilograms. Yield per hectare was calculated by multiplying respective mean bunch weight with number of plants per hectare and it was expressed in tons per hectare. Observations were recorded with regard to Sigatoka leaf spot disease intensity and nematode population was counted from 250 cc of soil and 10g of roots at shooting stage of plant growth.

### RESULT AND DISCUSSION

The data presented in Table-1 depicts that there was significant difference among the different treatments at all the stages except 7 and 8 months after planting with respect to

plant height. The treatment FYM 10 kg per plant+ Neem cake 1.25 kg per plant + Vermicompost 5 kg per plant + Wood ash 3.75 kg per plant (T<sub>2</sub>) recorded significantly maximum height, while it was minimum in Triple green manuring with Sun hemp + Cowpea + cowpea as intercrop (T<sub>6</sub>). At all the stages, pseudostem girth differed significantly among the treatments from 3 MAP and 10 MAP (Table-2). Significantly maximum pseudostem girth was noticed in FYM 10 kg per plant + Neem cake 1.25 kg per plant + Vermicompost 5 kg per plant + Wood ash 3.75 kg per plant (T<sub>2</sub>) and minimum girth was found in T<sub>6</sub> during the stages of observation.

At 3, 4, 5, 6, 7 and 8 MAP, the treatments varied significantly with respect to number of functional leaves (Table-3). Significantly more number of functional leaves were found in FYM 10 kg per plant + Neem cake 1.25 kg per plant + Vermicompost 5 kg per plant + Wood ash 3.75 kg per plant (T<sub>2</sub>), while they were less in triple green manuring with Sun hemp + Cowpea + cowpea as intercrop (T<sub>6</sub>), the treatments differed significantly during all the stages with respect to leaf area (Table - 4). It was found significantly maximum in FYM 10 kg per plant + Neem cake 1.25 kg per plant + Vermicompost 5 kg per plant + Wood ash 3.75 kg per plant (T<sub>2</sub>), and minimum in T<sub>6</sub>. FYM 10 kg per plant + Neem cake 1.25 kg per plant + Vermicompost 5 kg per plant + Wood ash 3.75 kg per plant recorded significantly maximum values and minimum values for all growth parameters were recorded in triple green manuring with Sun hemp + Cowpea + cowpea as intercrop (T<sub>6</sub>).

Initially in all the treatments, the increase was more prominent upto 10 MAP with respect to plant height and pseudostem girth. In parameters, viz., number of functional leaves and leaf area, the increase was more prominent upto 8 MAP, decreased during the stages from 9 to 10 MAP. Even the incremental growth from date of planting was maximum in FYM 10 kg per plant+ Neem cake 1.25 kg per plant + Vermicompost 5 kg per plant+ Wood ash 3.75 kg per plant (T<sub>2</sub>) than the other treatments for plant height, plant girth, number of functional leaves and leaf area. The parameters, viz., number of

functional leaves and leaf area the incremental growth from date of planting was maximum in FYM 10 kg per plant + Neem cake 1.25 kg per plant + Vermicompost 5 kg per plant + Wood ash 3.75 kg per plant (T<sub>2</sub>), till 8 MAP, afterwards the growth decreased as the age advanced upto 10 MAP.

From the data given in the Table 5, it is revealed that, the higher values for yield and yield attributing characters such as bunch weight (26.17 kg), number of hands per bunch (10.84), total number of fingers per bunch (199.18) and yield per hectare (201.70 kg) were found in treatment T<sub>13</sub> which received 175:105:220g NPK per plant, while, minimum was found in T<sub>5</sub> which received N<sub>0</sub> + P<sub>0</sub> + K<sub>0</sub> (Table -5). The increase in bunch weight could be attributed to increase in yield attributing characters like plant girth, number of functional leaves and leaf area besides higher content of measure nutrients in indexing leaf. Khalid Al-Harathi and Rashid Al-Yahyai<sup>4</sup>, Geeta and Nair<sup>2</sup>, Naby<sup>3</sup>, Tirkey *et al*<sup>6</sup>. reported that application of NPK at a rate of 600:100:500 g /mat /yr respectively produced numerically the highest yield.

The data on sigatoka leaf spot as influenced by organic nutrition on banana cv. Grand Naine are presented in Table 6.

The influenced by organic nutrition on sigatoka leaf spot was significantly differed among the treatments. In vegetative stage, the lowest sigatoka leaf spot index (30.81%) was recorded in the treatments of T<sub>7</sub> followed by T<sub>6</sub> (33.02%). The sigatoka leaf spot intensity was highest (37.49%) in the treatment of T<sub>11</sub>.

The data on nematode population was influenced by organic nutrition on banana cv. Grand Naine are presented in Table 7. The experimental results revealed that, the nematode population was lowest (103.33/250cc soil) in the treatment of T<sub>12</sub> followed by T<sub>8</sub> (106.67/250 cc soil), while in 10 g roots the nematode population was lowest (21.33/10 g roots) in T<sub>8</sub>.

Serious problems of black sigatoka and nematodes can be readily overcome with the technologies with the use of EM (Effective micro-organisms)<sup>1</sup>.

## CONCLUSION

Application of FYM 10 kg per plant + Neem cake 1.25 kg per plant + Vermicompost 5 kg per plant + Wood ash 3.75 kg per plant was superior which recorded maximum growth and yield parameters over the other treatments. The sigatoka leaf spot intensity was lowest (37.49%) in the treatment of T<sub>7</sub>, and the nematode population was lowest (103.33/250cc soil) in the treatment of T<sub>12</sub>.

**Table 1: Effect of organic nutrition on plant height (m) of Grand Naine banana during different months after planting**

Treatment	Months after planting							
	3	4	5	6	7	8	9	10
T <sub>1</sub>	0.54	0.68	0.85	1.09	1.41	1.44	1.50	1.55
T <sub>2</sub>	0.62	0.70	1.01	1.26	1.50	1.57	1.62	1.67
T <sub>3</sub>	0.56	0.61	0.84	1.09	1.42	1.44	1.50	1.55
T <sub>4</sub>	0.54	0.67	0.85	1.09	1.34	1.44	1.50	1.55
T <sub>5</sub>	0.49	0.50	0.73	0.94	1.30	1.32	1.36	1.40
T <sub>6</sub>	0.34	0.48	0.76	1.00	1.28	1.33	1.39	1.43
T <sub>7</sub>	0.58	0.67	0.95	1.24	1.47	1.56	1.59	1.64
T <sub>8</sub>	0.41	0.57	0.80	1.03	1.41	1.38	1.43	1.51
T <sub>9</sub>	0.59	0.69	0.99	1.25	1.49	1.56	1.60	1.64
T <sub>10</sub>	0.40	0.58	0.77	0.99	1.32	1.36	1.41	1.45
T <sub>11</sub>	0.57	0.67	0.94	1.23	1.46	1.55	1.59	1.62
T <sub>12</sub>	0.50	0.60	0.84	1.06	1.30	1.34	1.38	1.43
T <sub>13</sub>	0.54	0.63	0.91	1.14	1.47	1.46	1.54	1.59
SEm±	0.02	0.04	0.05	0.07	0.06	0.05	0.06	0.05
CD (P=0.05)	0.07	0.13	0.17	0.20	NS	NS	0.17	0.17

NS- Non significant

T<sub>1</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 1.75 kg/plant

T<sub>2</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 3.75 kg/plant

T<sub>3</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 0.625 kg/plant

T<sub>4</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 2.625 kg/plant

T<sub>5</sub>: N<sub>0</sub> + P<sub>0</sub> + K<sub>0</sub>

T<sub>6</sub>: T<sub>5</sub> + Triple green manuring with Sun hemp + Cowpea + cowpea as intercrop (45 + 10 + 30 + 10 + 30 + 10 days)

T<sub>7</sub>: AM @ 25g + Azospirillum @ 50g + PSB @ 50g + *T. harzianum* @ 50g/ plant

T<sub>8</sub>: T<sub>1</sub> + T<sub>6</sub>                      T<sub>9</sub>: T<sub>1</sub> + T<sub>7</sub>

T<sub>10</sub>: T<sub>1</sub> + T<sub>6</sub> + T<sub>7</sub>

T<sub>11</sub>: 300:100:300g NPK / plant as inorganic to be maintained separately for comparison

T<sub>12</sub>: FYM @ 10 kg/p + NC @ 1.25 kg/p K + PM @ 10 kg/plant

T<sub>13</sub>: (RDF) 175:105:220g NPK/plant

Note: NC- Neem cake, VC- Vermicompost, WA- Wood ash

**Table 2: Effect of organic nutrition on pseudostem girth (cm) of Grand Naine banana during different months after planting**

Treatment	Months after planting							
	3	4	5	6	7	8	9	10
T <sub>1</sub>	7.66	9.74	11.25	12.57	14.66	17.98	19.84	21.19
T <sub>2</sub>	8.30	10.21	12.93	14.11	16.37	18.73	20.51	22.53
T <sub>3</sub>	7.48	9.29	10.87	12.00	14.60	17.41	18.97	20.12
T <sub>4</sub>	7.62	8.67	10.73	12.68	14.87	17.20	18.76	19.81
T <sub>5</sub>	6.28	7.18	10.27	10.22	12.73	15.62	17.57	19.03
T <sub>6</sub>	5.56	6.79	9.56	10.96	13.60	15.95	17.80	19.40
T <sub>7</sub>	7.97	9.84	12.28	13.43	15.65	17.87	19.40	20.93
T <sub>8</sub>	5.80	7.35	10.14	11.43	14.97	17.75	19.28	20.31
T <sub>9</sub>	8.09	10.02	12.64	13.93	15.96	18.24	19.87	22.00
T <sub>10</sub>	5.86	7.27	9.77	11.61	13.59	15.48	17.15	18.81
T <sub>11</sub>	7.74	9.76	12.05	13.08	15.38	17.67	19.06	20.20
T <sub>12</sub>	7.30	9.14	11.07	12.40	13.63	16.47	18.10	19.72
T <sub>13</sub>	7.62	9.51	11.45	12.59	15.23	17.25	18.89	19.92
SEm±	0.45	0.58	0.67	0.64	0.55	0.67	0.66	0.62
CD (P=0.05)	1.29	1.66	1.93	1.84	1.58	1.93	1.89	1.79

T<sub>1</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 1.75 kg/plant

T<sub>2</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 3.75 kg/plant

T<sub>3</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 0.625 kg/plant

T<sub>4</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 2.625 kg/plant

T<sub>5</sub>: N<sub>0</sub> + P<sub>0</sub> + K<sub>0</sub>

T<sub>6</sub>: T<sub>5</sub> + Triple green manuring with Sun hemp + Cowpea + cowpea as intercrop (45 + 10 + 30 + 10 + 30 + 10 days)

T<sub>7</sub>: AM @ 25g + Azospirillum @ 50g + PSB @ 50g + *T. harzianum* @ 50g/ plant

T<sub>8</sub>: T<sub>1</sub> + T<sub>6</sub>

T<sub>9</sub>: T<sub>1</sub> + T<sub>7</sub>

T<sub>10</sub>: T<sub>1</sub> + T<sub>6</sub> + T<sub>7</sub>

T<sub>11</sub>: 300:100:300g NPK / plant as inorganic to be maintained separately for comparison

T<sub>12</sub>: FYM @ 10 kg/p + NC @ 1.25 kg/p K + PM @ 10 kg/plant

T<sub>13</sub>: (RDF) 175:105:220g NPK/plant

Note: NC- Neem cake, VC- Vermicompost, WA- Wood ash

**Table 3: Effect of organic nutrition on functional leaves of Grand Naine banana during different months after planting**

Treatment	Months after planting							
	3	4	5	6	7	8	9	10
T <sub>1</sub>	11.28	10.77	12.88	12.59	10.30	11.15	9.33	9.00
T <sub>2</sub>	11.83	11.87	14.06	14.26	12.10	13.32	11.04	10.89
T <sub>3</sub>	11.20	10.10	12.82	12.67	10.00	11.65	9.79	9.62
T <sub>4</sub>	11.02	9.93	12.91	12.47	10.55	11.55	9.68	9.29
T <sub>5</sub>	10.39	10.03	11.77	11.83	9.55	10.85	9.31	8.78
T <sub>6</sub>	8.24	9.65	12.61	12.49	11.10	11.25	9.56	9.13
T <sub>7</sub>	11.50	11.22	13.43	13.26	11.40	12.33	10.25	10.06
T <sub>8</sub>	9.40	9.50	12.00	11.99	10.55	12.35	10.40	10.34
T <sub>9</sub>	11.74	11.37	13.55	13.85	11.57	12.73	10.63	10.54
T <sub>10</sub>	9.73	9.78	12.92	12.30	10.80	11.60	9.72	9.34
T <sub>11</sub>	11.34	11.17	13.36	13.02	11.33	12.00	10.00	9.89
T <sub>12</sub>	10.98	11.08	12.57	12.62	9.55	11.50	9.62	9.25
T <sub>13</sub>	10.97	11.10	12.81	12.56	9.85	11.70	9.87	9.75
SEm±	0.52	0.42	0.42	0.46	0.45	0.43	0.34	0.39
CD (P=0.05)	1.51	1.21	1.21	1.32	1.30	1.25	0.99	1.14

T<sub>1</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 1.75 kg/plant  
 T<sub>2</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 3.75 kg/plant  
 T<sub>3</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 0.625 kg/plant  
 T<sub>4</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 2.625 kg/plant  
 T<sub>5</sub>: N<sub>0</sub> + P<sub>0</sub> + K<sub>0</sub>  
 T<sub>6</sub>: T<sub>5</sub> + Triple green manuring with Sun hemp + Cowpea + cowpea as intercrop (45 + 10 + 30 + 10 + 30 + 10 days)  
 T<sub>7</sub>: AM @ 25g + Azospirillum @ 50g + PSB @ 50g + T. harzianum @ 50g/ plant  
 T<sub>8</sub>: T<sub>1</sub> + T<sub>6</sub>                      T<sub>9</sub>: T<sub>1</sub> + T<sub>7</sub>                      T<sub>10</sub>: T<sub>1</sub> + T<sub>6</sub> + T<sub>7</sub>  
 T<sub>11</sub>: 300:100:300g NPK / plant as inorganic to be maintained separately for comparison  
 T<sub>12</sub>: FYM @ 10 kg/p + NC @ 1.25 kg/p K + PM @ 10 kg/plant  
 T<sub>13</sub>: (RDF) 175:105:220g NPK/plant  
 Note: NC- Neem cake, VC- Vermicompost, WA- Wood ash

**Table 4: Effect of organic nutrition on leaf area (m<sup>2</sup>) of Grand Naine banana during different months after planting**

Treatment	Months after planting							
	3	4	5	6	7	8	9	10
T <sub>1</sub>	2.59	3.65	4.75	5.77	6.82	7.87	9.92	11.97
T <sub>2</sub>	3.37	4.90	6.43	8.41	10.41	12.46	14.50	16.54
T <sub>3</sub>	2.31	3.43	4.54	5.66	6.70	7.91	10.11	12.32
T <sub>4</sub>	2.33	3.85	5.34	6.90	8.41	9.94	11.48	13.01
T <sub>5</sub>	1.84	2.78	3.72	4.66	5.60	6.54	8.48	10.42
T <sub>6</sub>	2.45	3.30	4.15	4.96	5.88	6.70	8.51	10.33
T <sub>7</sub>	2.91	4.42	5.93	7.44	8.90	10.45	12.01	13.56
T <sub>8</sub>	2.35	3.68	5.12	6.02	6.85	7.27	9.45	11.02
T <sub>9</sub>	3.01	4.59	6.17	7.73	9.33	10.91	12.49	14.07
T <sub>10</sub>	2.01	3.81	5.60	7.30	9.20	10.99	12.78	14.57
T <sub>11</sub>	2.33	4.35	6.38	7.96	9.49	11.02	13.06	15.09
T <sub>12</sub>	2.33	3.76	5.19	6.63	8.05	9.48	11.16	12.83
T <sub>13</sub>	2.87	4.38	5.88	7.39	8.90	10.415	11.93	13.45
SEm±	0.25	0.37	0.24	0.23	0.20	0.54	0.80	1.18
CD (P=0.05)	0.73	1.07	0.70	0.67	0.58	1.55	2.31	3.40

T<sub>1</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 1.75 kg/plant  
 T<sub>2</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 3.75 kg/plant  
 T<sub>3</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 0.625 kg/plant  
 T<sub>4</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 2.625 kg/plant  
 T<sub>5</sub>: N<sub>0</sub> + P<sub>0</sub> + K<sub>0</sub>  
 T<sub>6</sub>: T<sub>5</sub> + Triple green manuring with Sun hemp + Cowpea + cowpea as intercrop (45 + 10 + 30 + 10 + 30 + 10 days)  
 T<sub>7</sub>: AM @ 25g + Azospirillum @ 50g + PSB @ 50g + T. harzianum @ 50g/ plant  
 T<sub>8</sub>: T<sub>1</sub> + T<sub>6</sub>                      T<sub>9</sub>: T<sub>1</sub> + T<sub>7</sub>                      T<sub>10</sub>: T<sub>1</sub> + T<sub>6</sub> + T<sub>7</sub>  
 T<sub>11</sub>: 300:100:300g NPK / plant as inorganic to be maintained separately for comparison  
 T<sub>12</sub>: FYM @ 10 kg/p + NC @ 1.25 kg/p K + PM @ 10 kg/plant  
 T<sub>13</sub>: (RDF) 175:105:220g NPK/plant  
 Note: NC- Neem cake, VC- Vermicompost, WA- Wood ash

**Table 5: Effect of organic nutrition on yield characteristics of Grand Naine banana**

Treatment	Yield			
	No. of hands per bunch	Total number of fingers per bunch	Bunch weight (kg)	t/ ha
T <sub>1</sub>	7.83	120.46	19.035	59.02
T <sub>2</sub>	10.20	169.90	23.595	73.15
T <sub>3</sub>	8.66	133.57	18.205	56.43
T <sub>4</sub>	8.12	130.00	18.015	55.85
T <sub>5</sub>	7.72	112.72	16.48	51.09
T <sub>6</sub>	8.07	121.58	20.315	62.98
T <sub>7</sub>	8.83	142.61	21.715	67.32
T <sub>8</sub>	7.83	122.12	21.155	65.58
T <sub>9</sub>	8.96	145.68	22.985	71.24
T <sub>10</sub>	8.09	123.77	21.505	66.67
T <sub>11</sub>	10.37	172.23	24.125	74.79
T <sub>12</sub>	8.93	137.44	18.295	56.71
T <sub>13</sub>	10.85	199.18	26.175	81.15
SEm ±	0.31	6.51	0.33	1.04
CD (P=0.05)	0.91	18.68	0.96	2.98

T<sub>1</sub>: FYM @ 10 kg/pl + NC @ 1.25 kg/pl + VC @ 5 kg/plant + WA @ 1.75 kg/pl  
 T<sub>2</sub>: FYM @ 10 kg/pl + NC @ 1.25 kg/pl + VC @ 5 kg/plant + WA @ 3.75 kg/pl  
 T<sub>3</sub>: FYM @ 15 kg/pl + NC @ 1.875 kg/pl + VC @ 7.5 kg/plant + WA @ 0.625 kg/pl  
 T<sub>4</sub>: FYM @ 15 kg/pl + NC @ 1.875 kg/pl + VC @ 7.5 kg/plant + WA @ 2.625 kg/pl  
 T<sub>5</sub>: N<sub>0</sub> + P<sub>0</sub> + K<sub>0</sub>  
 T<sub>6</sub>: T<sub>5</sub> + Triple green manuring with Sun hemp + Cowpea + cowpea as intercrop (45 + 10 + 30 + 10 + 30 + 10 days)  
 T<sub>7</sub>: AM @ 25g + Azospirillum @ 50g + PSB @ 50g + T. harzianum @ 50g/ pl  
 T<sub>8</sub>: T<sub>1</sub> + T<sub>6</sub>                      T<sub>9</sub>: T<sub>1</sub> + T<sub>7</sub>                      T<sub>10</sub>: T<sub>1</sub> + T<sub>6</sub> + T<sub>7</sub>  
 T<sub>11</sub>: 300:100:300g NPK / pl as inorganic to be maintained separately for comparison  
 T<sub>12</sub>: FYM @ 10 kg/p + NC @ 1.25 kg/p K + PM @ 10 kg/plant  
 T<sub>13</sub>: (RDF) 175:105:220g NPK/plant  
 Note: NC- Neem cake, VC- Vermicompost, WA- Wood ash

**Table 6: Effect of organic nutrition on Sigatoka leaf spot disease intensity at 6 MAP of plant growth of banana cv. Grand Naine banana**

Treatment	6 MAP
T <sub>1</sub>	34.35 *(35.85)
T <sub>2</sub>	34.00(35.69)
T <sub>3</sub>	33.55(35.40)
T <sub>4</sub>	34.49(35.94)
T <sub>5</sub>	33.34(35.20)
T <sub>6</sub>	33.02(35.68)
T <sub>7</sub>	30.81(33.71)
T <sub>8</sub>	33.14(35.13)
T <sub>9</sub>	34.47(35.92)
T <sub>10</sub>	34.47(35.91)
T <sub>11</sub>	37.49(37.75)
T <sub>12</sub>	34.12(35.73)
T <sub>13</sub>	35.28(36.25)
SEm±	0.54
CD (P=0.05)	2.47

\* - Data in the parenthesis are angular transformed value

MAP: Months after planting

T<sub>1</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 1.75 kg/plant

T<sub>2</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 3.75 kg/plant

T<sub>3</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 0.625 kg/plant

T<sub>4</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 2.625 kg/plant

T<sub>5</sub>: N<sub>0</sub> + P<sub>0</sub> + K<sub>0</sub>

T<sub>6</sub>: T<sub>5</sub> + Triple green manuring with Sun hemp + Cowpea + cowpea as intercrop (45 + 10 + 30 + 10 + 30 + 10 days)

T<sub>7</sub>: AM @ 25g + *Azospirillum* @ 50g + PSB @ 50g + *T. harzianum* @ 50g/ plant

T<sub>8</sub>: T<sub>1</sub> + T<sub>6</sub>

T<sub>9</sub>: T<sub>1</sub> + T<sub>7</sub>

T<sub>10</sub>: T<sub>1</sub> + T<sub>6</sub> + T<sub>7</sub>

T<sub>11</sub>: 300:100:300g NPK / plant as inorganic maintained separately for comparison

T<sub>12</sub>: FYM @ 10 kg/p + NC @ 1.25 kg/p K + PM @ 10 kg/plant

T<sub>13</sub>: (RDF) 175:105:220g NPK/plant

Note: NC- Neem cake, VC- Vermicompost, WA- Wood ash, PM- Press mud

**Table 7: Effect of organic nutrition on nematode population of banana cv. Grand Naine**

Treatments	Nematode population ( <i>Rhodophilus similis</i> ) 6MAP	
	250 cc Soil	10 g roots
T1	141.67	40.33
T2	139.00	40.00
T3	128.33	35.67
T4	145.33	35.67
T5	161.67	42.00
T6	130.00	27.67
T7	158.00	46.00
T8	106.67	21.33
T9	121.00	36.33
T10	110.00	30.00
T11	164.67	47.67
T12	103.33	32.00
T13	162.33	49.00
SEm±	0.75	0.54
CD (P=0.05)	2.53	1.84

T<sub>1</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 1.75 kg/plant

T<sub>2</sub>: FYM @ 10 kg/plant + NC @ 1.25 kg/plant + VC @ 5 kg/plant + WA @ 3.75 kg/plant

T<sub>3</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 0.625 kg/plant

T<sub>4</sub>: FYM @ 15 kg/plant + NC @ 1.875 kg/plant + VC @ 7.5 kg/plant + WA @ 2.625 kg/plant

T<sub>5</sub>: N<sub>0</sub> + P<sub>0</sub> + K<sub>0</sub>

T<sub>6</sub>: T<sub>5</sub> + Triple green manuring with Sun hemp + Cowpea + cowpea as intercrop (45 + 10 + 30 + 10 + 30 + 10 days)

T<sub>7</sub>: AM @ 25g + *Azospirillum* @ 50g + PSB @ 50g + *T. harzianum* @ 50g/ plant

T<sub>8</sub>: T<sub>1</sub> + T<sub>6</sub>

T<sub>9</sub>: T<sub>1</sub> + T<sub>7</sub>

T<sub>10</sub>: T<sub>1</sub> + T<sub>6</sub> + T<sub>7</sub>

T<sub>11</sub>: 300:100:300g NPK / plant as inorganic maintained separately for comparison

T<sub>12</sub>: FYM @ 10 kg/p + NC @ 1.25 kg/p K + PM @ 10 kg/plant

T<sub>13</sub>: (RDF) 175:105:220g NPK/plant

Note: NC- Neem cake, VC- Vermicompost, WA- Wood ash, PM- Press mud

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