The Pharma Innovation Journal 2021; 10(9): 290-293

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(9): 290-293

www.thepharmajournal.com
Received: 13-07-2021
Accepted: 19-08-2021

SK Daware
Post Graduate Student, Department of Agricultural Entomology, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahmednagar, Maharashtra, India

DB Kadam
Associate Professor, Department of Agricultural Entomology, College of Agriculture, Muktainagar, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahmednagar, Maharashtra, India

PR Palande
Assistant Professor, Department of Agricultural Entomology, Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahmednagar, Maharashtra, India

Corresponding Author:
SK Daware
Post Graduate Student, Department of Agricultural Entomology, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahmednagar, Maharashtra, India

Assessment of avoidable yield losses caused due to *Meloidogyne incognita* infesting guava, *Psidium guajava* L.

SK Daware, DB Kadam and PR Palande

Abstract
Field experiment was carried out from October, 2020 to April, 2021 for assessing avoidable yield losses caused due to *M. incognita* in guava (cv. Sardar) with a paired plot design by soil application of carbofuran 3G at 135 kg/ha. The results specified avoidable loss in yield of guava over an untreated plot ranged from 18.84 to 31.17 per cent. However, average avoidable loss of 26.06 per cent in guava yield was recorded in an untreated plot, when treated with carbofuran 3G at 135 kg/ha.

Keywords: *Meloidogyne incognita*, *Psidium guajava*, Carbofuran 3G, Root knot nematode

Introduction

Guava (*Psidium guajava* L.) is an important fruit crop of India's tropical and subtropical region. It is an American native and belongs to Myrtaceae family. It is known as the "Apple of the tropics". Guava is a popular fresh fruit due to its excellent taste, high vitamin content and complete edibility. This fruit is also vital to the processing industry. Since the early 17th century guava has been cultivated in India and has gradually evolved into a commercially important crop. Lucknow- 49, also known as 'Sardar guava' is a Poona selection created by Cheema and Deshmukh. Guava roots, barks, and leaves have traditionally been used to treat gastroenteritis, diarrhoea, dysentery, ulcers, cough, chest aliments, inflamed gums, cerebral ailments, nephritis, convulsions and cachexia (Nasser *et al*., 2018) [7]. Guava production in India is approximately 0.27 million hectares with an annual output of 4.05 million tonnes of fruit with average productivity of 15.30 metric tonnes per hectare. Uttar Pradesh produces the most guava followed by Madhya Pradesh, Bihar and Andhra Pradesh. During 2017-2018 fiscal year, Maharashtra produced 0.38 million tonnes (Anonymous, 2017) [3]. This intrinsic fruit crop is plagued by various insect and non-insect pests, as well as diseases. Diseases caused by nematodes are significant. Root knot nematode (*Meloidogyne* spp.) is one of them causing significant yield losses in guava. Phytonematodes are most important agricultural pest, causing significant losses worldwide (Koenning *et al*., 1999) [6]. The estimated direct crop losses due to phytonematodes ranged from 5 to 10 per cent of the crop value annually. The information on monetary losses due to phytonematodes is essential for undertaking the control measures. Therefore, the field experiment was conducted to assess the avoidable yield losses due to root-knot nematode in guava (cv. Sardar).

However, the avoidable yield loss of 23.03% in grapevine (Anonymous, 1997) [1], 31.17% (Walunj, 2013) [9] and 32.80% (Kadam, 2014) [5] in pomegranate and 24.92% in fig (Jagdev, 2019) [4] were reported due to root- knot nematode (*M. incognita*), when these crops were treated with carbofuran 3G at 2 to 4 kg a.i./ha.

Materials and Methods

A field experiment was conducted from October, 2020 to April, 2021 in *M. incognita* sick orchard of guava at All India Co- Ordinated Research Project on Fruit Crops, Department of Horticulture, Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri for assessing avoidable yield losses caused due to *Meloidogyne incognita* infesting guava. The experiment was carried out by using paired plot design and replicated ten times with two treatments including an untreated control. In treated treatments granular nematicide, carbofuran 3G was applied @ 135 kg/ha. Composite soil (200 g) and root samples (5 g) were taken from every treatment while recording observation. For counting nematodes from the samples Cobb's decanting and sieving technique (Cobb, 1918) [2] was used in the laboratory.

In a plastic beaker, the residues from the 200 mesh and 350 mesh sieves were obtained and by adding tap water, the volume of beaker was increased to 200 ml.10 counts of 1 ml solution were recorded for the nematode count, which was multiplied by 200 ml of solution. On the basis of these findings the per cent decrease in nematode population was calculated. At each observation, 5 g of root samples were collected and the root galling and egg masses were noted. Based on these observations, a percent decrease in root galls and egg masses was calculated. The yield from the net plot (tree) of every treatment in the field was calculated and indicated in tonnes per hectare from harvesting to termination. The increase in the yield over control was calculated based on these observations. The collected data was statistically analysed using the 't' test to determine the significance of the difference between two treatments.

Results and Discussion

Root knot nematode population

Table 1 present that there were highly significant differences in recording population of root knot nematode in treated and untreated treatments at intermediate and at termination. At the intermediate stage the reduction in population of *M. incognita* varied from 46.43 to 62.50 per cent in plot treated with carbofuran 3G @ 135 kg/ha. This treatment resulted in an average population reduction of 54.33 per cent of *M. incognita* nematode. The reduction in population of *M. incognita* ranged from 26.32 to 41.51 per cent in plot treated with carbofuran 3G @ 135 kg/ha at the termination of the research study. This treatment, however, resulted in an average reduction of 32.73 per cent in the population of *M. incognita*.

Number of root galls and egg masses

Table 2 present that there were highly significant differences in recording root galls of *M. incognita* in treated and untreated plot at termination at intermediate and termination. At intermediate stage the reduction in the root galls number varied from 32.26 to 48.39 per cent in the plot treated with carbofuran 3G @ 135 kg/ha with an average reduction of 39.43 per cent in root galls of *M. incognita*. The reduction in root galls of *M. incognita* ranged from 12.50 to 25.00 per cent in plot treated with carbofuran 3G @ 135 kg/ha at the termination of the study. This treatment, however, resulted in an average reduction of 18.07 per cent in the root galls of *M. incognita*.

Table 3 shows that there were highly significant differences in recording egg masses of *M. incognita* in treated and untreated plot at intermediate and termination. As shown in table 3 at intermediate stage, the reduction in the number of root galls varied from 31.03 to 45.00 per cent in the plot that have been treated with carbofuran 3G @ 135 kg/ha. This treatment resulted in an average reduction of 38.50 per cent in egg masses of *M. incognita*.

The reduction in egg masses of *M. incognita* ranged from 20.83 to 41.38 per cent in treated plot at the termination of the study and resulted in an average reduction of 29.96 per cent in the egg masses of *M. incognita*.

Yield losses

Table 4 shows that the average output in treated and in an untreated guava plot was 18.93 and 14.00 tonnes/ha, respectively. Guava yield loss ranged from 18.84 to 31.17 per cent in untreated plot. However, an average loss in guava yield in intreated plot was recorded 26.06 per cent when compared with plot treated with carbofuran 3G @ 135 kg/ha. Previously, similar results were obtained by Walunj (2013) [9] and Kadam (2014) [5] who conducted an experiment on pomegranate for assessing avoidable yield losses caused due to *Meloidogyne incognita* and reported the avoidable loss in pomegranate as 31.17 and 32.80 per cent, respectively when treated with phorate 10G @ 2 kg a.i./ha. Patil *et al*. (2016) [8] also conducted experiment for assessing avoidable yield losses caused due to *Meloidogyne incognita* in guava (cv. Sardar) by soil application of carbofuran 3G @ 2 kg a.i./ha. The result indicated that the avoidable yield loss in the fruit yield was 23.77 per cent. Similarly, Jagdev *et al*. (2019) [4] also reported that the avoidable loss in fruit yield of fig was 24.92 per cent., when treated with carbofuran 3G @ 2 kg a.i./ha.

Table 1: Effect of treatment (Carbofuran 3G) on population of *M. incognita* in assessment of avoidable yield losses in guava

Replication	Root knot nematode population(J_2) / 200 cm^3 of soil							
	Treated (Carbofuran 3G at 135 kg/ha)	Untreated control	Treated (Carbofuran 3G at 135 kg/ha)	Untreated control	Treated (Carbofuran 3G at 135 kg/ha)	Untreated control	Per cent decline in nematode population in treated plot (%)	
	Initial		Intermediate		Termination		Intermediate	Termination
1	570	650	230	670	420	680	59.65	26.32
2	610	570	280	620	410	680	54.10	32.79
3	570	480	270	510	380	560	52.63	33.33
4	510	580	260	620	360	640	49.02	29.41
5	560	600	300	640	390	660	46.43	30.36
6	530	560	210	580	350	640	60.38	33.96
7	580	600	290	640	370	680	50.00	36.21
8	560	620	210	640	370	680	62.50	33.93
9	610	530	270	560	430	620	55.74	29.51
10	530	590	250	640	310	680	52.83	41.51
Mean	563.00	578.00	257.00a	612.00	379.00	652.00	54.33	32.73
't' cal.	0.81927		19.5191		16.2987			

't' Table (0.05) = 2.262 & (0.01) = 3.25, a = 't' tests for paired comparison revealed very significant differences from the untreated control.

Table 2: Effect of treatment (Carbofuran 3G) on root galls of *M. incognita* in assessment of avoidable yield losses in guava

Replication	Number of root galls / 5 g roots							
	Treated (Carbofuran 3G at 135 kg/ha)	Untreated control	Treated (Carbofuran 3G at 135 kg/ha)	Untreated control	Treated (Carbofuran 3G at 135 kg/ha)	Untreated control	Per cent decline in number of root galls in treated plot (%)	
	Initial		Intermediate		Termination		Intermediate	Termination
1	32	33	18	34	28	36	43.75	12.50
2	30	31	18	33	25	35	40.00	16.67
3	28	32	18	34	23	37	35.71	17.86
4	29	28	19	30	25	35	34.48	13.79
5	31	26	21	29	26	33	32.26	16.13
6	29	28	16	30	23	36	44.83	20.69
7	31	32	20	35	24	41	35.48	22.58
8	31	32	16	35	25	40	48.39	19.35
9	31	32	18	35	26	42	41.94	16.13
10	32	28	20	30	24	34	37.50	25.00
Mean	30.40	30.20	18.40a	32.50	24.90	36.90	39.43	18.07
't' cal.	0.2267		15.0592		11.0678			

't' Table (0.05) = 2.262 & (0.01) = 3.250, a = 't' tests for paired comparison revealed very significant differences from the untreated control.

Table 3: Effect of treatment (Carbofuran 3G) on egg masses of *M. incognita* in assessment of avoidable yield losses in guava

Replication	Number of egg masses / 5 g roots							
	Treated (Carbofuran 3G at 135 kg/ha)	Untreated control	Treated (Carbofuran 3G at 135 kg/ha)	Untreated control	Treated (Carbofuran 3G at 135 kg/ha)	Untreated control	Per cent decline in number of egg masses in treated plot (%)	
	Initial		Intermediate		Termination		Intermediate	Termination
1	24	22	14	25	19	28	41.67	20.83
2	28	25	17	30	20	33	39.29	28.57
3	27	27	17	31	19	32	37.04	29.63
4	30	26	20	29	23	32	33.33	23.33
5	29	31	20	33	21	35	31.03	27.59
6	23	25	13	28	15	30	43.48	34.78
7	26	26	17	29	16	32	34.62	38.46
8	20	23	11	26	14	30	45.00	30.00
9	24	20	14	26	18	28	41.67	25.00
10	29	30	18	32	17	33	37.93	41.38
Mean	26.00	25.50	16.10a	28.90	18.20	31.30	38.50	29.96
't' cal.	0.340119		10.0566		11.5538			

't' Table (0.05) = 2.262 & (0.01) = 3.250 a = 't' tests for paired comparison revealed very significant differences from the untreated control.

Table 4: Assessing yield losses due to *M. incognita* in guava

Replication	Yield (t/ha)		Loss in yield (%)
	Treated (Carbofuran 3G at 135 kg/ha)	Untreated control	
1	17.25	14.00	18.84
2	18.75	14.00	25.33
3	19.75	14.25	27.85
4	21.50	17.00	20.93
5	17.25	13.00	24.64
6	18.25	12.75	30.14
7	18.75	13.00	30.67
8	18.25	13.00	28.77
9	20.25	15.75	22.22
10	19.25	13.25	31.17
Mean	18.93a	14.00	26.06
't' cal.	8.1326		

't' Table (0.05) = 2.262 & (0.01) = 3.250, a = 't' tests for paired comparison revealed very significant differences from the untreated control.

Conclusion

The results specified that the average yield in treated and untreated plot of guava were 18.93 and 14.00 tonnes/ha, respectively. Avoidable loss in yield of guava over an untreated plot ranged from 18.84 to 31.17 per cent. However, average avoidable loss of 26.06 per cent in guava yield was recorded in an untreated plot, when compared with plots treated with carbofuran 3G at 135 kg/ha.

References

1. Anonymous. Avoidable yield losses in grapevine due to root-knot nematode, *M. incognita*. Biennial Report (1995-96) of "All India Co-ordinated Research Project on Plant Parasitic Nematodes with Integrated Approach for Their Control", M.P.K.V., Rahuri presented in Xth Biennial Group Meeting to be held at University of Agricultural Sciences, Bangalore 1997, 56-57.
2. Anonymous. India production of guava. Web link:

https:/agriexchange.apeda.gov.in. (Accessed on 24 July, 2021)
3. Cobb NA. Estimating the nematode population of soil. United States, Department of Agriculture, Agricultural Technical Circular. 1918, 48.
4. Jagdev GH, Hole UB, Kulkarni SR, Mhase NL. Assessment of Avoidable yield loss due to root-knot nematode, *Meloidogyne incognita* infesting fig under field conditions. The Pharma Innovation Journal 2020;9(2):13-16
5. Kadam DB. Studies on the root- knot nematode, *Meloidogyne incognita* (Kofoid and White, 1919) Chitwood, 1949 infesting pomegranate, *Punica granatum* L. Ph. D. dissertation submitted to M.P.K.V., Rahuri 2014.
6. Koenning SR, Overstreet C, Noling JW, Donald PA, Becker JO, Fortnum BA. Survey of Crop Losses in Response to Phytoparasitic Nematodes in the United States for 1994. Journal of Nematology 1999;31(4S):587-618.
7. Naseer S, Hussain S, Naeem N, Pervaiz M, Rahman M. The phytochemistry and medicinal value of *Psidium guajava* L. (guava). Clinical Phytoscience 2018;4:32.
8. Patil SC. Identification of hot spots, seasonal incidence and management of root- knot nematode, *Meloidogyne incognita* (Kofoid and White, 1919) Chitwood, 1949 infesting guava, *Psidium guajava* L. Ph. D. dissertation submitted to M.P.K.V., Rahuri 2016.
9. Walunj AR. Seasonal incidence and biological management of root- knot nematode, *Meloidogyne incognita* (Kofoid and White, 1919) Chitwood, 1949 infesting pomegranate, *Punica granatum* L. Ph. D. dissertation submitted to M.P.K.V., Rahuri 2013.