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Seasonal incidence of insect pests on drumstick (*Moringa oleifera* Lamk)

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Abstract

The incidence of various insect pests and associated natural enemies was observed on drumstick at farmer field, village Bharregaon district Rajnandgaon during *kharif-rabi*, 2019-20. During the course of study, ten insect pests species were noticed causing damage at various growth stages of drumstick crop. Leaf caterpillar, *N. blitealis* is one of the most prevalent insect of the drumstick and found throughout the year on variety PKM -1. Maximum population of 4.31 larvae/branch recorded during second week of April. February to April month was more congenial for development of leaf caterpillar. Maximum population of tussock caterpillar was recorded during third week of March with mean population of 0.91 larva/ branch. Population of thrips, *R. subnudula* was active throughout the year with 3.28 thrips /twig recorded during third week of March. Four peaks of aphid i.e. 3.63, 3.24, 3.88 and 3.53 aphids/cm recorded during second week of December, first week of January, third and fourth week of March, respectively. Bud worm with 1.10 larvae/ branch as a first peak during third week of March. Maximum population of 1.34 stem borers/ branch as a first peak recorded during second week of February. February month is more favorable in terms of growth and development of stem borer.

Keywords: Insect pests, natural enemies and drumstick

Introduction

Drumstick (*Moringa oleifera* Lamk.) is a member of Moringaceae family. In India, *Moringa* is widely used as a vegetable crop and grown commercially for its pods and leaves. Drumstick leaves have a rich source of β -carotene, protein, vitamin C, calcium and potassium and acts as a good source of natural antioxidants; and thus, increases the shelf life of fat-rich foods due to the presence of various types of antioxidant compounds such as ascorbic acid, flavonoids, phenols and carotenoids. In the Philippines, it is known as 'Mother's best friend' and is sometimes prescribed for anemia and due to its use to increase female milk production ^[10].

India is a major producer of drumstick with an annual production capacity of 2.2 million tonnes of tender pod from 43,600 hectare area, which is about 51 tonnes per hectare of productivity. Andhra Pradesh is the leading state in area (15,665 hectares) followed by Tamil Nadu (13,042 hectares) and Karnataka (10,280 hectares) ^[13]. In Chhattisgarh, an area of 2,556 hectare is under the cultivation of drumstick and the production is 19,426 metric tonnes. Chhattisgarh has major *Moringa* producing districts such as Korba, Rajnandgaon, Balada Bazar, Kabirdham and Kanker ^[1]. Like any other crop, drumstick trees are also susceptible to the attack of number of insect pests. As many as 28 different insect species have been reported so far from India on various parts of drumstick trees the major destructive pests are pod fly (*Gitona distigma*), leaf eating caterpillar (*Noorda blitealis* Walker), bud worm (*Noorda moringae*), hairy caterpillar (*Eupterote mollifera*) are considered as major insect pests. Whereas, trunk borer (*Indarbela tetraonis*), leaf eating weevils (*Myllocerus maculosus*), whitefly (*Trialeurodes rara*), scale insects and mites are considered as minor pests ^[3]. Owing to gain popularity of the crop and its intensive cultivation, the damage by insect pests has been also increasing. Studies on seasonal incidence of insect pests of any crop are important as these provide information on the status of various insect pests and their natural enemy fauna and also help in identifying the vulnerable stages of the crop. This information helps in developing an efficient management model for the insect pest attacking at various growth stages of the crop. In view of above points, the present study was carried out at the Instructional Research farm of Pt. Kishori Lal Shukla College of Horticulture and Research Station, Rajnandgaon (C.G.) during, *kharif-rabi*, 2019-20.

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Materials and Methods

For investigation of insect pests of drumstick, 20 trees of cultivar PKM-1 were selected randomly from entire area of farmers field, Bharregaon, Rajnandgaon. From each tree, five branches were selected from all directions like E, W, N, S and central portion of the plants as method given by [7]. Number of defoliators per branch was recorded at weekly interval. For recording the sucking insect pests, two branches were selected randomly from four directions and central portion of the plants and total number of pests counted. Side by side natural enemies population was recorded. Insect pests and natural enemy population was subjected to simple correlation.

Results and Discussion

The incidence of various insect pests and associated natural

enemies was observed on drumstick during *khariif-rabi*, 2019-20. Weekly observation on insect pests population with their natural enemies were recorded on marked area of randomly selected 20 plants at farmer field, village Bharregaon district Rajnandgaon are given in table 1 and depicted in Fig 1. During the course of study, ten insect pests species were noticed causing damage at various growth stages of drumstick crop. The insect pests namely leaf caterpillar and bud worm were first to damage the crop followed by thrips, aphid, ash weevil, semi looper and tree hopper which infested the crop from flowering stage to maturity stage. Beside these insect pests their natural enemies i.e. Pentatomid bug, Lady bird beetle, Spiders, Praying mantid and Green lace wing also recorded during the time of observation. Findings on major insect pests incidence on moringa are as mentioned below.

Table 1: Weekly population of insect pests with associated natural enemies on drumstick during, *khariif-rabi*, 2019-20

Date of observation	Leaf caterpillar /branch	Tussock caterpillar /branch	Thrips /twig	Bud worm /branch	Aphid /cm	Stem borer /branch	Spiders /branch	Pentatomid bug /branch	Preying mantid /branch	Lady bird beetle/ branch	Green lacewing /branch
03-09-2019	1.12	0.82	0.00	0.03	0.05	0.00	1.92	0.02	0.05	0.03	0.01
10-09-2019	1.75	0.76	0.03	0.08	0.22	0.00	1.84	0.05	0.04	0.06	0.02
17-09-2019	1.99	0.71	0.21	0.11	0.33	0.01	1.63	0.06	0.07	0.08	0.03
24-09-2019	3.13	0.63	0.80	0.18	0.61	0.09	1.51	0.07	0.09	0.10	0.05
01-10-2019	2.98	0.56	1.05	0.09	0.65	0.09	1.41	0.08	0.12	0.12	0.01
08-10-2019	2.07	0.37	0.71	0.05	0.75	0.08	1.24	0.09	0.08	0.14	0.07
15-10-2019	0.75	0.45	1.54	0.02	0.01	0.09	0.58	0.14	0.05	0.06	0.00
22-10-2019	0.57	0.03	1.41	0.03	0.95	0.14	1.51	0.04	0.03	0.07	0.08
29-10-2019	1.29	0.51	1.12	0.01	1.04	0.02	1.26	0.03	0.06	0.13	0.06
05-11-2019	1.22	0.37	1.20	0.00	0.88	0.00	1.16	0.09	0.05	0.08	0.09
12-11-2019	0.71	0.34	0.80	0.00	0.61	0.07	0.79	0.10	0.10	0.13	0.12
19-11-2019	0.66	0.26	1.48	0.00	1.14	0.06	1.05	0.11	0.10	0.08	0.07
26-11-2019	0.53	0.29	0.94	0.00	1.34	0.02	1.60	0.40	0.45	0.02	0.01
03-12-2019	0.47	0.00	0.45	0.00	1.12	0.05	2.40	0.02	0.86	0.00	0.03
10-12-2019	0.51	0.00	0.86	0.00	3.63	0.70	2.65	0.04	0.93	0.00	0.02
17-12-2019	0.45	0.00	0.24	0.00	0.67	0.30	1.50	0.01	1.01	0.00	0.00
24-12-2019	0.32	0.00	0.58	0.00	1.92	0.08	0.95	0.06	0.79	0.00	0.04
31-12-2019	0.10	0.00	0.92	0.00	3.24	0.54	2.75	0.00	0.92	0.00	0.01
07-01-2020	0.41	0.00	0.19	0.00	1.36	0.26	1.86	0.34	0.76	0.00	0.00
14-01-2020	0.17	0.00	1.46	0.00	0.98	0.81	3.13	0.11	0.31	0.00	0.00
21-01-2020	0.30	0.00	1.34	0.00	1.23	0.67	1.35	0.42	0.01	0.00	0.06
28-01-2020	0.31	0.00	0.90	0.50	1.69	1.22	1.23	0.54	0.00	0.00	0.00
04-02-2020	0.58	0.66	1.23	0.52	1.71	1.28	0.59	0.90	0.00	0.49	0.00
11-02-2020	0.77	0.14	1.73	0.49	2.31	1.34	2.07	0.29	0.00	0.09	0.00
18-02-2020	0.97	0.50	2.29	0.91	1.08	0.76	0.67	0.92	0.00	0.73	0.00
25-02-2020	1.29	0.62	1.11	0.62	1.02	0.60	0.47	0.54	0.00	0.30	0.00
03-03-2020	1.31	0.72	3.12	0.84	1.23	0.91	0.76	0.63	0.00	0.41	0.00
10-03-2020	1.44	0.56	1.21	0.59	2.17	0.98	0.68	0.81	0.00	0.36	0.00
17-03-2020	2.13	0.91	3.28	1.10	3.88	0.75	1.54	1.24	0.00	0.37	0.00
24-03-2020	2.69	0.34	2.99	0.98	3.53	0.24	1.32	1.25	0.00	0.36	0.00
31-03-2020	2.98	0.85	1.45	0.70	1.65	0.56	2.65	0.43	0.00	0.04	0.00
07-04-2020	3.45	0.79	1.11	0.03	0.08	0.51	1.87	0.32	0.00	0.01	0.00
14-04-2020	4.31	0.73	0.99	0.00	0.01	0.32	1.47	0.29	0.00	0.00	0.00
21-04-2020	2.84	0.68	0.50	0.00	0.00	0.21	1.05	0.12	0.00	0.00	0.00
28-04-2020	1.67	0.45	0.30	0.00	0.00	0.09	0.89	0.05	0.00	0.00	0.00
Seasonal mean	1.37	0.40	1.12	0.22	1.23	0.39	1.48	0.31	0.22	0.13	0.02
Correlation (r) Leaf caterpillar Tussock caterpillar Thrips Bud worm Aphid Stem borer					0.350*	0.733**			0.474**	0.047	-0.176
					0.371*	0.883**			-0.643**	0.102	-0.227
					-0.174	0.136			-0.162	0.636**	0.408*
					-0.241	0.129			-0.392*	0.273	-0.151
					0.256	0.018			0.299	0.786**	0.464**
					0.028	0.056			-0.143	0.206	-0.157

Leaf caterpillar, *Noorda blitealis* Walker

Population of leaf caterpillar was found throughout the year on variety PKM -1. Its first appearance on crop was observed in the first week of September with the mean population of 1.12 larvae/ branch. After that the population gradually increased up to 3.13 larvae / branch recorded during the

fourth week of September which was the first peak population of the leaf caterpillar. After that two peaks of 1.29 and 1.22 larvae / branch recorded during fourth week of October and first week of November, respectively. Population was constantly increased and reached to maximum level of 4.31 larvae/branch during second week of April. Total four peaks

were noticed during September, October, February and April. The present finding was in accordance with the finding of Selvi and Muthukrishnan who reported that leaf caterpillar, *N. blitealis* considered to be the most serious pest of annual moringa as it occurred throughout year and cause the serious damage to the crop [11, 9]. Patel reported six peaks of *N. blitealis* during February, March, April, June, October and January which is supported to the present finding where four peaks of *N. blitealis* were recorded during September, October, February and April [2]. Ayyar reported that *N. blitealis* caused severe defoliation during March, April, December and January whereas, in the present investigation fourth peaks was recorded during the month of April. [6] Honnalingappa at Bangalore reported peaks population of *N. blitealis* during January, November and December which is contradictory with the present investigation.

Tussock caterpillar, *Euproctis lunata* Fabricius

The population of tussock caterpillar, *E. Lunata* was first recorded on crop during first week of September with the mean population of 0.82 larva/ branch. Then after, population completely disappeared from first week of December to fourth week of January. Again population was appeared during first week of February and reached maximum population during third week of March with mean population of 0.91 larva/ branch. This was the second peak of insect. [6] Honnalingappa reported *E. Lunata* is a medium sized moth and feed to foliage of drumstick. He also reported that *E. Lunata* was active from May to December with a average larval population of 6.75/25 plants which is contradictory with the present investigation where this pest was active from September to October and February to April.

Thrips, *Ramaswamihiella subnudula* Karmy

Population of thrips, *R. subnudula* was active throughout the year. Initial population of thrips was recorded on drumstick during second week of September with the mean of 0.03 thrips/twig. This population gradually increased up to 1.54 thrips/twig as first peak during third week of October thereafter, two peaks were recorded viz. during third week of November and second week of January with the maximum population of 1.48 and 1.46 thrips/twig, respectively. After a third peak, fourth peak of 3.28 thrips /twig recorded during third week of March with the slightly fluctuation of population up and down manner with the seasonal mean of 1.12 thrips/ twig [3]. Butani and Verma reported that thrips, *Ramaswamihiella subnudula* Karmy as a polyphagous pest and also found on inflorescence of drumstick. This finding is in agreement with present studies wherein, maximum population 3.28 thrips/twig recorded during third week of March. [6]. Honnalingapp reported incidence of thrips during January to May and November to December within average population of 4.69/25 compound leaves which is supported to present study where the thrips was active from September to April.

Aphid, *Aphis craccivora* Koach

Aphid, *A. craccivora* was first seen on drumstick during the first week of September with mean population of 0.05 aphid /cm. Maximum population of 3.63 aphids/cm as first peak observed during second week of December. Afterthat, second peak population of aphid with 3.24 aphids/cm recorded during first week of January. Thanafter, population reached up to a maximum of 3.88 aphids/cm during third week of March and

3.53 aphids/cm during fourth week of March which were third and fourth peaks of insect, respectively. *A. craccivora* Koach observed that the insects infest the tender shoots of moringa during January to march on under surface of leaflets [4] which is in agreement with present one where aphid was active from first week of September to third week of April [6]. Honnalingappa also reported the incidence of *A. craccivora* during January to July and December which is supported to the present investigation.

Bud worm, *Noorda moringae* Tams

First appearance of bud worm, *N. moringae* was recorded on drumstick during the first week of September with a population of 0.03 larva/ branch. The pest activity increased gradually up to 0.18 larva/ branch during fourth week of September. Thereafter, pest population completely disappeared from first week of November to fourth week of January. With the formation of fruit, pest again appeared during fourth week of January and reached maximum of 1.10 larva/ branch as a first peak during third week of March. Thereafter, population gradually declined and disappeared after second week of April [5]. David and Ramamurthy, reported that bud worm, *N. moringae* is a destructive pest on moringa. Larvae bored into flower buds, resulting bud shedding up to 78%. This infestation was highest during summer which is in agreement to present studies where *N. Moringae* was active from September to October and January to April. The present investigation also supported by [8] Mahesh math reported incidence of *N. moringae* throughout the year except December month.

Stem borer, *Diaxenopsis apocynoides* Bruning

Initial population of the pest was about 0.01 stem borer/ branch recorded during third week of September. Population constantly scored less than 1 stem borer/ branch, from fourth week of September to third week of January. Afterthat, population scored 1.22 stem borer/ branch during fourth week of January which was gradually increased up to 1.34 stem borer/ branch as a first peak during second week of February with the decreasing order of population during third and fourth week of February. Present finding was in accordance with the finding of [12]. Subramanian (1920) who studied on drumstick insects and pests at Bihar. He also reported that *D. apocynoides* infested tender shoots of moringa in field condition. However, he also reported peak activity of stem borer recorded during month of September to November which is partially supported to present one where pest was active during January and February month.

Correlation studies between insect pests of drumstick and their natural enemies

To record the effect of natural enemies on the activity of the insect pests of drumstick. The population of leaf caterpillar, tussock caterpillar, thrips, aphids, bud worms and stem borer was correlated with spiders, pentatomid bugs, lady bird beetles, preying mantids, green lacewing and braconid wasps. Spiders was significant positively correlated with leaf caterpillars and tussock caterpillars with the correlation coefficient value (r) of 0.421 and 0.371 respectively. Similarly, pentatomid bugs was also highly significant positively correlated with leaf caterpillars and tussock caterpillars with correlation coefficient value (r) of 0.733 and 0.883, respectively. Highly significant positive relationship found between preying mantid and leaf caterpillars with the

correlation coefficient value of 0.474. However, this predator showed significant negative correlation with population of tussock caterpillars ($r = -0.643$) and bud worm ($r = -0.392$). Population of aphids and thrips were highly significant and positively correlated with lady bird beetles with the

correlation coefficient value (r) of 0.636 and 0.786, respectively. Similar trend was also recorded between the correlation of green lace wings with aphids ($r = 0.464$) and thrips ($r = 0.408$).

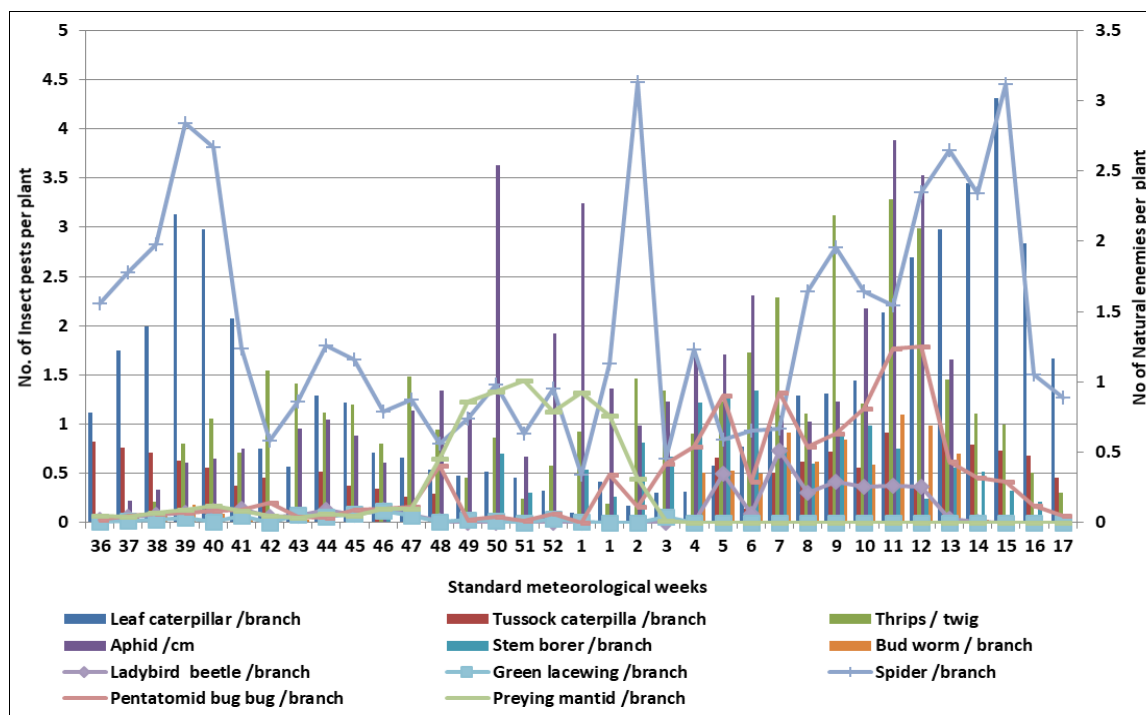


Fig 1: Seasonal incidence of insect pests on drumstick and their natural enemies during, kharif - rabi, 2019-20

Conclusion

In pest succession studies, ten species of different insect pest viz. leaf caterpillar, tussock caterpillar, thrips, aphid, stem borer, bud worm, tiger moth, ash weevil, and semi looper were recorded. Among these, some were found damaging the tree while, others were only visitors present in very few numbers. Leaf caterpillar, *N. blitealis* Walker was categorized as major pest followed by tussock caterpillar, thrips, aphids and bud worm. Among the natural enemies, pentatomid bug, *Eocanthecona furcellata* and spiders, *Neoscona* sp., *Peucetia* sp., *Thomisus* sp. and *Agriope* sp. were observed as a major bio agent against leaf caterpillar and tussock caterpillar whereas, preying mantid are the next major predators which preys upon leaf caterpillar. Green lace wing and lady bird beetle were also observed as a major predators against aphid and thrips.

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References

1. Anonymous. Status Report, Deptt of Horticulture, Govt. of Chhattisgarh, 2018.
2. Ayyar TVR. Pests of drumstick. In: Handbook of Economic Entomology for South India, Namrutha publications, Madras, 1963, 249- 250.
3. Butani DK, Verma S. Insect pests of vegetables and their control- Drumstick. Pesticides. 1981; 15(10):29-32.
4. David KS. Notes on south Indian Aphids. III-Lachinae to Aphidinae (Part). Indian J Ent. 1958; 19:171-180.

5. David B, Ramamurthy VV. Elements of Economic Entomology. Eighth edition. Brillion Publishing, New York-New Delhi. 2016; 398:147-148.
6. Honnalingappa YB. Insect pests of drumstick (*Moringa olifera* Lamk.) with special reference to the bioecology of and management of leaf eating caterpillar, *Noorda blitealis* Walker (Lepidoptera: Pyralidae), 2001, 87.
7. Ms Bk. Studies on The Insect Defoliators of Drumstick with Special Reference to *Noorda blitealis* Walker (Lepidoptera: Crambidae) (Doctoral dissertation, University of Horticultural Sciences, Bagalkot), 2014.
8. Mahesh M, Kotikal YK. Studies on insect pests of drumstick, *Moringa oliefera* Lamk. Indian J Plant Prot. 2014; 42:461-464.
9. Patel BP, Radadia GG, Pandya HV. Biology of leaf eating caterpillar, *Noorda blitealis* Walk. on drumstick, *Moringa oleifera* L. Insect Environment. 2010; 16(3):135-138.
10. Siddhuraju P, becker K. Antioxidant Properties of Various Solvent Extracts of Total Phenolic Constituents from three Different Agro-Climatic Origins of Drumstick Tree (*Moringa oleifera* Lam.), Journal Agriculture Food Chemistry, 2003. 15: 2144-2155.
11. Selvi C, Muthukrishnan N. Biology of moringa leaf caterpillar, *Noorda blitealis* Walk. on different annual moringa accessions. Journal of Plant Protection and Environment. 2011; 8(2):89-92.
12. Subramaniam T. The life history of moringa stem-borer. In Report of Proceedings, Bihar, 1920, 922-925.
13. Zirmire Jyoti. A study on economic viability of Moringa in dryland regions of Maharashtra: with special reference to value addition and export aspects. Journal of Pharmacognosy and Phytochemistry. 2018; 7(2):374-376.