



RESEARCH ARTICLE

Studies on the Invertebrate Fauna Associated With *Moringa Oleifera* (Lam), (Moringaceae) During the Rainy Season in Awka, Anambra State, Nigeria

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ABSTRACT

Studies were carried out to investigate the diversity of higher invertebrate fauna living in close association with horse-radish plant, *Moringa oleifera* Lam (Moringaceae) in Awka metropolis of Anambra State, Nigeria. *Moringa* shrubs growing in backyard gardens along compound fences and hedge rows were sampled. Pyrethroid knockdown insecticide (PKD); Raid[®] was sprayed on the trees to dislodge the animals from the trees. Broad white cotton linen sheets were spread on the ground around the plants before insecticide spraying. The organisms that fell on the spread linen following PKD application with jarring of the trees with sticks were collected and placed in glass jars containing FAA (10% ethanol, 5% formalin and glacial acetic acid). They were subsequently identified in the laboratory by aid of a hand lens and stereo microscope and classified into broad taxonomic hierarchies down to their order and family, as much as possible. Results showed that several invertebrate belonging to various taxons were associated with *M. oleifera* plant growing in Awka environ. The groups included (Class: Arachnida, orders: Araneae and Acarina) spiders and mites respectively, (Mollusca: Gastropoda) land and tree snails mainly *Achatina* and *Helix* spp., (Class Insecta: Hymenoptera) black and orange-yellow ants; (Lepidoptera) hairy black/pink caterpillars; (Coleoptera) adult weevils; (Homoptera: Aphididae); lady beetles, green and brownish-black aphids, (Homoptera: Aleyrodidae) whiteflies. Others included (Dictyoptera: Mantidae) mantids; (Dictyoptera) cockroaches and (Odonata) dragonflies. The potentials of these large groups of invertebrates both as beneficial or potential pest of the moringa crop are pointed out. The need for further investigations and identification was however suggested.

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INTRODUCTION

Moringa oleifera (Lam) synonym *M. pterygosperma* (Gathn): Moringaceae, is a fast growing drought resistant and slender softwood tree. It is found widely distributed in both tropical and subtropics areas. It is commonly known by several names in different countries such as horse radish tree, drumstick tree, wonder plant, ben oil tree or the miracle tree (Palada and Chang, 2003; Radovich, 2009). In Nigeria it is known as Zogale (in Hausa), Gawara (in Fulfude), Okwe oyibo (in Ibo) and Ewe Igbale (in Yoruba) (Gombe, 2009). *Moringa* is one of the world's most useful plants. It is a highly nutritive crop, the tender pods, leaves and flowers of which are used as popular vegetables in cuisines for their distinctly inviting flavor

(Rajangam *et al.*, 2001). The leaves contain more B-carotene than carrot, more protein than peas, more vitamin C than orange, more calcium than milk, more potassium than bananas and more iron than spinach (Palada and Chang, 2003; Radovich and Paull, 2008). Furthermore, the crop is an interesting plant with many different uses in agriculture (livestock forage), medicine for cancer (Fahey, 2005), treatment of ulcers, *Staphylococcus aureus* (Medical Pharmacopia, 1999) and industry (dyes and water purification) (Rajangam *et al.*, 2001, Palada and Chang, 2003; Gombe, 2009; Akinbode and Ikotun, 2008). Its multiple uses have attracted the attention of researchers, development workers and farmers. Although principally perennial and highly cross-pollinated in nature, there are seed-grown annual cultivars with definite

superiority over perennial types, and the crop has adapted to varied agro ecosystems and farming systems. Rajangam *et al* (2001) were of the opinion that Moringa is beset with many production constraints and limiting factors including vulnerability to pests and diseases. For example, several authors have reported various insect pests including caterpillars, aphids, fruitflies and mites from other parts of the globe, particularly in India, Hawaii (USA) and China (Sivagami and David, 1968; Anjaneya Murthy and Regupathy, 1992; Rajangam *et al.*, 2001; Fuglie and Sreeja, 1998; Palada and Chang, 2003; Radovich, 2009; TNAU, 2008). *Moringa oleifera* is currently gaining popularity as both vegetable and medicinal crop in Nigeria. People in this area may tend to believe that moringa does not have its own beneficial as well as pestiferous organisms. This might be wrong or right hence there is need to assess the situation appropriately. However, there is a dearth of information on different insect pests and associated fauna of this important crop in Nigeria and Africa in general. Thus the major objective of the present studies was to investigate and generate some basic information on the potential natural pests that are likely to cause serious economic damage and loss as well as the beneficial fauna of the Moringa crop in Awka, Nigeria.

MATERIALS AND METHODS

Moringa plants growing in backyard gardens and those planted along compound fences in living homes and boundary hedges in Awka metropolis, Anambra State, Southeast of Nigeria were sampled. The sampling and collection of both insects and miscellaneous arthropods, together with other invertebrate fauna of the crop were carried out once a week and for 5 weeks beginning from June through July of 2010. The exercise was conducted by applying pyrethroid knockdown (PKD) insecticide spray, followed by jarring of the stems and branches with stick in order to dislodge the animals from the trees. Large sheets of white cotton linen were spread thinly on the ground all around the trees before PKD spraying. All insects, arthropods and invertebrate fauna that fell on the linen sheets were collected, after careful folding of the cloths starting from the edges. The collections were placed inside large glass jars containing preservatives of 10% formalin and 10% alcohol. These were subsequently taken to the laboratory for identification. All other invertebrates found lodging on the tree barks were also collected. Tender branches and twigs, together with leaves, were all pinched and placed inside transparent polyethylene bags for further thorough inspection. The sample collections were later examined with the aid of a hand lens and the specimens separated into taxonomic classes, orders and where possible families and recorded accordingly.

RESULTS

The results are presented in Table 1 below. One hundred and seventy five invertebrate specimens were collected excluding the mites, aphids, white flies and mealy bug which could not be counted immediately. The insects and related arthropods found included caterpillars,

aphids, weevils, spiders and mites. Other invertebrate animals included tree and land snails. These have pale white shells with dark brown notches as ornamentation.

The species recorded (Table 1) included *Achatina sp.* and *Helix sp.*, both of which are land and tree snails, respectively. They were 16 specimens, constituting about 9.0 percent of the collection. The Araneae and Acarina (spiders and mites, respectively) of the class Arachnida included 52 aerial, web-building spiders (29.7% of total) and numerous green mites. The insect groups made up about 61% of the invertebrate collections, including 50 specimens of black and orange-yellow ants, 13 black hairy caterpillars, 13 weevils and 19 lady bird larvae. Among the piercing and sucking insects were numerous green and brown/black aphids, whiteflies and mealy bugs. Others included praying mantis (9) and two small adult cockroaches and one dragonfly.

DISCUSSION

The results presented in this study show that various invertebrates belonging to different classes are closely associated with *Moringa oleifera* plant. The likely roles each category of animals plays in relation to Moringa crop production are not known but may be suggestive in the mean time. Some are potentially destructive and likely to cause economic loss in the crop. The believe around us that moringa has no pest problems is most likely wrong. For instance, aphids, mealy bugs and mites are sap-sucking species and pestiferous on other crops. Their feeding activities are most likely to constitute stress problem in the growing crop, apart from their ability to transmit viral diseases in the plants. Morton (1991), Palada and Chang (2003), Fuglie and Sreeja (1998) and Radovich (2009) reported particularly *Aphis craccivora* in India, Hawaii and the Pacific Islands and this species was found in many large amount in the present studies. Palada and Chang (2003) and Radovich (2009) noted that even though Moringa may be resistant to most pests and diseases, spider and mite populations could increase during dry and cool weathers, thereby causing leaf yellowing. They normally constitute the biggest economic problem according to Radovich (2009) because of the potential for rejecting shipments of Moringa from the producing areas of Hawaii to North America. Numerous white flies (*Bermisia sp.*) were recorded during our present investigation. Palada and Chang (2003) also reported prevalence of white flies among other insect pests of Moringa in India. Various hymenopteran were observed to be associated with Moringa in the present studies. Their presence in large numbers would indicate that they are most likely tending the aphids and mealy bugs on the trees in return for their honey-dew production. The presence of these ants, aphids and mealy bugs should therefore be taken into consideration. They are most likely to constitute production constraint. The caterpillars, which are the larvae of moths and butterflies have been recorded in our studies. They are potential defoliators on crop plants, apart from their ability to scrape off tender barks from growing plants. Reports from Tamil Nadu Agric. Univ, India TNAU (2008) showed that among the major insect pests of Moringa, hairy caterpillars were gregarious feeders on tree trunks, scraping the bark and gnawing

Table 1: Invertebrate fauna associated with *Moringa oleifera* plant in Awka

Phylum	Class	Order	Common name	Number	% Of total	Remarks
Mollusca	Gastropoda	Achatina	Land Snail	6	3.4	Land snail
Mollusca	Gastropoda	Helix	Tree Snail	10	5.7	Tree snail
Arthropoda	Arachnida	Araneae	Spiders	52	29.7	Aerial web builder
Arthropoda	Arachnida	Acarina	Mites	Numerous	-	
Arthropoda	Insecta	Hymenoptera	Ants	50	28.6	Black, Orange yellow
Arthropoda	Insecta	Lepidoptera	Caterpillar	13	7.4	Black, Hairy
Arthropoda	Insecta	Coleoptera	Adult weevil	13	7.4	Curculionids
Arthropoda	Insecta	Coleoptera	Beetle Larvae	19	10.9	Lady bird beetle
Arthropoda	Insecta	Dictyoptera	Mantid	9	5.1	Green mantids
Arthropoda	Insecta	Dictyoptera	Cockroach	2	1.1	Small milky
Arthropoda	Insecta	Homoptera	Aphid	Numerous	-	Green, brown/black
Arthropoda	Insecta	Homoptera	Whitefly	Numerous	-	Whitefly
Arthropoda	Insecta	Homoptera	Mealybug	Few	-	Woolly
Arthropoda	Insecta	Odonata	Dragonfly	1	0.6	Dragonfly
Total				175(Excluding mites, aphids, whitefly & mealy bug).	100	

foliage thereby causing severe defoliation. Furthermore, leaf caterpillars feeding on Moringa leaflets reduce them to papery structures. Morton (1991) similarly reported various caterpillars causing defoliation, while Radovich (2009) noted several insects including weevils and caterpillars causing damage to trees and fruits of Moringa in India. Some curculionid weevils have also been noted in the present reports. They are likely to be stem and fruit borers. Likewise, Morton (1991) and Radovich (2009) reported occasional heavy damage to tree trunks by borers in India and Hawaii. Therefore, the presence and possible roles of the weevils in Moringa production and economy in Nigeria should be put into consideration especially with regards to crop damage through scraping of tree trunks, defoliation and subsequent crop loss.

Certain insects may just be crop visitors, passing by or resting on the plants. Their activity in the crop, on the one hand, would be neutral as they do not eat the plant. Thus the dragon fly and cockroaches recorded in the present report could have been caught accidentally. On the other hand, the mantids, lady bird larvae and the spiders which are naturally predacious, would be immensely beneficial to Moringa production. They would very likely keep the aphid, mealy bug and other insect populations low in the crop. Nevertheless, the activity of the snails observed in the present studies is not clear. However, they may be feeding on the tender foliage, causing defoliation or may simply be resting on the tree trunk for shelter. These should therefore, be investigated in order to throw more light on their proper role in the Moringa crop.

Conclusion

From the foregoing accounts, we have clearly demonstrated that different invertebrates amongst which insects of various groups associate with and live on Moringa crops in the Southeast geographical zone of Nigeria during the rainy season period. These and others are potential pest species and therefore, pose likely threats to crop production in this area. However, some beneficial species including spiders and ladybird beetles exist in large numbers in Moringa ecosystem and would likely contribute immensely in keeping the populations of certain pests low. Detailed identification of the specimens up to species level and further investigations to identify the pestiferous and beneficial species are therefore, suggested.

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