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SURVEY ON THE OUTBREAK OF *ANOPLOCNEMIS CURVIPES* ON THE LEAVES OF BITTER LEAF IN RSU RESEARCH FARM, RIVERS STATE

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ABSTRACT: *A survey on the infestation of a polyphagous insect pest Anoplocnemis curvipes was conducted in bitter leaf garden located at Rivers State University Teaching and Research farm. This piercing and sucking insect severely damaged the young shoots, petiole and stems of bitter leaf thereby causing wilting and death of the plants in Rivers State University vegetable (bitter leaf) garden. Lambda-cyhalothrin insecticide was applied on the infested bitter leaf using Knapsack sprayer at a recommended dosage to manage the insect pest, 116 nymph/adult A. curvipes were counted after the application. As a result of the severity of the pest attack, 100% yield loss was recorded in the garden. Thus, this survey is reporting its damage as a pest alert and also to create awareness of the presence of this notorious polyphagous pest A. curvipes in our garden as a major insect pest in our agro-ecological environment.*

KEYWORDS: *Anoplocnemis curvipes*, insecticide, damage, bitter leaf garden.

INTRODUCTION

Bitter leaf (*Vernonia amygdalina* Del.), a member of the daisy family (Asteraceae) is a small shrub that grows in Tropical Africa such like Togo, Kenya, Tanzania, Ghana, Cameroon, Nigeria (Egedigwe, 2010). In Nigeria, it is grown in most Southern States which include Cross River, Akwa Ibom, Rivers, Bayelsa, Anambra, Imo, Abia and Enugu States and has many local names such as ewuro (Yoruba), etidot (Ibibio), oriwo (Edo), onugbu (Igbo), chusar-doki (Hausa) and ityuna (Tiv) (Egedigwe, 2010; Kokwaro, 2009).

Vernonia amygdalina Del. Is drought tolerant and adapts to a wide range of ecological zones in Africa (Bonsi *et al.*, 1995a), it grows to a height of 2-5m, the bark is rough and the leaves are elliptical and up to 20cm long (Ijeh and Ejike, 2011). The bitter taste of bitter leaf is due to the presence of anti-nutritional metabolites such as alkaloids, saponin, tannin and glycosides which act as defensive chemicals against invading herbivores (Ologunde *et al.*, 1992; Buttler and Bailey, 1973). Thus has often been used in the management of some agricultural pest particularly larva of coleopteran and lepidopteran (Kabeh and Jalingo, 2007). *V. amygdalina* has for these qualities classified as a biopesticidal plant. Medicinally, bitter leaf is used for the treatment of fever,

gastrointestinal infection, diarrhea, hepatitis, cough, as a laxative and fertility inducer, abortifacent, diabetes, parasitic infection, ringworm, typhoid, snake bite, bacterial and fungal infection, convulsion, sexually transmitted diseases, scabies and stomach ache (Yeap *et al.*, 2010; Abosi and Raseroka, 2003).

However, the yield of this biopesticidal plant is surprisingly reduced due to infestation and infection by very few insect pest and pathogenic microorganisms. One of the insect that attack the leaves of this crop is *Anoplocnemis curvipes*. This insect pest (*A. curvipes*) is a disease vector and sap-sucking insect belonging to the Family: Coreidea, they lay 10-40 dark grey eggs and the eggs hatch between 7-11 days while there five nymphal instars last 30-60 days (NRI, 1996) sucking sap from the host plant leading to wilting, die back of the stem and eventual dryness of the entire plant. This distinctive ability has earned them the name leaf-wilter (Schabel, 2006). Appert and Deuce (1988) reported that this insect pest transmit toxic and infectious diseases by piercing and sucking the growing succulent region of the plant thereby preventing normal seed formation and cause premature drying.

A. curvipes is a major pest of many types of agricultural plants ranging from trees, shrubs, vegetables and also legumes. It has the highest number of host plants compare to all coreinae species that have been classified as polyphagous insects due to their feeding on both food crops and wild plants (Yeboue *et al.* 2015). Yeboue *et al.* (2015) surveyed over 72 plants in Côte d'Ivoire and found that 65 plants were infested by *A. curvipes*, these plants include *Anacardium occidentalis, Mangifera indica, Cocos nucifera, Elaeis guineensis, Ipomoea batatas, Cucumus sativus, Cucurbita maxima, Langenaria vulgaris, Hevea brasiliensis, Manihot esculenta, Arachis hypogaea, Glycine max, Phaseolus lunatus, Vigna unguiculata, Persea Africana, Abelmoschus esculentus, Gossypium barbadense, Musa paradisiaca, Psidium guajava, Passiflora edulis, Oryza glabberima, Zea mays, Coffea Arabica, Citrus limosus, C. maxima, C. sinensis, Lycopersicon esculentum, Solanum nodiflorum, S. melongena* and *Theobroma cacao.* Seri-Kouassi (2004) reported that *A. curvipes* significantly reduce plant yield from 10% to 80% and also attack plants' pods and seeds. Similarly, a yield loss of over 100% resulting from severe outbreak of *A. curvipes* has been previously recorded on citrus orchard at the Rivers State University farm (Dimkpa *et al.*, 2019). The damage observed were multiple and dependent on the insect abundance on the plants. Therefore, the intensity of damage caused by these insects is associated to their quantity on the field making its management in the field difficult (Abdoul *et al.*, 2014; Tano, 2007).

This polyphagous insect pest *A. curvipes* has been observed in great numbers infesting the leaves, petioles and stems of the biopesticidal plant bitter leaf in Rivers State University Teaching and Research farm. The survey of its infestation becomes highly imperative to understand its severity, abundance and its management methods. Thus, this paper is reporting the survey of the damage of this insect pest within the study area.

MATERIALS AND METHODS

Study Area

The outbreak of *A. curvipes* was observed on bitter leaf garden (Plate 1d) planted at the Rivers State University Teaching and Research farm. The farm is located at latitude $04^0$8"59"N and longitude $06^0$10"90"E of the equator; the farm lies in the humid tropical zone. The annual rainfall ranges from average of 2000mm to 3500mm and the monthly temperature ranges from 28^0C and 33^0C (RISADEP, 1995).

Plate 1a: Dorsal view of *A. curvipes*

Plate 1b: Ventral view of *A. curvipes*

Plate 1c: Bitter leaf garden

Plate 1d: *A. curvipes* presence on the leaves of bitterleaf

Survey

Some insects were observed in the bitter leaf garden during regular farm checkup by the farm workers and were reported to the farm manager. The farm manager carried out a survey on the entire bitter leaf garden in the university farm, surrounding home gardens and observed the same infestation rates and damage. Five bitter leaf stands from ten different gardens were surveyed in the university and observed drastic multiplication of the insect's population and wilting of the young leaves, petiole and shoots of bitter leaf after 1-2 weeks of infestation (Plate 2a- 2d). In 3-4 weeks intervals, the leaves and stem had severely wilted and this lead to eventual death of the plant (Plate 3a-c). This rapid multiplication of the insect pest, wilting and death of the leaves, petiole and stem of the plants was taken into serious account using pictorial presentation and precised damage scale.

The key used for the assessment of the damage caused by *A. curvipes* on bitter leaf plant were according to the modified damage scale by Maduewesi (1977):

1: Zero leave damage/ No symptoms = No Damage
2: One leaf damage = Moderate Damage
3: Two-Three Leaves = Average Damage
4: Four leaves damage = Severe Damage
5: Five leaves and above = Very Severe Damage

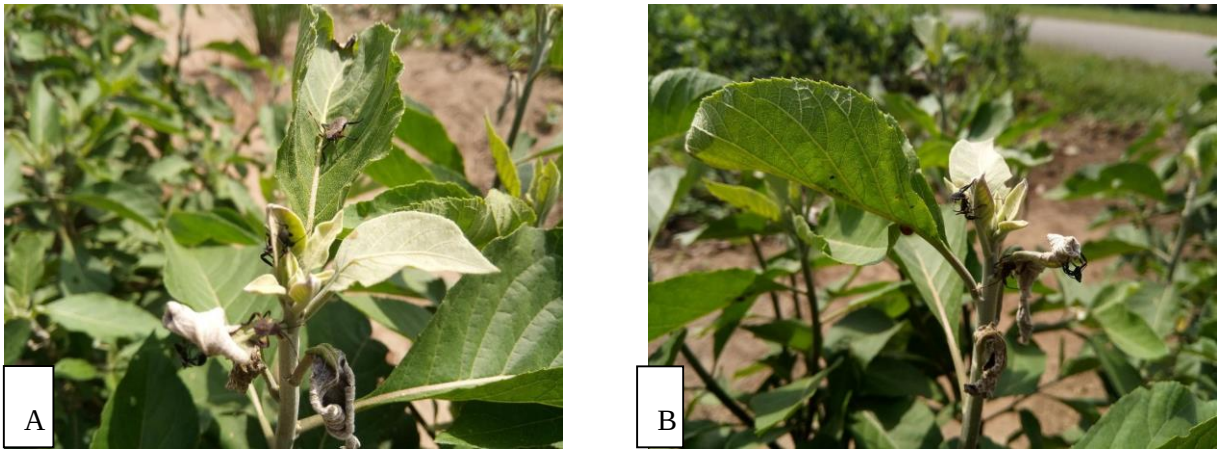

Plate 2a & b: Gradual wilting of the leaves of bitter leaf by *A. curvipes* after a week of infestation


C


D

Plate 2c & d: Wilting of the leaves and stem of *Vernonia amygdalina* Del. after two weeks of *A. curvipes* infestation


A


B

Plate 3a & b: Wilting of the leaves and stem of *Vernonia amygdalina* Del. after three weeks of *A. curvipes* infestation

Plate 3c: Eventual death of the leaves and stem of bitter leaf after four weeks of *A. curvipes* infestation

Management

Although, there are numerous insect pest management methods used in controlling/minimizing the damage caused by *A. curvipes* in other parts of the world, these damage control techniques used includes host plant suitability and resistance, chemical control, cultural method (NRI, 1996). Due to the severe infestation and wilting of the plants, Lambda-cyhalothrin insecticide was considered appropriate and used at a standard dosage of 1ml to a liter of water to checkmate the insect population on the plant.

RESULTS

The experimental survey on damage caused by *A. curvipes* in Table 1 showed severe damage/infestation in two gardens, moderate damage in six and average damge in two gardens respectively. It also showed that the damage caused by this pest increase drastically to very severe after four weeks of infestation. There was no significant difference but mean differences between the insect pest *A. curvipes* counted from five bitter leaf plants in ten gardens in the university after insecticide application (Table 2).

Table 1: Damage Rating of *A. curvipes* on the ten different Bitter leaf gardens

GARDENS	DAMAGE RATING AT 1ST WEEK OF INSECT INFESTATION	DAMAGE RATING AT 4TH WEEK INSECT INFESTATION
1	Severe	Very severe damage
2	Moderate damage	Very severe damage
3	Severe	Very severe damage
4	Moderate damage	Very severe damage
5	Average damage	Very severe damage
6	Moderate damage	Very severe damage
7	Moderate damage	Very severe damage
8	Average damage	Very severe damage
9	Moderate damage	Very severe damage
10	Moderate damage	Very severe damage

Table 2: Mean Population of insect caught per bitter leaf garden assessed

Bitter leaf	Nymph/Adult
1	10^a
2	12^a
3	10^a
4	14^a
5	10^a
6	13^a
7	12^a
8	11^a
9	13^a
10	11^a

DISCUSSION

Result obtained from this study after four weeks survey showed that *Anoplocnemis curvipes* severely damaged the young shoots, petiole and stems of bitter leaf, this findings corroborated with that of Yeboue *et al.* in 2015 who stated that this insect pest lives and bites the capsules, the twigs, shoots and also sucks the moisture content of groundnut and cotton. The insect pest damages the apical stem and this result to drying and wilting of the affected plant part after being bitten. This damage caused by the insect on the twigs and leaves, prevent the plant to flower in the end of the season when their number is very high (Yeboue *et al.*, 2015), this situation was also noted by Soyelu and Akingbohungbe (2007), and Koona *et al.* (2004) on cowpea (*Vigna unguiculata*) in combination with other bugs.

A. curvipes multiplied drastically in the home garden and surrounding garden closed to the research farm due to its high productivity as it lays 10-40 eggs and the hatching of these eggs is between 7-11 days (NRI, 1996), this clarifies the cause of the drastic increase in population of the insect pest. Pitan & Odebiyi (2001) reported that *A. curvipes* are capable of causing significant yield loss at low population density where economic threshold values of 2 bugs per 10 plants. The abrupt presence of this insect pest in Rivers State university teaching and research farm may be as a result of alteration of the ecosystem, urbanization and lack of natural enemies in the surrounding areas (Dhaliwal *et al.,* 2013). It is noteworthy to state that this study reports colossal damage of 100% loss to the farm and this is in line with the findings of Soyelu and Akingbohungbe (2007), Seri-Kouassi (2004), who revealed in their research that *A. curvipes* reduce yield significantly from 26.4 to 51.7% and 10 to 80% in cowpea production in Nigeria and Côte d'Ivoire respectively; also the findings of Dimkpa *et al.* (2019) who stated that *A. curvipes* significantly caused yield loss of 100% in RSU citrus orchard. Therefore, the intensity of damage caused by these insects is associated to their quantity on the field making its management in the field difficult (Tano, 2007).

Metcalf (2002) revealed that the chemical composition of the insecticide (Lambda-cyhalothrin) used is a mixture of isomers and pyrethroid. He further explained that this insecticide disrupts the functioning and nervous system of insects thereby leading to paralysis or death and this was noted in this study as the insecticide (Lambda-cyhalothrin) successfully killed the nymph and adult *A. curvipes*. Further work will be done on the gut and mouth parts of the insects to check for possible vectors of other transmissible pathogens by the insect.

CONCLUSION

This survey evaluated the wilting of leaves and stem of bitter leaf by notorious piercing and sucking insect pest *A. curvipes* at Rivers State University Teaching and Research farm, in which its damage on the garden caused colossal leaf loss of 100% on the farm. It also revealed that the chemical Lambda-cyhalothrin successfully managed the insect pest.

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