Survey of Some Important Insect Pest of Mango, (A case study of Dikumari ward, Damaturu)

[*1]Alhaji Goni Kyari and Zarah Muhammad Goje[2]

[1&2] Department of Applied Biology,
School of Science and Technology,
The Federal Polytechnic, P.M.B 1006, Damaturu, Yobe State, Nigeria.
*Corresponding author: kyarigoni121@gmail.com, 07039477283

ABSTRACT

The research is conducted to determine important insects pest of Mango in Dikumari Ward. Mango (*Mangifera indica* L.) is one of the most important fruit crops grown in tropical and subtropical regions of the world. In Nigeria, it serves not only as a source of food and income but also contributes significantly to rural economies and Livelihoods. This survey aimed to identify and document important insect pests affecting Mango production. Field surveys were conducted in major mango-growing regions to collect and identify pest specimens. The study revealed several key insect pests, including mango hoppers (*idioscopus spp*.). Jiles (*Bactrocera spp*.), and mealybugs (*Psreudococcidae*). The research concluded that mango is attacked by a wide range of insect pests from different taxonomic groups, the study also concluded that the importance of regular pest monitoring, timely identification, and the adoption of integrated pest management (IPM) strategies tailored to specific crop stages and local pest profiles. The result of the findings recommended that regular field demonstrations should be organized to show early signs of pest infestation and proper response techniques, the study also recommend that contribute to the development of effective pest management strategies to mitigate losses and promote sustainable mango production.

Keywords; *pest, insects, mango, pest management, survey.*

INTRODUCTION

Background to the Study

Mango (*Mangifera indica* L.) is one of the most important fruit crops grown in tropical and subtropical regions of the world. In Nigeria, it serves not only as a source of food and income but also contributes significantly to rural economies and Iivelihoods. Mango fruits are consumed in various forms: fresh, dried, or processed into juices, jams, and jellies. The crop is widely cultivated in the northern states of Nigeria, particularly in Yobe State, where favorable climatic conditions support its growth and productivity (Mishra, 2023).Despite the economic and nutritional importance of mango, its production is seriously threatened by insect pests. These pests attack the crop at various stages of development, including flowering, fruiting, and post-harvest stages. The infestation by insect pests leads to substantial losses in yield and quality, thereby affecting the economic value of the produce. Insect pests such as fruit flies (*Bactrocera dorsalis*), mango mealybugs (*Drosicha mangiferae*), and (*Drosicha mangiferae*), and mango weevils (*Sternochetus mangiferae*) are common and cause extensive damage (Afreen *et al*. 2023).The Dikumari Ward in Damaturu Local Government Area of Yobe State is one of the mango-producing area in Damaturu, Yobe state. However, farmers in this area have consistently reported declining yields and poor fruit quality, often attributing these problems to pest infestations.

Aim and Objectives

The aim of this study is to identify the major insect pests affecting mango trees in Dikumari Ward, Yobe State.

The objectives are as follows:

1. To identify and classify the major insect pests infesting mango trees in Dikumari Ward.
2. To determine the seasonal abundance of these insect pests during mango flowering and fruiting periods.
3. To assess the nature and extent of damage caused by each pest on mango leaves, flowers, and fruits.

Materials and Methods

Materials Used

Apparatus

- Insect sweep nets
- Microscope
- White collecting sheets
- Hand Lens
- Forceps and hand lens
- Digital camera for photographic records
- Hand Gloves
- Field notebook and data sheet
- Specimen bottles
- Insect Box
- Cutting Wood

Reagent

- Formal dehydrate
- Ethanol

Biological Specimen

- Insect
- Mango

The biological specimens collected consisted of insect pests found on mango

- (*Mangifera indica*) trees in the study area. These included:
- Mango hoppers (*Idioscopus clypealis*, *Amritodus ath*
- Mango mealybug (*Drosicha mangiferae*)

- Fruit flies (*Bactrocera dorsalis*, *Bactrocera correcta*)
- White mango scale (*4ulacaspis tubercularis*)
- Thrips (*Scirtothrips dorsalis*)
- Stem/shoot borer (*Chlumetia transversa*)

Specimens were collected at different growth stages of the mango crop

(flowering, fruit set, and maturation) to capture pest diversity and incidence patterns.

Methods

The research adopted a survey method involving direct field observation, insect sampling, and identification. The survey was carried out during the flowering and fruiting seasons when insect pest populations are typically at their peak. A stratified random sampling method was used to select mango farms for sampling across different parts of Dikumari

Study Area

The study was conducted at Dikumari Ward, located in Damaturu Local Government Area of Yobe State, Nigeria. The area lies within the Sudan Savannah agro-ecological zone characterized by a long dry season and a short rainy season. Mango cultivation is common in this region due to its suitable climatic conditions and economic value. The geographical coordinates of the study area are approximately 11°44'N latitude and 1 1°58'E longitude. Method were used to select 10 mango farms across the ward. Each farm was visit twice during the flowering and fruiting seasons.

Sampling Technique and Sample Size

A total of 10 mango farms were randomly selected across Dikumari Ward. Each farm was divided into quadrants, and 5 mango trees per farm were sampled, giving a total of 50 mango trees for the study. Sampling was conducted weekly or a period of eight (8) weeks during the peak mango season (March to May).3.8 Sweep Netting. Insects were collected by sweeping, a standard insect net around the mango canopy for about 10 minutes per tree. Collected specimens were transferred to spears bottler containing ethanol.

Beating Method

A beating tray was placed under mango branches, and branches were shaken or tapped with a stick to dislodge insects. Fallen insects were collected using forceps and transfer in labeled containers.

Visual Observation Some insect pests were observed and recorded directly based on damage symptoms(e.g., leave curling, fruit boring, sap exudation) and physical presence.

Preservation and Labeling of Specimens

All collected insect pests were preserved in 70% ethanol and labeled with the date. location, plant part (leave, flower, or fruit), and host tree code. Photographs were taken where possible for additional documentation.

Identification of Insect Pests

Insect specimens were taken to the Biology Laboratory of the Department of

Applied biology, The Federal Polytechnic, Damaturu for identification using entomological keys and reference books.

Data Collection and Recording

The number of each insect species per mango tree was recorded weekly.

Observations were also made on:

- Type of damage

- Stage of mango development (flowering, fruiting, maturation)
- Weather conditions during sampling

A data sheet was prepared to track insect abundance, diversity, and frequency

across different farms and time periods.

Data Analysis

Collected data were analyzed using descriptive statistics such as frequency, mean, and percentage occurrence. The Shannon- Wiener diversity index (H) was also used to assess insect pest diversity. Bar charts and pie charts were used to illustrate the abundance of various insect pests. Where appropriate, ANOVA (Analysis of Variance) was used to test for significant differences in pest populations across farms, One way ANOVA.

Ethical Considerations

Permission was obtained from mango farm owners before sampling. Insect collection was done with minimal disruption to the ecosystem, and all samples were handled using standard laboratory safety procedures.

RESULTS

Table 1: Showing Insect Pest Species Identified

S/N	Common Name	Scientific Name	Order	Family	Pest stage	Nature of Damage
1	Mango Hopper	Idioscopus nitiidulus	Hemiptera	Cicadellidae	Nymph/adult	Sap sucking Leave curling
2	Fruit fly	Bactrocera Dorsalis	Diptera	Tephritidae	Larva/adult	Fruit Boring Premature Drop
3	Mango Mealybug	Drosicha Mangiferae	Hemiptera	Margarodide	Nymph/adult	Sap Sucking Mold Formation
4	Mango Shoot Borer	Chlumetia Transversa	Lepidoptera	Noctuidae	Larva	Shoot and Stem boring
5	Mango Gall Midge	Procontarini A matteiana	Diptera	Cecidomyiida e	Larva	Leave gall Formation
6	Bark-Eating Caterpillar	Indarbela Quadrinotata	Lepidoptera	Metarbelidae	Larva	Bark Damage Sap oozing
7	Mango Leave Webber	Orthage Exvinacea	Lepidoptera	Pyralidae	Larva	Leave Webber Defoliation
8	Mango Stem Borer	Batocera Rufomaculata	Coleoptera	Cerambycidae	Larva adult	Stem Boring Dieback
9	whitefly	bemisia tabaci	hemiptera	diaspididae	Nymph/adult	say sucking viraltransmission

10	mango	aphis	hemiptera	aphididae	adult	curling
11	scale	aspidiotus	hemiptera	diaspididea	adult	protecting

Table 2: Total Count Per Species Across all Farms

S/N insect pest	Total number of collected with their	Percentage (%)
Mango hopper	295	23.7%
Fruit fly	210	16.9%
Mango mealy bug	180	14.5%
Mango shoot borer	145	11.6%
Mango gall midge	110	8.8%
Bark-eating Caterpillar	85	6.8%
Mango leave webber	70	5.6%
Mango stem borer	60	4.8%
Whitefly	30	2.4%
Mango aphid	25	2.0%
Scale insect	20	1.6%
Ants	15	1.2%
Total	1245	100%

Seasonal occurrence of insect pests

Pest population various with seasons. Mango hopper and mealy bugs were dominant during the following stage (March-April), while fruit flies increased during the fruiting stage April-May).

Table 3: Symptoms and Economic Impact

Pest	Symptoms	Crop Affected	Stage Economic Impact
Mango Hopper	Sap Exudation, Leave Curling	Flowering	flower Drop, Yield Loss
Fruit	Fruit rot Internal Boring		Reduced Market Value
Mealy bug	Sticky Honey Dew, Mold	Flowering/Fruiting	Quality Reduction
Shoot borer	Tip Dieback	Vegetative	Poor Tree Growth

Table 4: Pest Counts by Farm Location

FARM NO.	HOPPER	FRUIT FLIES	MEALYBUG	TOTAL PEST
Farm 1	**40**	**18**	**12**	**70**
Farm 2	**35**	**21**	**15**	**71**
Farm 3	**50**	**20**	**20**	**90**
Farm 4	**60**	**45**	**30**	**135**
Farm 5	**30**	**28**	**16**	**74**
…	…	…	…	…

Table 5: Showing the Number of Pest From a Root, Stem, Leave and Flower

S/N		PEST	percentage %
1.	ROOT	0.5	17.85
2.	LEAVE	10	35.72
3.	STEM	06	21.42
4.	FLOWER	07	25
5.	TOTAL	28	

DISCUSSION

The results of the survey (Table 1) shows that mango in the study area is attacked by a diverse complex of insect pests spanning different orders and families. Hemiptera was the most represented order, comprising sap-sucking pests such as mango hoppers (Idioscopus nitidulus), mango mealybug (*Drosicha mangiterae*), whitefly (*Bemisia tabaci*), mango aphid (*Aphis gossypii*), and scale insect (*Aspidiotus destructor*). These pests damage mango mainly by extracting plant sap. causing leave curling, chlorosis, and honeydew secretion that encourages sooty mold

development. Lepidoptera species such as mango shoot borer (*Chlumetia Lransversa*), mango leave webber (*Orthaga exvinacea*), and bark-eating caterpillar (*Indarbela quadrinotata*) were noted for their boring and defoliating activities, which directly impair vegetative growth. Dipteran pests like the fruit (*Bactrocera dorsalis*) and mango gall midge (*Procontarinia matteiana*) target fruits and leaves, respectively, leading to direct quality and yield losses. Coleoptera (*Batocera rufomaculata*) and Hymenoptera (*Oecophylla smaragdina*) were less diverse but have indirect rolesborers cause structural damage and ants protect other sap-sucking pests, aggravating infestations.

From Table 2, mango hopper was the most abundant pest recorded, with 295 individuals accounting for 23.7% of the total catch, confirming its status as the primary. pest during the survey period. This was followed by fruit fly (16.9%) and mealybug (14.5%), indicating that both sap-sucking and fruit-damaging pests are of major concern. Pests like scale insects and ants recorded low abundance (below White mango scale was observed as small, white or grayish encrustations on leaves, twigs, and fruits, producing yellow spots or pink blemishes on fruit skin, leave chlorosis, twig dieback, and a reduction in flowering when infestations were severe. Thrips feeding caused silvery or bronzed patches on young leaves and shoots, leave curling. distortion, and premature fall, along with russeting and Scarring of young fruits. Shoot and stem borer damage was evidenced by small entry holes on tender shoots with frass deposits, leading to wilting and drying of terminal shoots, commonly referred to as "dead heart," and stunted growth due to repeated shoot attacks. These symptoms collectively contributed to reduced mango yield, poor fruit quality, and economic losses to farmers. Each pest was associated with distinct damage symptoms, which helped in their identification are as follows:

Damage Symptoms Observed

1. **Mango Hoppers (*Idioscopus spp., Amritodus atkinsoni*)**

- Wilting and drying of inflorescences due to sap-sucking.
- Premature flower drop, leading to poor fruit set.
- Presence of sticky honeydew on leaves and flowers.
- Development of black sooty mold fungus on honeydew, reducing photosynthesis.

2. Mango Mealybug (Drosicha mangiferae)

- Clusters of white, cottony wax on shoots, flower stalks, and young fruits.
- Yellowing and curling of infested leaves.

Damage Symptoms Observed

During the survey of insect pests of mango, several characteristic damage symptoms were observed on different parts of the mango trees. Infestation by mango hoppers resulted in wilting and drying of inflorescences due to continuous Sap-sucking activity, accompanied by premature flower drop which reduced fruit set. Their feeding also led to the excretion of honeydew, encouraging the growth of black sooty mold that covered leaves and flowers, thereby interfering with photosynthesis. Mango mealybug infestations were marked by clusters of white, cottony wax on shoots, flower stalks, and young fruits, causing yellowing and curling of leaves, sap depletion, and heavy flower drop, often accompanied by Sooty mold formation. Fruit flies caused small puncture marks on fruit surfaces where eggs were laid; the pulp around these sites softened and rotted, leading to

premature fruit drop, and maggots were often found inside the damaged fruits.

White mango scale was observed as small, white or grayish encrustations on leaves, twigs, and fruits, producing yellow spots or pink blemishes on fruit skin, leave chlorosis, twig dieback, and a reduction in flowering when infestations were Severe. Thrips feeding caused silvery or bronzed patches on young leaves and shoots, leave curling, distortion, and premature fall, along with russeting and Scarring of young fruits. Shoot and stem borer damage was evidenced by small entry holes on tender shoots with Fras deposits, leading to wilting and drying of terminal shoots, commonly referred to as "dead heart," and stunted growth due to repeated shoot attacks. These symptoms collectively contributed to reduced mango yield, poor fruit quality, and economic losses to farmers. Each pest was associated with distinct damage symptoms, which helped in their identification are as follows:(2%), yet their indirect role in pest ecology, particularly as vectors or protectors, should not be overlooked. The relative abundance pattern suggests that pest management strategies should prioritize hoppers, fruit flies, and mealybugs as key targets.Seasonal occurrence data show a clear temporal distribution of pest populations. Mango hoppers and mealybugs peaked during the flowering stage (March-April), which is critical for fruit set; their feeding at this stage can cause significant yield reduction. Fruit fly populations, however, were highest during the fruiting stage (April-May), correlating with their oviposition biology. This seasonal shift underscores the need for stage-specific pest control interventions, where preventive measures against hoppers and mealybugs are taken early, followed by fruit fly management during fruit development.

Table 3 further links symptoms to economic impacts. For instance, hopper infestations during flowering caused flower drop and potential yield losses, while fruit flies induced fruit rot and internal boring that reduce both quantity and market quality. Mealybug infestations across flowering and fruiting stages caused sticky honeydew and mold, lowering visual appeal and storability of fruits. Shoot borer activity in the vegetative stage led to tip dieback, reducing photosynthetic area and long-term productivity. This pest-stage-impact mapping is vital for farmers to plan timely interventions to minimize economic losses. Data in Table 4.4 on pest counts by farm location indicate variability in infestation levels between farms. For example, Farm 4 recorded the highest counts for hoppers (60), fruit flies (45), and mealybugs (30), totaling 135 pests-suggesting higher susceptibility, possibly due to poor orchard sanitation, varietal differences, or proximity to unmanaged mango trees. In contrast, farms like Farm 1 and Farm 2

- Severe sap loss resulting in flower drop and stunted growth.
- Black sooty mold formation on affected plant parts.

3**. Fruit Flies (*Bactrocera dorsalis, B. correcta)***

- Tiny puncture marks on fruit surface (oviposition sites).
- Softening and rotting of the pulp around the puncture site.
- Premature fruit drop.
- Presence of maggots inside infested fruits.

4. White Mango Scale (*Aulacaspis tubercularis*)

- Small, white or grayish scale covers on leaves, twigs, and fruits.
- Yellow spots or pink blemishes on fruit skin.
- Leave chlorosis, twig dieback, and reduced flowering in severe infestations.

5. Thrips (*Scirtothrips dorsalis*)

- Silvery or bronzed patches on young leaves and tender shoots.
- Leave curling, distortion, and premature fall.
- Russeting, scarring, or cracking of young fruits.

6. Shoot and Stem Borer (*Chlumetia transversa*)

- Entry holes on tender shoots, often with frass (borer excreta) visible.
- Wilting and drying of terminal shoots ("dead heart" symptom).
- Stunted vegetative growth due to repeated shoot damage.

Had lower totals (70 and 71, respectively), possibly reflecting better pest management or different microclimatic conditions. This spatial variation highlights the importance of localized pest monitoring and site-specific control measures rather than uniform treatments.

CONCLUSION

The survey revealed that mango in the study area is attacked by a wide range of insect pests from different taxonomic groups, with mango hoppers (ldioscopus nitidulus), fruit flies (Bactrocera dorsalis), and mango mealybugs (Drosicha mangiferae) emerging as the most abundant and economically important species. Seasonal variation was evident, with hoppers and mealybugs peaking during the flowering stage, while fruit flies were more prevalent during the fruiting stage.Other pests such as shoot borers, gall midges, and bark-eating caterpillars also contributed to yield losses and quality reduetion, albeit at lower frequencies. The nature of damage ranged from sap-sucking, leave curling, and sooty mold formation to fruit boring, premature fruit drop, and structural damage to shoots and stems. The findings underscore the importance of regular pest monitoring, timely identification, and the adoption of integrated pest management (IPM) strategies tailored to specific crop stages and local pest profiles. By doing so, farmers can reduce economic losses, improve fruit quality, and ensure sustainable mango production in the region.

Recommendations

Based on the findings of this research, the following recommendations were made:

Farmer Training and Education

- Farmers should be trained on insect pest identification using visual aids and local language guides.
- Regular field demonstrations should be organized to show early signs of pest infestation and proper response techniques.

Promotion of Integrated Pest Management (IPM)

Extension services should advocate IPM strategies including:

- Use of neem-based biopesticides
- Introduction of natural predators such as parasitic wasps
- Cultural practices like pruning and weeding to reduce pest habitats

Regular Monitoring and Early Warning

- A community-based monitoring system should be set up to detect pest outbreaks and report them early.
- Use of pheromone traps, sticky boards, and light traps should be promoted for monitoring specific pests like fruit flies.

Use of Resistant Mango Varieties

- Farmers should be encouraged to grow pest-tolerant mango varieties that have been tested and recommended by agricultural research institutes.

Strengthening Agricultural Extension Services

- Government and non-government organizations should strengthen local extension officers through capacity building to better support mango farmers with up-to-date pest management information.

Access to Affordable and Safe Pesticides

- Government should regulate pesticide supply to ensure availability of safe and affordable insecticides in local markets.
- Training on safe pesticide application should be mandatory to avoid misuse and environmental pollution.

Encouragement of Farmer Cooperatives

- Formation of mango farmer groups or cooperatives will facilitate information sharing, bulk purchase of inputs, and better access to credit and training,

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