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Research Article

Diversity And Abundance of Arthropods Infesting Economic Trees in The Federal School of Forestry, Plateau State, North Central Nigeria

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ABSTRACT

Arthropod diversity is crucial for the survival of economic trees, as arthropods serve as pests, pollinators, decomposers and herbivores. This study aimed to investigate the diversity and abundance of arthropods on economically important trees. During the rainy season (June-July 2023), arthropods were collected using hand-picking, beating and sweep-netting methods. A total of 883 arthropods were collected from 28 different economic tree species, with 188 (21.41%) collected using sweep netting, 63 (7.13%) using the beating method and 631 (71.46%) through hand-picking. These arthropods belonged to 4 classes, 13 orders, 51 families and 69 species. The Shannon-Weiner Diversity Index (H´) for the arthropod community was 4.07535, indicating a high level of diversity. This index also revealed significant variations in arthropod diversity, with Hymenoptera, Formicidae and *Monomorium minimum* being the most abundant taxa and *Monomorium minimum* being the most diverse arthropod, identified on 12 out of 28 economic tree species. This study highlights the strong association between economic trees and arthropods, with trees influencing arthropod diversity while providing benefits such as food, shelter and breeding grounds. Therefore, biological conservation is essential for maintaining a healthy ecosystem.

Keywords: Economic trees, Arthropods, Forestry, Abundance, Diversity

Introduction

Economic trees support a rich diversity of associated arthropods, including herbivores, detritivores, predators and parasites[1]. These trees are assemblages of conserved, biodiverse tree species, with the majority being native and some exotic. Among all forest resources, trees are categorized as a primary product due to their high economic value[2]. A crucial association in terrestrial ecosystems exists between economic trees and arthropods, driven by the feedback between these two groups of organisms. Plants provide habitat and food, while arthropods can

alter plant diversity[3,4]. Arthropods contribute to decomposition, mediate plant reproduction and disperse seeds[5]. The relationship between economic trees and arthropods is further characterized by the impact of beneficial arthropod predators (e.g., spiders, beetles) on guild diversity, suppressing and regulating phytophagous pest populations[6]. Approximately one-quarter of all insect species are phytophagous, playing a vital role as consumers of plant resources and serving as food for predators [7]. Members of various orders, including Hymenoptera, Diptera, Coleoptera, Phasmida orthoptera, Hemiptera, Dermaptera, Homoptera and Lepidoptera, are naturally herbivorous, although they can also be considered pests and biocontrol agents of weeds, causing harm to beneficial plants and trees in many ecosystems[1]. Arthropods play a crucial role on economic trees, acting as herbivores, predators, decomposers, pollinators and parasitosis to other pests. Their characteristics, such as high diversity, small body size, high reproductive capacity, acute sensitivity to environmental changes and ease of sampling, make them suitable for environmental monitoring[8]. Furthermore, arthropods are often used as biological indicators of ecosystem integrity[9]. The diversity of arthropods on economic trees encompasses two aspects: species richness (i.e., the number of species in a set of samples) and equitability (i.e., the number of individuals of each species in a sample)[8]. This information can be reliably used to determine the type and number of arthropods on economic trees, including their functions and habitat conditions[10]. Therefore, developing practical procedures for estimating arthropod biodiversity is a high priority, aiming to produce a protocol that samples arthropods from many components of ecosystems[11].

Materials and Methods

Study area

The Federal College of Forestry, Jos, is situated in the heart of Jos North, along Bauchi Road, Plateau State, North-Central Nigeria. Specifically, it is located at latitude 9°56'48" North and longitude 8°53'34" East. Established in 1958 by the then Northern Nigeria Regional Government, the institution was originally known as the Northern Nigeria School of Forestry, Jos. Today, it is a multi-disciplinary tertiary institution that provides training in forestry, agriculture, wood technology, environmental services and forest-related organizations, playing a vital role in the country's forestry sector.

Sample period

Sampling was conducted on a daily basis over a four-week period in 2023. For each tree species, an average of at least 30 minutes was allocated for sampling.

Techniques for the collection of arthropods

Arthropods were collected within the forest reserve of the school, which was divided into six sections to facilitate sampling. A stratified sampling procedure was employed to ensure representative sampling. Sampling efforts targeted arthropods active during the daytime, including leaf-chewing and sap-sucking arthropods, as well as flying insects around the trees. The collection methods used included sweep netting for flying insects, hand-picking for leaf-chewing and sap-sucking arthropods, as well as those crawling on the ground and trees. Additionally, the beating sampling method was used where applicable. Collected arthropods were immobilized in 70% ethanol for subsequent identification and quantification in the laboratory.

Identification and quantification of arthropods

The contents of each sample bottle were carefully poured into a petri dish, where the arthropods were sorted and identified. Identification was facilitated using a combination of resources, including the photographic atlas of Entomology and Castner's[12] guide to insect identification. Additionally android application tools such as Picture Insect and Google Lens were employed to aid in identification. For more precise generic and specific identifications, the systematic and taxonomic laboratory of the Department of Science Laboratory Technology, University of Jos, Nigeria was consulted.

Statistical analysis

The data obtained were analysed using R Console Software version 2.9.2. Chi-square ($\chi 2$) tests were employed to compare the mean abundance of arthropod Orders, Families and Species. Level of significance was set at $P < 0.05$.

Species diversity index

Arthropod species diversity was calculated using the Shannon-Wiener diversity index (H′):

$$H' = -\sum_{i=1}^{S} (Pi)\,(\ln Pi)$$

Where:

H′ is the diversity index

P_i is the proportion of individual species

S is the total number of species on the trees

i is the proportion of species.

Results

A total of 883 arthropods, representing 69 species, 51 families, 13 orders and 4 classes, were collected from 28 distinct types of economic trees at the Federal School of Forestry. Three collection methods were employed: beating, hand picking and sweep netting (Table 1). The majority of arthropods (71.46%, n = 631) were collected through hand picking, followed by sweep netting (21.41%, n = 189) and beating (7.13%, n = 63). The abundance of arthropod orders varied significantly across economic trees ($\chi 2 = 1215.281$, df = 324, $p < 0.001$). Hymenoptera was the most abundant order, comprising 54.50% (n = 481) of the total arthropods collected. In contrast, Lithobiomorpha was the least abundant order, with only 2 individuals (0.20%). A significant difference was also observed in the abundance of arthropod families ($\chi 2 = 2053.366$, df = 1350, $p < 0.001$). Formicidae was the most abundant family, accounting for 50.50% (n = 446) of the total arthropods. Conversely, 11 families (Bibionidae, Bombyliidae, Archoteermeigidae, Cetoniidae, Coccinellidae, Saturnidae, Archotermeigidae, Scarabaedae, Lisiocampidae and Vespidae) were represented by only a single individual each (0.10%) (Table 1). The abundance of arthropod species across different economic trees showed a significant difference ($\chi 2 = 2526.9661$, df = 1836, $p < 0.001$). The species *Monomorium minimum* had the highest abundance, accounting for 42.00% (n = 371) of the total arthropods. In contrast, nine species (*Bibio marci, Utetheisa ornatrix, Euphoria kernii, Diocteria articapilla, Kunugia undans, Catocala nupta, Vespa orientalis, Iris oratoria*) were the least abundant, each represented by only a single individual (0.10%) **(Table 1)**. Regarding the

infestation of economic trees, the mango tree was the most heavily infested, harboring a total of 181 arthropod individuals (20.50%). Conversely, four tree species (African locust beans, *Jatropha*, African peach and common cabbage) showed minimal infestation.

The Shannon-Weiner Diversity Index (H′) for the arthropod community was 4.07535, indicating a high level of diversity. Statistical analysis revealed a significant difference in arthropod diversity across the study area ($\chi 2 = 2226.5641$, df = 1032, $p < 0.001$). The species *Monomorium minimum* exhibited the highest diversity index of 0.20095 when found on Cadaghi trees. Notably, this species was also recorded on 12 out of 28 economic tree species surveyed in this study. In contrast, 13 species (*Bibio marci, Utetheisa ornatrix, Diocteria articapilla, Euphoria kernii, Odontota dersalis, Hemileuca maia, Kunugia undans, Catocala nupta, Efferia austans, Vespa orientalis, Onthophagus taurus* and *Iris oratoria*) showed the lowest diversity index of 0.00768 each, as presented in **Table 2**.

Table 1: Species of Arthropods Infecting Different Economic Trees in the Federal School of Forestry.

Order	Family	Species	Economic Tree	BT	HP	SN	**Total**	**Percent**
Araneae	Trombidiidae	*Trombidium holosericeum*	Mango tree	-	25	-	25	2.83
	Sparassidae	*Heteropoda venatoria*	Guava tree	3	-	-	3	0.34
	Tetragnathadae	*Metelina mengei*	Mango tree	6	-	-	6	0.68
			Eucalyptus spp	4	-	-	4	0.45
	Theridiidae	*Steatoda grossa*	Cadaghi tree	2	-	-	2	0.23
			Christ thorn	3	-	-	3	0.34
			Mango tree	4	-	-	4	0.45
			Teak	16	-	-	16	1.81
	Trombidiidae	*Trombidium holosericeum*	*Eucalyptus* spp	-	20	-	20	2.27
	Thomisidae	*Xysticus cristatus*	Tower tree	2	-	-	2	0.23
Coleoptera	Coccinellidae	*Harmonia axyridis*	Mango tree	-	-	1	1	0.11
	Carculionidae	*Odontopus calceatus*	Cashew	-	2	-	2	0.23
			Gulta perchia tree	-	1	-	1	0.11
	Scarabaiedae	*Onthophagus taurus*	Lemon	-	1	-	1	0.11
	Chrysomelidae	*Donacia semicuprea*	Cadaghi tree	-	-	2	2	0.23
	Cetoniidae	*Euphoria kernii*	Mango tree	-	1	-	1	0.11
	Chrysomelidae	*Odontota dorsalis*	Flamboyant tree	-	-	1	1	0.11
	Dryophthoridae	*Rhyrichophorus crucutanus*	Mango tree	-	-	2	2	0.23
	Tenebrionidae	*Tenebrio molitor*	Cadaghi tree	-	-	5	5	0.57
			Shorea tree	-	3	-	3	0.34
	Chrysomelidae	*Trachymela sloani*	Mango tree	-	-	2	2	0.23
Diptera	Bombyliidae	*Anthrax anthrax*	Black olive	-	-	1	1	0.11
	Calliphoridae	*Chrysomya megacephala*	Mango tree	-	-	5	5	0.57
	Asilidae	*Diocteria atricapilla*	Mango tree	-	-	1	1	0.11
		Efferia austans	Sasswood	-	-	1	1	0.11
	Muscidae	*Musca domestica*	Flamboyant tree	-	-	7	7	0.79
	Syrphidae	*Ornidia obesa*	Cadaghi tree	-	-	1	1	0.11
			Eucalyptus spp	-	-	2	2	0.23
	Vespidae	*Vespa orientalis*	Tower tree	-	-	1	1	0.11
	Bibionidae	*Bibio marci*	Mango tree	-	-	1	1	0.11
	Chironomidae	*Chironomus plumosus*	Black plum tree	-	-	7	7	0.79
	Calliphoridae	*Chrysomya megacephala*	Cadaghi tree	-	-	2	2	0.23
	Syrphidae	*Ornidia obesa*	Mango tree	-	-	3	3	0.34
Hemiptera	Aphrophoridae	*Aphrophora alni*	Guava tree	3	-	-	3	0.34
			Mango tree	-	-	3	3	0.34
	Rhopalidae	*Boisea trivitatta*	Camel's foot tree	-	15	-	15	1.7
			Common cabbage	-	-	10	10	1.13
			Eucalyptus spp	-	15	-	15	1.7
			Mango tree	-	25	-	25	2.83
	Membracidae	*Campylenchia latipes*	Cashew	-	-	2	2	0.23
	Pentatomidae	*Carpocois fuscipinus*	Albizia tree	-	6	-	6	0.68
	Coreridae	*Coreus marginatus*	Sasswood	-	9	-	9	1.02
Hymenoptera	Curculionidae	*Acrotaphus wiltii*	*Jatropha*	-	-	3	3	0.34

	Formicidae	*Componotus americanus*	Cadaghi tree	-	10	-	10	1.13
		Componotus floridanus	Black olive	-	3	-	3	0.34
			Sasswood	-	7	-	7	0.79
		Componotus pennsylvanicus	Cadaghi tree	-	14	-	14	1.59
	Eumenidae	*Delta conoideum*	Lowveld fig	-	-	18	18	2.04
			African locust beans	-	-	2	2	0.23
			Black plum tree	-	-	3	3	0.34
			Mango tree	-	-	6	6	0.68
	Formicidae	*Linopithemi humile*	Mango tree	-	10	-	10	1.13
		Monomorium minimum	African peach	-	21	-	21	2.38
			Albizia tree	-	23	-	23	2.61
			Cadaghi tree	-	70	-	70	7.93
			Cat's claw	-	21	-	21	2.38
			Eucalyptus spp	-	23	-	23	2.61
			Flamboyant tree	-	24	-	24	2.72
			Malaina	-	57	-	57	6.46
			Mango tree	-	12	-	12	1.36
			Pine tree	-	35	-	35	3.96
			Sasswood	-	50	-	50	5.66
			Shorea tree	-	25	-	25	2.83
			Tropical almond	-	10	-	10	1.13
		Oecophylla smaragdina	Mango tree	-	31	-	31	3.51
	Ichneumonidae	*Thyreodon articolor*	Cadaghi tree	-	-	3	3	0.34
Isoptera	Rhinotermitidae	*Reticulitermes flavipes*	Lemon	-	8	-	8	0.91
			Mango tree	-	9	-	9	1.02
	Archotermeigidae	*Zootermopsis angusticollis*	*Eucalyptus* spp	-	1	-	1	0.11
Lepidoptera	Hesperiidae	*Caprona ransonnettii*	Sickle bush	-	-	2	2	0.23
	Nymphalidae	*Aglais oi*	Cadaghi tree	-	-	3	3	0.34
			Cashew	-	-	2	2	0.23
	Pieridae	*Appias paulina*	Mango tree	-	-	3	3	0.34
	Noctuidae	*Catocala nupta*	Cashew	-	-	1	1	0.11
	Nymphalidae	*Danaus chysippus*	Camel's foot tree	-	-	3	3	0.34
	Saturniidae	*Hemileuca maia*	Teak	-	1	-	1	0.11
	Nymphalidae	*Junonia orithya*	Common wild fig	-	-	2	2	0.23
	Lisiocampidae	*kunugia undans*	Tropical almond	-	-	1	1	0.11
	Pieridae	*Leptophobia aripa*	Cadaghi tree	-	-	3	3	0.34
	Pyralidae	*Plodia interpuctella*	Cashew	-	-	2	2	0.23
	Noctuidae	*Thyas honesta*	Cadaghi tree	-	-	5	5	0.57
		Trichopulsia ni	*Eucalyptus* spp	-	1	-	1	0.11
			Mango tree	-	2	-	2	0.23
	Artiidae	*Utetheisa ornatrix*	Mango tree	-	1	-	1	0.11
Lithobiomorpha	Lithobiidae	*Lithobius forficatus*	*Eucalyptus* spp	-	2	-	2	0.23
Mantodea	Coptepterygidae	*Brunneria boralis*	Cadaghi tree	3	-	-	3	0.34
			Eucalyptus spp	2	-	-	2	0.23
			Mango tree	2	-	-	2	0.23
	Eremiaphilidae	*Iris oratoria*	Lemon	1	-	-	1	0.11
	Tettigonidae	*Phenoroptera nana*	Christ thorn	2	-	-	2	0.23
	Eremiaphilidae	*Stagmomantis limbata*	Lemon	4	-	-	4	0.45
Neuroptera	Mymeleontidae	*Vella fallax*	Black olive	-	-	10	10	1.13
			Tower tree	-	-	3	3	0.34
Odonata	Coenagrionidae	*Amphigrion abbreviatum*	Mango tree	-	-	2	2	0.23
	Libellulidae	*Cratilia lineata*	Cadaghi tree	-	-	11	11	1.25
			Mango tree	-	-	13	13	1.47
			Common wild fig	-	-	4	4	0.45

		Libellula lydia	Malaina	-	-	1	1	0.11
	Coenagrionidae	*Pseudagrion pilidorsum*	Malaina	-	-	5	5	0.57
			Sickle bush	-	-	5	5	0.57
	Libellulidae	*Sympetrum infuscatum*	Lowveld fig	-	-	8	8	0.91
			Mango tree	-	-	5	5	0.57
Orthoptera	Gryliidae	*Acheta domsticus*	Flamboyant tree	-	7	-	7	0.79
	Acrididae	*Dissosterra carolina*	Mango tree	2	-	-	2	0.23
		Gomphocerippus rufus	*Eucalyptus* spp	-	5	-	5	0.57
			Gulta perchia tree	4	-	-	4	0.45
		Locusta migratoria	Cat's claw	-	8	-	8	0.91
			Mango tree	-	4	-	4	0.45
	Tetrigidae	*Tettigidae leteralis*	Cashew	-	7	-	7	0.79
Polydesmia	Trigomulidae	*Trigomulus corollinus*	Cadaghi tree	-	3	-	3	0.34
			Eucalyptus spp	-	3	-	3	0.34
			Total	63	631	189	883	
			Percentage	7.13	71.46	21.41		100

BT=Beating, HP=Hand picking, SN=Sweep net

Table 2: Shannon-Wiener Diversity Index for Species of Arthropods on Economic Trees.

Economic Tree	Arthropod Species	Abundance	Pi X ln (Pi)
Cadaghi tree	*Brunneria boralis*	3	0.01931
	Thyas honesta	5	0.0293
	Steatoda grossa	2	0.01379
	Trigomulus corollinus	3	0.01931
	Componotus americanus	10	0.05074
	Leptophobia aripa	3	0.01931
	Componotus pennsylvanicus	14	0.06571
	Thyreodon articolor	3	0.01931
	Donacia semicuprea	2	0.01379
	Tenebrio molitor	5	0.0293
	Ornidia obesa	1	0.00768
	Monomorium minimum	70	0.20095
	Chrysomya megacephala	2	0.01379
	Aglais oi	3	0.01931
	Cratilia lineata	11	0.05463
Mango tree	*Brunneria boralis*	2	0.01379
	Delta conoideum	6	0.03392
	Steatoda grossa	4	0.02445
	Dissosterra carolina	2	0.01379
	Bibio marci	1	0.00768
	Utetheisa ornatrix (larva)	1	0.00768
	Ornidia obesa	3	0.01931
	Amphigrion abbreviatum	2	0.01379
	Monomorium minimum	12	0.05842
	Metelina mengei	6	0.03392
	Reticulitermes flavipes	9	0.04674
	Rhyrichophorus crucutanus	2	0.01379
	Locusta migratoria	4	0.02445
	Trichopulsia ni (larva)	2	0.01379
	Trachymela sloani	2	0.01379
	Cratilia lineata	13	0.06211
	Chrysomya megacephala	5	0.0293
	Aphrophora alni	3	0.01931
	Sympetrum infuscatum	5	0.0293
	Appias paulina	3	0.01931
	Euphoria kernii	1	0.00768
	Linopithemi humile	10	0.05074
	Oecophylla smaragdina	31	0.11759
	Boisea trivittata	25	0.10092
	Harmonia axyridis	1	0.00768
	Trombidium holosericeum	25	0.10092
	Diocteria atricapilla	1	0.00768
Camel's foot tree	*Boisea trivitatta*	15	0.06923
	Danaus chysippus	3	0.01931
Flamboyant tree	*Musca domestica*	7	0.03835
	Acheta domsticus	7	0.03835
	Odontota dorsalis	1	0.00768
	Monomorium minimum	24	0.09799
Black plum tree	*Delta conoideum*	3	0.01931
	Chironomus plumosus	7	0.03835
Common wild fig	*Cratilla lineata*	4	0.02445
	Junonia orithya	2	0.01379
Christ thorn	*Phenoroptera nana*	2	0.01379
	Steatoda grossa	3	0.01931
Teak	*Steatoda grossa*	16	0.07267
	Hemileuca maia	1	0.00768
Malaina	*Monomorium minimum*	57	0.17689
	Libellula lydia	1	0.00768
	Pseudagrion pilidorsum	5	0.0293
Black olive	*Anthrax anthrax*	1	0.00768
	Vella fallax	10	0.05074
	Componotus floridanus	3	0.01931
Eucalyptus	*Boisea trivittata*	15	0.06923
	Trombidum holosericeum	20	0.08579
	Lithobius forficatus	2	0.01379
	Metellina mengei	4	0.02445
	Gomphocerippus rufus	5	0.0293
	Trigomulus corollinus	3	0.01931

	Zootermopsis angusticollis	1	0.00768
	Monomorium minimum	23	0.09502
	Trichopulsia ni	1	0.00768
	Brunneria boralis	2	0.01379
	Ornidia obesa	2	0.01379
Tropical almond	*Monomorium minimum*	10	0.05074
	kunugia undans	1	0.00768
African peach	*Monomorium minimum*	21	0.08892
Common cabbage	*Boisea trivittata*	10	0.05074
Lowveld fig	*Sympetrum infuscatum*	8	0.04262
	Delta conideum	18	0.07936
Pine tree	*Monomorium minimum*	35	0.12795
Cashew	*Tettigidae leteralis*	7	0.03835
	Aglais oi	2	0.01379
	Plodia interpuctella	2	0.01379
	Catocala nupta	1	0.00768
	Odontopus calceatus	2	0.01379
	Campylenchia latipes	2	0.01379
Guava tree	*Heteropoda venatoria*	3	0.01931
	Aphrophora alni	3	0.01931
Cat's claw	*Locusta migratoria*	8	0.04262
	Monomorium minimum	21	0.08892
Saswood	*Coreus marginatus*	9	0.04674
	Componotus floridanus	7	0.03835
	Efferia austans	1	0.00768
	Monomorium minimum	50	0.16259
Sickle bush	*Caprona ransonnettii*	2	0.01379
	Pseudogrion pilidorsum	5	0.0293
Tower tree	*Xysticus cristatus*	2	0.01379
	Vespa orientalis	1	0.00768
	Vella fallax	3	0.01931
Albizia tree	*Monomorium minimum*	23	0.09502
	Carpocois fuscipinus	6	0.03392
Jatropha	*Acrotaphus wiltii*	3	0.01931
Gulta perchia tree	*Gomphocerippus rufus*	4	0.02445
	Odontopus calceatus	1	0.00768
African locust beans	*Delta conoideum*	2	0.01379
Shorea tree	*Monomorium minimum*	25	0.10092
	Tenebrio molitor	3	0.01931
Lemon	*Reticulitermes flavipes*	8	0.04262
	Onthophagus taurus	1	0.00768
	Stagmomantis limbata	4	0.02445
	Iris oratoria	1	0.00768
	Total	883	4.07535

Discussion

The present study revealed a diverse range of arthropods on economic trees at the Federal School of Forestry, with 883 individuals representing 69 species, 51 families, 13 orders and 4 classes. This finding is consistent with previous studies that have highlighted the importance of trees in supporting arthropod diversity[13]. The dominance of Hymenoptera (54.50%) and Formicidae (50.50%) in this study is consistent with other studies that have reported the abundance of these groups in tropical ecosystems[14]. The high abundance of *Monomorium minimum* (42.00%) is also consistent with previous studies that have reported the dominance of this species in certain ecosystems[15]. The significant difference in arthropod abundance across different economic trees suggests that tree species play a crucial role in shaping arthropod communities. This finding is supported by previous studies that have highlighted the importance of tree species in influencing arthropod diversity[16]. The mango tree was the most heavily infested tree species, harboring 20.50% of the total arthropod individuals. This finding is consistent with previous studies that have reported the susceptibility of mango trees to arthropod pests[17].

The Shannon-Weiner Diversity Index (H′) of 4.07535 indicates a high level of arthropod diversity in the study area. This finding is consistent with previous studies that have reported high arthropod diversity in tropical ecosystems[13,16]. The significant difference in arthropod diversity across the study area suggests that environmental factors, such as tree species and habitat structure, play a crucial role in shaping arthropod communities[1]. The high diversity index of *Monomorium minimum* on Cadaghi trees (0.20095) is consistent with previous studies that have reported the dominance of this species in certain ecosystems[15]. The widespread distribution of *Monomorium minimum* across 12 out of 28 economic tree species surveyed in this study suggests that this species is highly adaptable and able to thrive in a variety of environments. In contrast, the low diversity index of 13 species (0.00768 each) suggests that these species may be more specialized or have narrower habitat requirements[18]. Further research is needed to understand the ecological factors that contribute to the low diversity index of these species.

Conclusion and Recommendation

This study highlights the importance of economic trees in supporting arthropod diversity and the role of tree species in shaping arthropod communities. The findings of this study have implications for the management of economic trees and the conservation of arthropod diversity.

Based on the findings of this study, it is recommended that economic trees be conserved and managed sustainably to maintain their ecological integrity and support biodiversity. Additionally, further research should be conducted to explore the specific relationships between arthropod species and economic trees and to identify strategies for promoting arthropod diversity and ecosystem services in agroforestry systems.

References

1. Jactel H, Moriera Y. Bastein Tree Diversity and Forest Resistance to Insect Pests: Patterns, Mechanisms and Prospects. Annual Review of Entomology. Annual Review 2021;66(1):277-296.
2. Onefeli AO and Adesoye PO. Early Growth Assessment of Selected Exotic and Indigenous Tree Species in Nigeria. South-East Eur 2014;5(1):45-51.
3. Bachi R, Gallery RE, Gripenberg S, et al. Pathogens and insect herbivores drive rainforest plant diversity and composition. Nature 2014;506:85-88.
4. Kempel A, Razanajalovo M, Stein C, et al. Herbivore preference drives plant community composition. Ecology 2015;96:2923-2934.
5. Obrien MJ, Brezz M, Schuldt A, Zhang J, Ma K, Schmid B. Tree diversity drives diversity of arthropod herbivores, but successional stage mediates detritivores. Ecol Evol 2017:8758-8760.

6. Paoli GD. Divergent leaf traits among congenic tropical trees with contrasting habitual associations on Bornoe. J Tropical Ecology 2006;22:297.

7. Turnor-Skoff J, Cavender N. The Benefits of Trees for Liveable and Sustainable Communities. Plants People Plant 2019;1(4):323-335.

8. Aughes JD, Darly GC and Ehrlich PR. Conservation of Insect Diversity: A Habitat Approach. Conservation Bio 2000;14(6):1788-1797.

9. Vanbael SA, Brawn JD, Robinson SK. Birds defend trees from herbivours in a neotropical forest canopy. Proceeding of National Academy of Sci 2002;100:8304.

10. Weisser WW and Sieman E. Insects and ecosystem function 1st Edn. Springer-Verlag, Berlin Heielberg, New York 2004.

11. Kitching RL, Boulter SL, Vickerman G, Laidlaw M, Hurley KL and Grimbacher PS. The Comparative Assessment of Arthropod and Tree Biodiversity in Old-World Rainforest. The Rainforest CRC/Earth Watch Protocol Manual. Second Edition. Cooperative Research Center for Tropical Rainforest Ecology and management. Rainforest CRC, Cainis 2005:88.

12. Castner JL. Photographic Atlas of Entomology and Guide to Insect Identification. Feline Press Gainesville USA Inc 2000:74-223.

13. Southwood TRE, Wint GRW, Kennedy CEJ. The resource-based habitat concept for ecological research, biogeography and conservation. J Animal Ecology 2004;73(3):448-458.

14. Bolton B. Ants of Africa and Madagascar: A Guide to the Genera. Harvard University Press 2014:45-67.

15. Drees BM, Barr CL, Vinson SB. Distribution and abundance of ants in Texas cotton fields. J Economic Entomology 1993;86(4):887-895.

16. Novotny V, Drozd P, Miller SE. Guilds of arthropod predators associated with tropical tree species. Ecology 2006;87:841-848.

17. Pena JE, Mohyuddin AI, Wysoki M. A survey of arthropod pests and their natural enemies on mango in Pakistan. J Applied Entomology 2002;126(4):187-194

18. Holt RD. Community modules. In: Hochberg ME, Clobert J. Researching the Population Ecology of Insect Outbreaks 1997:147-164.