

ENTOMOLOGICAL DYNAMIC APPROACH TO SUSTAINABLE AGRICULTURE, HEALTH CARE AND ECONOMIC DIVERSIFICATION

By

Oyerinde Akeem Abolade PhD mesn, mnspp

Department of Crop Protection, University of Abuja, Nigeria



Dr. Oyerinde Akeem

Entomology is the scientific study of insects which include the study of terrestrial animals in phylum arthropod a group or other phyla, such as arachnids, myriapods, earthworms, land snails, and slugs. It is otherwise known as the

scientific study in which there is a focus on insect-related inquiries that overlaps with a cross-section of topics as diverse as molecular genetics, behavior, biomechanics, biochemistry, systematics, physiology, developmental biology, ecology, morphology, and palaeontology.

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FROM THE PRESIDENT



Professor S.S. Ogbogu

The Entomological Society of Nigeria (ESN) holds her annual conference at Usmanu Danfodiyo University, Sokoto, from October 8th to 11th, this year. As usual, it is an opportunity, for members to meet again

after last year's conference. Over the years, the society has persistently directed its thoughts towards national development. Therefore, it is not out of place for the theme of this year's conference to focus on sustainable agriculture, health care and economic diversification. These are useful indices in assessing the well-being of any country. It is a common knowledge that Nigeria faces considerable socio-economic challenges. And the citizenry are no strangers to the impact of these challenges. But this notwithstanding, the generality of Nigerians are optimistic and with the resolve to wade through as shown determination of ESN members to attend this year's conference.

It is hoped that this year's conference would among other things, provide ideas that are useful in designing strategies for tackling the challenges Nigeria is currently facing in the areas of agriculture, human health, as well as the quest for economic diversification.

Thank you.

Professor Sylvester S. Ogbogu, FESN
President, Entomological Society of Nigeria

In line with the abundance of over 1.3 million described species, insects account for more than two-thirds of all known organisms in the world. The study of these creatures is imminent to achieve the goal of sustainable agriculture. The sustainable agriculture is hypothesized to meet society's food and textile needs in the present without compromising the ability of future generations to meet their own needs. Practitioners of sustainable agriculture seek to integrate three main objectives namely:

- * a healthy environment,
- * economic profitability, and
- * social and economic equity.

The entomologist is needed in systems such as growers, food processors, distributors, retailers, consumers, and waste managers. All of which encounter insect in their activities as pests, pollinators, food, decomposers and artifacts. This portrayed insects and other arthropods as a major player in ensuring a sustainable agricultural system.

Benefits of insects to sustainable agricultural system

Foods

In roughly 80% of the countries in the world, individuals consume insect products or the insect itself. The practice of eating insects otherwise known as entomophagy, is common almost

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REPOSITIONING THE ENTOMOLOGICAL SOCIETY OF NIGERIA FOR RELEVANCE IN NATIONAL DEVELOPMENT AND THE DYNAMIC WORLD OF INSECT SCIENCE

By
Professor Sylvester S. Ogbogu, FESN

Being a Presidential Address Delivered at the Opening Ceremony of the 48th Annual Conference of the Entomological Society of Nigeria Held at Nnamdi Azikiwe University, Awka, Anambra State.

Protocol

Distinguished Ladies and Gentlemen
fellow Members of the Entomological Society of Nigeria,

Introduction

Permit me to start by thanking everyone here for finding time to grace this occasion with your presence.

I welcome you all on behalf of the Executive Council to the 48th Annual Conference of Entomological Society of Nigeria (ESN). I must thank fellow Entomologists in particular for unanimously electing me as the President of ESN in the Annual General Meeting of the 4th Annual Conference held at Ilorin last year.

Entomology is an age-long profession involving the study of insects and their allies. In it, insect scientists (Entomologists) and non-professionals (Amateur Entomologists) are concerned with the study of nature as well as the biology of animals – insects in this case. However, insects have posed a number of problems as pests and vectors of diseases which tend to outstrip the benefits of these animals in the earth's ecosystems. And in turn, Entomologists have been working hard through research studies to discover and establish ways of containing the problems.

Diversifying Entomological Research in Nigeria

Over the years, entomological research efforts have been dominated by topics related to the effects of insect activities on crop growth, performance and yield as well as post-harvest losses and strategies aimed at mitigating them. Yet the problems of insect pests and insect borne pathogens persist. It then appears that either the research findings are not being

utilized or that they are simply ignored. On the other hand however, insect pests are known to develop resistance to insecticides which is one of the major factors that aid their resurgence. We are almost certain that research in the direction of finding solutions to resistance are ongoing and will end with breakthroughs someday.

Recent advances in entomological research have also brought beneficial insects to focus. It is on record that presentations and publications on insects such as honey bees and those of forensic importance, entomophagy, as well as useful insects for biomonitoring purposes in aquatic and terrestrial ecosystems now feature in our annual conferences and dot the publication landscape in the *Nigerian Journal of Entomology*, *NJE* respectively. This development is an indication of the widening spectrum of interests of Nigerian entomologists.

One of the implications of the increasing diversity of interest is that entomologists now have increased role to play in national development. However, it is worthy of note that ESN as an organization which brings these entomologists together is left out in the scheme of things pertaining to some national development issues.





ESN is hardly consulted or brought into the picture in most policy initiatives of the government and non-governmental organizations. For instance, one of the major challenges facing Nigeria today as regards crop insect pest management is the Fall Army Worm (FAW) resurgence. Unfortunately, ESN is officially unaware of the current efforts by government to contain the menace of the pest. ESN has come a long way, with large membership including entomologists who are highly distinguished and respected as internationally recognized scholars. The time is up for us to correct this anomaly. I hereby call on all state governments, the Federal government and relevant organizations to harness the talents and experience of seasoned entomologists which abound in ESN, in tackling insect pest problems and related issues in Nigeria. ESN is ever ready to partner with governments and individuals and any relevant organisation in any initiative aimed at solving insect pest and related problems.

The Nigerian Journal of Entomology

Ladies and gentlemen, let it be known that like others, the Nigerian Journal of Entomology (NJE) occupies an enviable position in the list of reputable international journals published in Nigeria. It is highly recommended, subscribed in and outside the country as a highly rated publication outlet for cutting-edge research in Entomology. With the latest volume (Vol. 33) about to be published, NJE will continue to serve its purpose for ESN members and others worldwide. You will agree with me that one of the best ways to ensure quality of service is periodical critical appraisal of previous policies and actions. Observations show that we need to step up the quality of manuscripts we submit and at the same time deepen the thoroughness in manuscript review process. I therefore call on all of us to rise to the occasion in making our journal more relevant and competitive in the dynamic world of insect science research and publication. To set the ball rolling, I am working towards ensuring that henceforth workshops/presentations topics pertaining to modern research methods scientific manuscripts writing for publication, become

regular features in our annual conference programmes.

Another issue that has been in the front burner regarding NJE is the delay authors experience in processing of manuscripts. I can authoritatively tell you that this is being properly handled with vigour. At an Executive Council meeting last July, a task force was constituted to fast-track the production volume 33 of NJE. Those Who submitted manuscripts recently can attest to the increased speed in the handling of their submissions. The tenure of the current editorial board will end this October, at this conference to be precise, and a new one has to be constituted immediately to continue where the task force stops. With the constitution of a three-man committee to work towards the improvement of the society's website at the last AGM, we should be looking forward to online publication of NJE in the near future.

Membership of Entomological Society of Nigeria

As years roll by, more insect scientists are getting enlisted in the membership of ESN, making the desk of the national Secretary very busy at all times. But the question that quickly comes to mind is whether members are committed to society activities at both branch and national levels. It is evident that not all branches are actually active as- expected, irrespective of the fact that some members of inactive branches try to attend annual conferences individually. Even at that, participation in conference programmes with particular reference to technical sessions is not encouraging. As a result, presentations are at times made without sufficient and robust discussions that would improve the quality of manuscripts and/or further research studies emanating from lessons learnt at the sessions.

As part of the initiatives to sustain the increase in membership and participation in ESN activities, there should be redoubled efforts to bring in and mentor undergraduate and postgraduate students. They should be encouraged at branch levels to attend and present papers at our annual conferences, and participate in other activities as well, if ESN must continue to be relevant. Already, there are competitions to encourage students' participation at conferences. These include quiz competition with maiden edition at the 4th Annual





this regard is to ensure that the competitions feature in every conference programme. These are in addition to the Apeji/Badejo/Okelana foundation which provides small grants to subsidize the cost of participation of deserving students at annual conference. I call on members to come up with more initiatives to increase the visibility of students in ESN activities.

Entomological Society of Nigeria Secretariat

Till date, ESN secretariat office is being housed by the Department of Crop Protection at Ahmadu Bello University Zaria. While activities are sustained in that office, efforts are being made to actualize the society's dream of having a permanent secretariat building on the portion of land given to it by the management of University of Abuja. To this end, the executive council has set the machinery in motion to raise funds to secure the land with a concrete block perimeter fence, and start the construction of the proposed secretariat building as soon as possible. I therefore call on all members of ESN, friends and supporters to join hands in working towards achieving this goal. Already, even without the proposed building, the Executive Council meetings usually held in June/July yearly in now held in Abuja. This is in compliance with decision of council as ratified by AGM during the 4th Annual Conference of ESN at Ilorin in October 2016. The decision is that for easy logistics, the Executive Council Meetings are reduced from three to two per year, and the one outside the conference venue will always hold at Abuja. With this the need to erect the building will be appreciated at all times and not overlooked. Therefore, I urge all branch chairmen to

bear this in mind and prepare to host such council meeting at Abuja as appropriate whenever they get the hosting right. Let me assure you that council will keep exploring ways to ensure that ESN activities are seamless, cost effective and still efficient.

Promotions, Awards and Honours

Ladies and gentlemen, it is our policy to recognize and appreciate deserving members of ESN. In the past one year, a lot of milestones were achieved in the life and career of some of our members. Professors S. C. Ewuim, A. N. Oparaeke and Dr. C. I. Aisagbonhi were honoured with the ESN's prestigious fellowship FESN, for their outstanding contributions to the progress of the society. Professor T. T. Epi was appointed Rector of Isaac Jasper Boro College of Education, Sagbama, Bayelsa State. Dr. S. O. Okunade was promoted to the rank of Director to head the Department of Durable Crop Research at Nigeria Stored Product Research Institute, Ilorin. Drs. F. Agbidiye, A. U. Yusuf and G. Arnuga were promoted to the rank of Professor while Drs. M. M. Degri and M. B. Sosan were also promoted to the rank of Associate Professor. Professor E. A. Omudu was appointed Deputy Vice-Chancellor (Academic) of Benue State University, Makurdi. Professor F. A. Ajayi, the National Secretary was appointed Director, Centre of Sustainable Agriculture and Rural Development at Nasarawa State University, Keffi. Professor M. O Ashamo was appointed Director of Academic Planning at Federal University of Technology, Akure. Professor B. I. Ahmed was appointed a member of governing the council of Federal University, Oye, Ekiti. Professor (Mrs.) B. N. Iloba delivered the 179th Inaugural Lecture titled *Insect, our Witness (if) Life and Death*, at University of Benin. Farewell activities were organized by Port Harcourt/Yenagoa branch to honour Professor O. C. Umeazor who retired from service at University of Port Harcourt. Drs. C Oaava and S. Dattijo completed their doctoral degree programmes and bagged PhDs.

Bereavement





It is also important though very sad to report a number of losses to the members of the society. The society lost Professor S. M. Misari early this year. A few of our members lost their loved ones too. Professors M. o. Ashamo and S. S. Ogbogu lost their fathers while Dr. K. D. Iloke lost his mother. Professor W. A. Muse lost his wife. May the souls of the departed rest in peace.

Conclusion

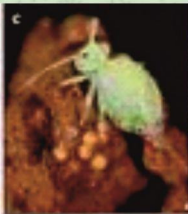
Ladies and gentlemen, we are all aware of the difficult situation in the country occasioned by economic recession. In most cases, it is difficult to raise funds for society activities, which the LOC of this 48th Annual Conference can easily attest to. But this notwithstanding, it was tenacious in seeing that today is a reality as we can see. While thanking Awka branch for working hard to prepare for this conference,

I appeal to all members of the society to emulate it by arming themselves with the required determination to succeed in society's businesses. I therefore look forward to more commitment to financial and other support from all through levies and donations towards completing the society's projects. It is also expected that we support our

journal, *NJE* which is a major image maker of ESN. With all these, the goal of taking the society to an enviable height will be achieved.

Let me appreciate the unflinching support the trustees of the society have been providing by bringing their wealth of experience to bear when taking decisions on critical issues affecting the society. Their advice is of immense value in charting the way forward in the continuous quest to realize the goals of the society at all times. I appreciate the contributions of the Editorial Board and the task force on volume 33 of *NJE* for the wonderful work they have done during their tenures. I acknowledge the team spirit of the current Executive Committee and the entire Executive Council in running the affairs of ESN. My gratitude also goes to all members of ESN who through their suggestions have contributed immeasurably in all decisions of ESN at all times in the past one year.

Finally, I thank the Awka branch of ESN for preparing for this occasion in particular and the entire programme of activities of the 48th Annual Conference (Awka 2017) in general.



everywhere. Many insects are high in protein and efficiently mass reared, so the process of entomophagy is starting to become more popular in the world as a means of combatting the high costs and environmental implications of some of the practices involved in traditional meat production. In some cultures, insects, especially deep-fried cicadas, are considered to be delicacies, whereas in other places they form part of the normal diet. Insects have a high protein content for their mass, and some authors suggest their potential as a major source of protein in human nutrition. In most first-world countries, however, eating of insects was previously a taboo. Since it is impossible to entirely eliminate pest insects from the human food chain, insects are inadvertently present in many foods, especially grains. Food safety laws in many countries do not prohibit insect parts in food, but rather limit their quantity.

Due to the abundance of insects and a worldwide concern of food shortages, the Food and Agriculture Organisation of the United Nations considers that the world may have to, in the future, regard the prospects of eating insects as a food staple. Insects are noted for their nutrients, having a high content of protein, minerals and fats and are eaten by one-third of the global population. The beneficial insects are responsible for many products humans use and consume every day. Honey, beeswax, and bee pollen (a nutritional supplement) are common products from honeybees. Honey alone is responsible for millions of dollars

in revenue for beekeepers around the world every year. Bees also make propolis, a sticky substance found in some chewing gums, car waxes, and traditional medicine. Some other insects are eaten as novelties, but some other societies use beetle grubs and other insects commonly as food in the different regions of the world.

Insect as Feed

Insects as feed ingredient has been reviewed in general, for fish, and specifically for West Africa. Appropriate palatability of insect meal for poultry, pigs, fish species and ruminants were demonstrated and insects could replace 25–100 % of soymeal or fishmeal depending on the animal species. For large scale production the most promising species are the Black soldier fly *Hermetia illucens* (Diptera: Stratiomyidae) and the Domestic house fly *Musca domestica* (Diptera: Muscidae). However, a number of other species are also considered such as mealworms, termites, grasshoppers, crickets, and caterpillars (such as the silkworm). The use of the Black soldier fly as feedstuff has been investigated for chickens, pigs, channel catfish, African catfish, blue tilapia, turbot, and rainbow trout. Fly larvae can be used to recycle agricultural by-products like coffee pulp, palm kernel meal, manure, and organic waste materials like fish offal, market waste, municipal organic waste, dewatered faecal sludge, organic

leachates and Distiller's Dried Grains with Solubles (DDGS). Persistent pollutants such as heavy metals often occur in organic waste streams. In an experiment, cadmium accumulated in the Black soldier fly prepupae limiting their potential to be used in animal feed, while in the case of lead and zinc, this proved to be less critical. The maggots of the Domesticated housefly can also be used as a protein source to feed poultry, fish and crustaceans. The larvae can be reared on waste substrates such as pig or poultry manure, mixtures of cattle blood with wheat bran or rumen contents. The advantages of using the Domesticated housefly is that they have a very short life cycle (6–10 days). A life cycle analysis conducted for the Domesticated housefly indicated that by producing insect meal compared to fishmeal and soymeal, land use decreased, but energy use increased. In this specific study it was indicated that energy use may be decreased and that insect meal has potential to reduce the environmental impact of the livestock sector.

Use of insects in aquaculture has recently received quite some interest. This has to do with the diminishing availability of fishmeal as a major dietary protein source in compounded



feed for many important farmed species. Since 2013, the European Union Regulation (EU) 56/2013 allows the use of insects in feed for fish in aquaculture.

Insect Farming

As mentioned above, in tropical countries most insect species are collected from nature. However, if insects are to become an important resource, they need to be farmed as mini-livestock. Besides, in nature edible insect resources are already threatened due to overexploitation and habitat degradation or pesticide use. For example, the collection and marketing of the Mopane caterpillar *Imbrasia belina* (Lepidoptera: Saturniidae)

compromises the sustainable use of forestry resources. For this reason, a restriction of the harvesting period has been proposed.

Pollination

Although pest insects attract the most attention, many insects are beneficial to the environment and to humans. Pollination is a mutualistic relationship between plants and insects. As insects gather nectar from different plants of the same species, they also spread pollen from plants on which they have previously fed. This greatly increases plants' ability to cross-pollinate, which maintains and possibly even

improves their evolutionary fitness.

Bees are not the only pollinators in the world; many plants depend on other insects for successful breeding. Many types of flies, including fruit flies, hover flies, bee flies, and even blow flies, are significant pollinators. Butterflies and moths are also known to pollinate some plants, as do beetles, thrips, wasps, and ants. In fact, some of these insects, such as the fig wasp, are specialized for pollinating certain varieties of plants.



Various products produced by bees





ENTOMOLOGICAL DYNAMIC APPROACH TO SUSTAINABLE AGRICULTURE, HEALTH CARE AND ECONOMIC DIVERSIFICATION

This ultimately affects humans since ensuring healthy crops is critical to agriculture. As well as pollination ants help with seed distribution of plants. This helps to spread the plants, which increases plant diversity.

The value of pollination of plants by insects is nearly incalculable. Honeybees are clearly among the most important of pollinators, and their efforts result in an estimated 80 percent of insect pollination in the world. Pollination by Honeybees in the U.S. favourably affects some \$20 billion dollars in crops per year, including fruits, vegetables, and many nuts.

Silk and other products

Silk is another insect product, of

the silk moth, *Bombyx mori*. This insect has been selectively bred and used in textile production for so long that it has become dependent on humans for its survival. The production of silk has had an enormous impact on the history of Chinese trade and economy. Some lesser known insect products include dyes and shellac. Both dyes and shellac are produced by tiny scale insects. These products are common ingredients found in foods and makeup. Many red tinted makeup products, like lipstick and blush, as well as foods like jellies, juices, and bottled marinades, contain carmine dye from cochineal scales. Shellac is often used as a coating on pills, candies, and even citrus fruits. Odds are that you probably eat or

wear something containing an insect-produced product everyday.

Natural and biological control

Insectivorous insects, or insects that feed on other insects, are beneficial to humans if they eat insects that could cause damage to agriculture and human structures. For example, aphids feed on crops and cause problems for farmers, but ladybugs feed on aphids, and can be used as a means to get significantly reduce pest aphid populations. While birds are perhaps more visible predators of insects, insects themselves account for the vast majority of insect consumption. Ants also help control animal populations by consuming small vertebrates. Without predators to keep them in check, insects can undergo almost unstoppable population explosion.

Also, some specialized species of tiny braconid wasps use their egg laying structures, or ovipositors, to pierce a tomato or tobacco hornworm and lay eggs. When the eggs hatch, the developing larvae feed within the hornworm, eating it from the inside out. This feeding does not immediately kill the hornworm. When finished feeding, the wasp larvae will emerge from the inside of the hornworm's body and pupate. Adult wasps will soon emerge, and the hornworm will die. Thus, these wasps help to biologically control a pest species.

The balance of nature depends



Silk and other products





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Parasitized hornworm covered in wasp pupae

on the activities of parasites and predators, the majority of which are species of insects. Researchers use this concept in biological control, and have been dramatically successful in many programs.

Aesthetics

Insects are well known in various areas of arts and as pleasant to the senses. Butterflies are certainly one of the most appealing creatures in nature, with colours and patterns that are enjoyed by humans most of the year. Insects have been used by many societies throughout history, and have not been limited to colourful and/or large butterflies and beetles. Native Americans in the United States used parts of insects in a manner similar to feathers in their crafts. Brightly coloured wing covers of certain beetles are used for earrings by Jivaro Indians of

Ecuador. The Egyptians chose a scarab beetle as a symbol of their sun God. Bees were depicted on ancient Greek coins. Most branches of art have exhibited insects in some form, including a great selection of worldwide postage stamps.

Genetics. Fruit flies have long been used in genetic studies, and are practical for such studies due to their short lifespan (about 10 days).

Dermestids for cleaning skeletons. Carpet beetles are small insects that will feed on almost anything organic, including cereals, carpets, and dried insects in collections. Museum technicians take advantage of this fact, and utilize established colonies of dermestids to clean skeletons of mammals.

As pests

Many insects are considered pests by humans. Insects commonly regarded as pests include those that are parasitic

(e.g. lice, bed bugs), transmit diseases (mosquitoes, flies), damage structures (termites), or destroy agricultural produce (locusts, weevils beetle). Many entomologists are involved in various forms of pest control, as in research for companies to produce insecticides, but increasingly rely on methods of biological pest control, or biocontrol.

Despite the large amount of effort focused at controlling insects, human attempts to kill pests with insecticides can backfire. If used carelessly, the poison can kill all kinds of organisms in the area, including insects' natural predators, such as birds, mice and other insectivores.

In research

Insects play important roles in biological research. For example, because of its small size, short generation time and high fecundity, the common fruit fly *Drosophila melanogaster* is a model organism for studies in the genetics of higher eukaryotes. *D. melanogaster* has been an essential part of studies into principles like genetic linkage, interaction between genes, chromosomal genetics, development, behaviour and evolution. Because genetic systems are well conserved among eukaryotes, understanding basic cellular processes like DNA replication or transcription in fruit flies can help to understand those



PICTURES OF BENEFICIAL INSECTS AND ARTHROPODS



South American Jungle Ants Relieve Arthritis



Grasshoppers Have Potential



Blister Beetles Fight Cancer



Termites Get Try-outs in India



Maggots Perform Major Cleansing



PICTURES OF BENEFICIAL INSECTS AND ARTHROPODS



Bee Benefits Abound (Apitherapy)



Blowflies Star in Real-Life Dramas



Silkworm Supplements may Boost Circulation



Try "The Centipede Cleanse"



Black Mountain Ants vie with Viagra

