**http://dx.doi.org/10.4314/bajopas.v12i1.17**

***Bayero Journal of Pure and Applied Sciences, 12(1): 127 - 131***
*Received:* June, 2019
*Accepted:* June, 2019
**ISSN 2006 – 6996**

# A SURVEY OF ZODARIIDAE (ARANEAE) FROM NIGERIA

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***ABSTRACT***
***Spiders have been understudied in most part of Africa especially in Nigeria. Presently, 7 species of Zodariids distributed in three out of the six geopolitical zones are recorded from Nigeria. Most of these species were found in Awka, Southeast zone with exceptions to Malinella bicolor found in Jos, Northcentral, Systenoplacis quinqueguttatus and Systenoplacis septemguttatus both from Ibadan, Southwest zone. The distribution cut across the forests, grasslands, farmlands and even bank of lakes. The Zodariids were mostly sampled by pitfall trapping and handpicking while other sampling methods like sweep net and jarring showed zero collection. Though the genus Malinella recorded the highest number of species (3) followed by Systenoplacia with 2 species, however, it was Dusmadiores with just one species that was the most widely distributed genus both across the zones and different habitats within a location. The distribution of Zodariids across almost all the zones and locations where spiders are recorded in Nigeria suggests the great potential both in population and diversity of spiders in Nigeria. More studies on diversity, population and distribution are needed to have a true picture of the spider fauna of Nigeria across all zones.***
***keywords; Zodariidae, pitfall trap, habitat, forest, farmland, fallow, spiders***

## INTRODUCTION

Spiders live in different habitats, in arid regions and wetlands, in lowlands and mountains, in cold tundra and in hot equatorial regions. Spiders are all predators. Their prey ranges from microscopic mites to vertebrates the size of small birds. There are about forty seven thousand, one hundred and twenty three described species of spiders distributed all over the world according to the World Spider Catalog Version 18.5. Some parts of the world, particularly Europe and North America, are better studied while spiders of other regions are poorly known and Nigeria is among the least studied countries of the world.

Members of the family Zodariidae include the 'Ant eating spiders. The Zodariids are small to medium-sized eight-eyed spiders found world-wide which also include 'Ant eating group'. There are relatively few species of Zodariidae in North America. The ant eating zodariids are mostly ant mimics, often spotted by their attractive, bright yellow or orange spots against a dark brown abdomen. Most species of the Zodariidae are daytime hunters which live among the ants, mimicking their behaviour and sometimes even their chemical traits. According to Pekár(2004), unlike ant-eating salticids which are also able to capture other insects, zodariid spiders turned out to be more specialized in their diet. The result of Pekár (2004) found two species of zodarion feeding on ant species of different sizes and belonging to different groups within the same family. With the exception of termites, they ignored other insects offered. Although the spiders attacked termites, they seldom killed them. Similar results on the prey preference of *Zodarion rubidum* were obtained by Couvreur (1989). These results suggest that the two study species of zodarion are strict ant specialists.

The present study aimed to determine the species diversity and distribution of Zodariids in Awka, southeastern Nigeria and collate information on diversity and distribution of already any records of zodariids from all the other geopolitical zones in Nigeria. It will provide some basic ecological information and insight on this natural enemy of pest. It will also help to provide new information on the poorly known Nigeria spiders in general.

## MATERIALS AND METHODS

The sampling was conducted for twelve months within NnamdiAzikiwe University Awka in the South eastern Nigeria. The investigation was carried out in four different study sites to obtain a total picture of Nnamdi Azikiwe University. The sites include farmland, fallow plot, marshy and forest habitats. Awka is located in the lowland rain forest zone of southern Nigeria according to (Keay,1963; Charter, 1970). Awka is the capital of Anambra state, with a land mass of about 12,007 hectares in dimension.

This study was conducted between April 2012 and March 2013 inside NnamdiAzikiwe University Awka, Anambra State. Three sampling method; pitfall trap, sweep net and jarring methods were used to sample Zodariids from the four chosen locations.

Eight pitfall traps made of white plastic containers were used on the four selected study sites and sampling carried out once a month. The traps were collected after twenty-four hours and the spiders sorted. Sweep net was used to sample the farmland, fallow plot, and marshy habitat once every month. The sweep net was not used in the forest because of the inadequacy of the technique in such habitats, being dense, tangled and lacking space. Few trees of relatively small (shakable) trunk were selected randomly in the farmland, fallow plot and the marshy plot for each sampling occasion using jarring method. Each tree was jarred few times (by the trunk) on each sampling occasion before collection. This technique was not applied to forest because of the clustered nature of the forest, which could make the separation of any single tree difficult for sampling. All the spiders collected were then sorted and preserved in well labeled vials containing 70% alcohol and sent for identification. The identification took place at the Entomology Department of National Museum of Natural History, Smithsonian Institution Washington D.C. U.S.A. Leica MZ16 and Olympus stereo microscopes were used. African spiders, an identification manual by Dippenaar-Schoeman and Jocque (1997) in addition to the world spider catalog provided the identification keys. Existing data on Nigeria zodariids were from spider experts that worked on Nigeria spider. These people include Tony Russell-Smith, Judy Jocque and AnsieDippenaaur-Schoeman.

## RESULTS AND DISCUSSION

A total of four genera and seven species are presently recorded from Nigeria according to this study. Out of these seven species, the Table1 below summarizes the result of the sampling work at Awka, while Table2 shows taxonomical distribution of Zodariids across Nigeria.

Table1. Summary of species richness and distribution of zodariidae in Awka

| Genus | Species | Farmland | Fallow | Forest | Marshy | Total | % |
|---|---|---|---|---|---|---|---|
| Diores | *Diores*sp. | 6 | 5 | 5 | 0 | **16** | 20.8 |
| Dusmadiores | *D.katelijnae* | 0 | 13 | 0 | 0 | **13** | 16.9 |
| Mallinella | *M.leonardi* | 0 | 0 | 27 | 0 | **27** | 35.1 |
| | *M.kibonotensis* | 0 | 0 | 10 | 0 | **10** | 13 |
| | *Mallinellaindet* | 0 | 0 | 11 | 0 | **11** | 14.2 |
| **Total** | | **6** | **18** | **53** | **0** | 77 | |
| % | | 7.8 | 23.4 | 68.8 | 0 | | |

There were records of Zodariids in all the sites except in marshy habitat. This suggests that Zodariids are not among the very few spiders adapted to aquatic environment. All the Zodariids recorded in this study from the three sites were exclusively by pitfall trap method. A total of 77 Zodariids were recorded from three out of the four sites with the exception of the marshy habitat. Sweep net and jarring showed zero efficiency in the collection of Zodariids. The Zodariids were distributed across all the months except in January (Figure 1) below.

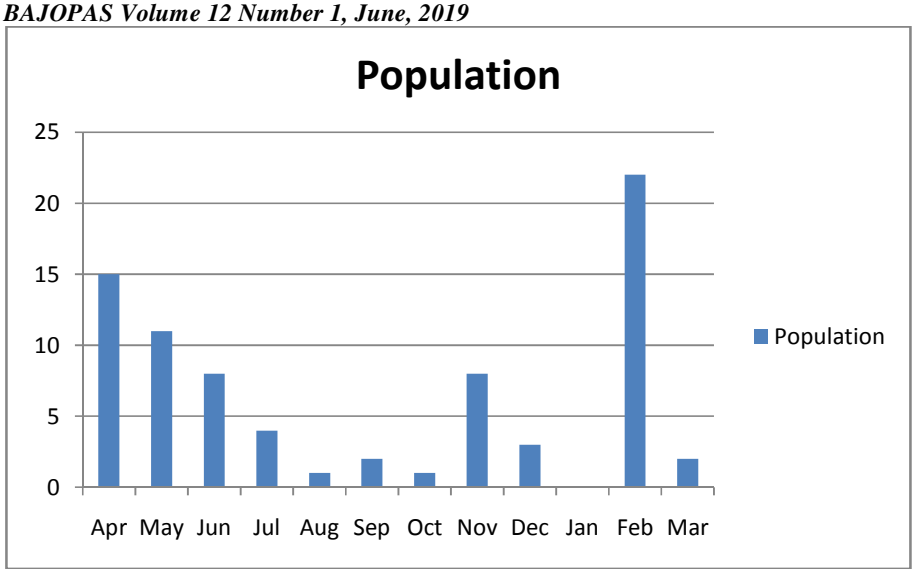


Fig.1. The monthly distribution of the whole Zodariids collected from the four study sites in Awka.

*Diores* sp. was one species that stood out more than other species in terms of distribution, with distribution in all the three habitats where Zodariidae was recorded. It was the only species of Zodaridae found at the farmland. There were a total of four species of Zodariidae recorded from the sampling in Awka. They include *Diores* sp., *Malinellaleonardi, Malinellakibonotensis* and *Dusmadioreskatelijnae*. *Dusmadioreskatelijnae* was an exclusive species of the fallow while all the other species were recorded in the forest habitat.

The forest habitat with 69% was the site with the highest population of Zodariids followed by fallow with 23% and lastly farmland at a mere 8% population, Table1.

The abundance and distribution varied in the different month of the sampling period. This variation appeared to be seasonal, were more abundance and diversity was recorded during dry season to early rainy season. The summary of the distribution is demonstrated in Figures 1 and 2.

In determining the abundance of spider population inhabiting the orchards in citrus valley of Sargodha district, Pakistan, (Bukhari*et al.,* 2012) concluded that spider population varied in different months of a year and were strictly dependent on the environmental factors like temperature, relative humidity and rainfall. Also in the present work though not significant, yet there was negative relationship between Zodariidae population and distribution in the forest site with seasonal change seen in the distribution across the months of the year.

At the farmland, there was paucity of Zodariidae which was represented by only one species (*Diores* sp.) in just two out of the twelve study months. *Diores* sp. was the only species of Zodariidae that was represented in the three sites were Zodariids were recorded. They were the most distributed. The monthly distribution of Zodariidae at the farmland was similar to its distribution at the fallow site, though there was a greater abundance and wider distribution in four months at the fallow site. The catches were both during early rainy season, though there was a record of one *Dusmadioreskatelijnae* in November. The similarity in the distribution pattern between farmland and fallow sites could be as a result of their proximity, were both shared boundary. The preponderance of Zodariidae at the forest habitat was as a result of special adaptation to rain forest by some species of Zodariidae (Dippenaar-Schoeman and Jocque, 1997).

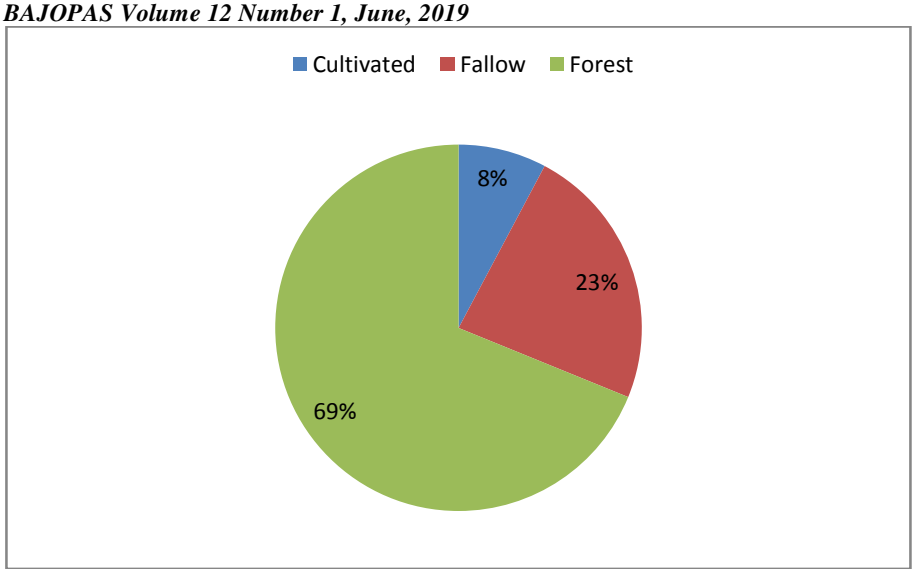


Figure 2. Zodariids distribution across the study sitesinAwka

According to Russell-Smith *et al.* (1987), Zodariids are wandering spiders and almost all are ground-dwelling. This explains why they were all caught exclusively by pitfall trapping method. Most species occur in arid or semi arid regions, although some genera (e.g.Mallinella, Asceua) are adapted to living in rainforests and this could be the reason for their obvious absent in marshy habitat in this present work. They form an important component of the ground-dwelling spider assemblage and are often among the most abundant families in pitfall trap samples in the central parts of Africa. This supports the result that showed Zodariidae to be collected exclusively by pitfall trapping technique.

The distribution of *Diores*sp. in all the three sites Zodariids could be attributed to its wider spread to places with ant distribution due to their preference on preying on ants. This wide distribution and abundance of species like *Malinellaleonardi* suggest that Zodariids are good prospects to consider in biological pest control management programs within Awka and Anambra state in general. The cosmopolitan nature of *Diores sp*. in Awka suggests that it could be a good alternative when considering pest control in more lager scale, involving different habitats. Spiders can control prey populations because they often capture and kill more prey than they consume. Riechert and Lockley (1984) reported that a spider may kill as many as 50 times the number of prey it consumes. Persons (1999) found that wolf spiders (*Schizocosaocreata*) killed more crickets than they could feed upon, even when satiated. This pest control ability (wasteful killing) has been documented in other Lycosids as well, ( Riechert and Lockley, 1984; Persons, 1999).

About 69% of these Zodariids were trapped at the forest habitat, and not only was the forest Zodariids the most abundant it also showed the most species diversity with three species of Zodariids against one species each for the other two sites. Out of the three sampling methods used, pitfall trapping showed to be the only method that can be efficient in the collection of Zodariids especially the taxonomical groups recorded in this study, this is because Zodariidae are ground-dwellers. The other species that were previously recorded in Nigeria were *Systenoplacisquinqueguttatus, Systenoplacisseptemguttatus, Malinellabicolor* and lastly, *Dusmadioreskatelijinae* that was also recorded from the sampling work inAwka. The two species of the Systenoplacis were exclusively distributed to Ibadan in southwest while the *Malinellabicolor* was exclusive to Jos in Northcentral. *Diores*sp., *Mallinelaleonardi* and *Mallinelakibonotensis* were exclusive to Awka in southeast. Only *Dusmadioreskatelijinae* had distribution in more than one zone,Awka and Ibadan, making it the most widely distributed in Nigeria. Table 2 below shows the summary of Zodariidae species distribution in Nigeria presently.

Table 2: Nigeria Zodariids and their distribution across the zones.

| Genus | Species | Southsouth | Southeast | Southwest | Northcentral | Northeast | Northwest |
|---|---|---|---|---|---|---|---|
| Dusmadiores | *D.katelijnae* | * | Awka | Ibadan | * | * | * |
| Diores | | | | | | | |
| Malinella | *Diores*sp. | * | Awka | * | * | * | * |
| Malinella | | | | | | | |
| Malinella | *M.leonardi* | * | Awka | * | * | * | * |
| | *M.kibonotensis* | * | Awka | * | * | * | * |
| | *M.bicolar* | * | * | * | Jos | * | * |
| Systenoplacis | *S.quingueguttatus* | * | * | Ibadan | * | * | * |
| | *S.septemguttatus* | * | * | Ibadan | * | * | * |

## CONCLUSION

The fact that three of these seven species from the sampling work at Awka where new to Nigeria suggest that there could be so many new species or genera of Zodariids yet to be discovered in Nigeria. The absence of Zodariids in the marshy plot suggests that wetland is not likely a preferred habitat for them. Less number of Zodariidswere collected during the peak of rainy season (August – October) still suggesting that spiders generally has less affinity with water. The Zodariids were exclusively collected by pitfall trap method. Although, Spence and Niemela (1994) stated that high numbers of individuals and species are usually caught by pitfall trap method, however the success of pitfall trap in Zodariids sampling will not be unconnected to the fact that they are wandering spiders (ground dwellers). Only *Dusmadioreskatelijinae*was distributed in more than one zone. This shows that not only are Zodariids prey-specific but could also have preference for different climate and vegetations. Again, that may be why there were more exclusive species to the different habitats in Awka than the one single cosmopolitan species (*Diores*sp.) within the same sampling sites.

Finally, though this is the recorded data on Nigeria Zodariids, however, four genera and seven species cannot be the true picture of Nigeria Zodariidae due to very little work done on this subject in few locations, therefore a need for more works on Nigeria spiders.

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