EJSIT
European Journal of Science, Innovation and Technology
ISSN: 2786-4936
www.ejsit-journal.com
Volume 4 | Number 6 | 2024

Identification of Rice Insect Pests (Oryza sativa) Grown in Kindu: Case of the Lwama I Site

Adiyo Sumbu Henriette, Sosthenes Kitaby
University of Kindu UNIKI, Faculty of Agricultural Sciences,
Department of Phytotechnics (Plant Protection), Maniema, Kindu City, DR Congo

ABSTRACT

The experiment was carried out in the DRC, Maniema Province, City of Kindu precisely in the Lwama I university site. The main objective of this study was to identify the insect pests of rice (Oryza sativa) grown in Kindu. Indeed, in a specific way, we have set the following objectives: to determine the types of insects that attack rice grown in Kindu, and to observe the damage caused by insect pests to the organs of rice grown in Kindu. To achieve these objectives and test our hypotheses, we used the experimental method with a randomized complete block design with 4 treatments and 4 replicates.

At the end of this study, the following results were obtained: (1) The order of orthoptera 29.4% and beetle with 24% were important; (2) 17 species of insect pests have been identified and described; (3) 4 species showed the high number of insects inventoried (Zonocerus variegantus with 38 insects, Orseola oryzivora with 34 insects, Diploxis falaxis with 31 insects and forficula auricularia 28 insects); (4) 3 species caused serious nuisance during the vegetative phase (Coccinella septempunctata with 60%, Cnapholocrosis medinalis and Shistocera gregaria attacked at 55%); (5) 3 species were important for the nuisance in the production phase (Forficula auricularia caused damage at 80% attack, Diaperasticus Erytrocephalus at 70% and Leptoglosus membranaceus at 56.1%).

In view of these results, the production of rainfed rice cultivation in Kindu reinforces a problem related to attacks, especially since each species causes losses on the different organs and on each phase of the plant's development. Losses caused by insects that cut the stubble and destroy the panicles are more formidable.

Keywords: identification, rice, insect pests, Kindu

INTRODUCTION

In the Democratic Republic of Congo (D.R.C.), rice cultivation, especially upland rice, is of paramount importance. Production, which is essentially peasant, does not cover the ever-increasing needs of demand (Dobelmann, 1976).

Rice is an important foodstuff in Maniema Province, but it is considered to be a host for several pests that cause significant and dramatic losses in rice yield, from sowing to storage (Nwilene, 2019).

It should be noted, however, that several varieties of rice grown in the province of Maniema are degenerated and have become susceptible to attacks by diseases and pests. Producers still use local varieties of upland rice, although their production is low (IRRI, 2017). This is due to the lack of availability of improved varieties (Jack cited by Emongo, 2014).

All the cultural practices used by farmers represent an abundant source of knowledge for researchers to know about pests and also to adopt measures to protect rice cultivation (Ngama, 2018).

Rice is a staple food for the people of Maniema in general and the city of Kindu in particular. It is grown on small areas and often attacked by leafminers or stem borers which

are responsible for the transmission of several diseases that do not allow good production (Autrique, 1981; Ekukolé, 2003).

In addition to insect attacks, rice production reinforces several other problems for its production, including the lack of improved variety, poor soil, disease attacks, climatic disturbances, and small-scale production. This situation causes production to be low and causes inflation of rice on the market (Kasongo, 1997).

In view of the problem mentioned above, this study asks the following questions:

- What types of insects would attack rice?
- What would be the damage of insects on rice grown in Kindu?

To answer this problem, we put forward the following hypotheses:

- There are many insect pests of rice grown in Kindu, whose defoliators are very dangerous.
- The damage of insects that attack rice would be on all organs.

The general objective of this study was to identify the Rice Insect Pests (Oryza sativa) grown in Kindu. Case of the Lwama I site. Specifically, we have set ourselves the following specific objectives:

- Determine the types of insects that attack rice grown in Kindu,
- Observe the damage caused by insect pests on the organs of rice cultivated in Kindu.

MATERIALS AND METHODS

The study took place in the experimental site of Lwama commune of Mikelenge, DRC, in the province of Maniema, city of Kindu, in a period from July 2021 to April 2022, i.e. eight months.

Figure 1: Location of the Lwama University Site

MATERIAL AND METHODS

Material

As part of this experimental study, we have used the seeds of the upland rice. In addition to seed, we will also use the following technical equipment: GPS, decameter, camera, notebook, pen, machete, hoe, string, etc.

For the identification of insects, we used an identification key. Which is usually dichotomous or taxonomic or a tool that makes it possible to determine the species to which a given insect belongs; this identification is organized in couplet. A verse is usually made up of two mutually exclusive descriptions of a given character; Example: the size of an insect, the shape of the antennae, the consistency of the wings, the legs, etc. (Mignon et al., 2022). With each verse, the user chooses the statement that best corresponds to the insect he or she is trying to identify and walk through the key until he or she arrives at the final couplet, morphology, body structure (Laurentiaux, 2017).

Methods

To achieve our objectives and test our hypotheses, we used the experimental method on the spot. Who used a randomized full block design with 4 treatments and 4 replicates. The treatments consisted of different varieties of rice grown in Kindu.

Data Processing

The data collected on each plot from the samples were entered and grouped using the Excel 2019 spreadsheet, which was also used to produce the graphs. Species collected from the capture samples were listed and counted using the identification key.

RESULTS AND DISCUSSION

After analysis of the data obtained during this investigation, we present the results in the tables and fugues followed by their interpretations and discussions.

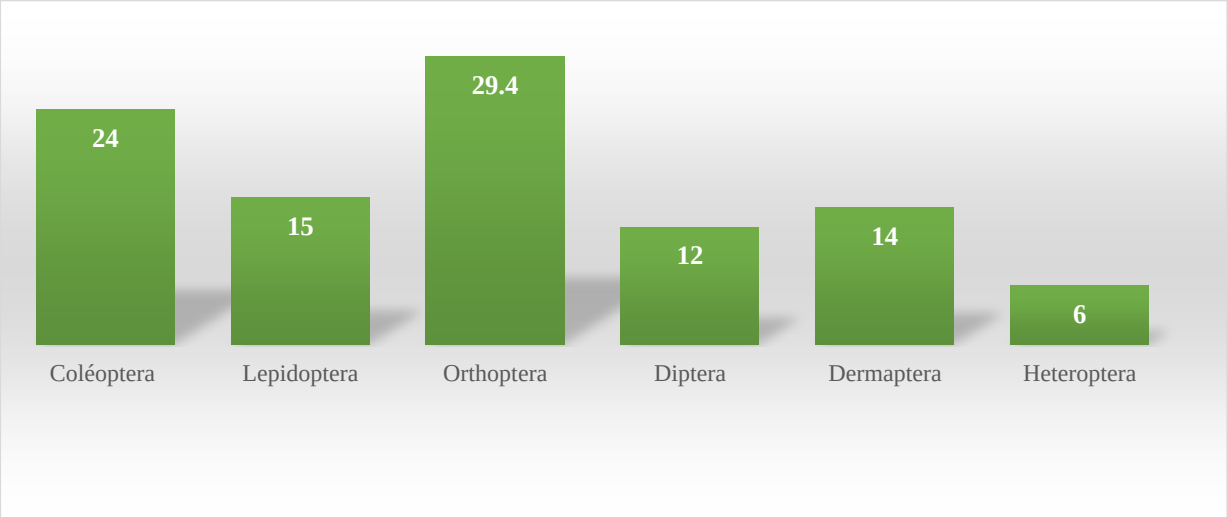

Figure 2: Classification of insect pests in order (%)

In view of the results shown in Figure 2 above, it can be seen that the order of orthoptera 29.4% was large, followed by the order Coleptera with 24%. Indeed, the orders of Lepidoptera with 15% and Dermaptera with 14% were intermediate according to the orders and finally the order of Diptera and Heteroptera presented the low importance of all the orders.

Table 1

N°	Species	Family	Order	Mouthparts	Body under attack	Damage
01	*Coccinella septempunctata*	*Coccinelidae*	*Coléoptera*	Grinders	Stems and leaves	Cut the stems and eat the leaves
02	*Cnapholocrosis medinalis*	*Pyralidae*	*Lepidoptera*	Sucking clamps	Stems and leaves	Cut the stems and eat the leaves
03	*Shistocera gregaria*	*Acrididae*	*Orthoptera*	Grinders	Leaves	Consume leaves and create galleries (mines)
04	*Locusta migratoria*	*Acrididae*	*Orthoptera*	Mandibles	Leaves	Consume the leaves
05	*Chnootriba similis*	*Orthoptera*	*Orthoptera*	Clamps and mandibles	Leaves	Consume leaf tissue and remain translucent
06	*Diopsis thoracica*	Cecidomyidae	*Diptera*	Mandible in the form of a shear	Stems and leaves	Cut the stems and consume the leaves at the border
07	*Zonocerus variegatus*	*Acrididae*	*Orthoptera*	Mandibles	Leaves	Consume the leaves
08	*Orseola oryzivora*	Cecidomyidae	*Diptera*	Appendages in the form of shears	Stamens	Heart of the stem is cut at an angle, only the terminal leaf yellows
09	*Hispa armigera*	*Hispidae*	*Coléoptera*	Sucking prick	Leaves	Stains and holes on sheet
10	*Carabus geminata*	Carabidae	*Colepotera*	Pricker	Leaves	Prick and roll up the leaves (with silk)
11	*Chilo sp*	*Hispidae*	*Coléoptera*	Sucking clamps	Stems and leaves	Consume the leaves and cut the stems
12	*Forficula auricularia*		*Dermaptera*	Tail appendage	Panicles	Cutting of stamens and stigmas empty caryopsis, abortion
13	*Diaperasticus Erytrocephalus*		*Dermaptera*	Prick sucker	Panicles	Attacks grains during anthesis and causes empty grains
14	*Diploxis falax*	*Coreidae*	*Dermaptera*	Sucking clamps	Bites on leaves	Cause necrosis and chlorotic spots
15	L*eptocorisa orastoris*	*Pertatomidae*	*Heteroptera*	Sucking clamps	Leaves and panicle	Consume the leaves and attack the panicles during the rise
16	*Nymphula* depunctalis	*Pyralidae*	*Dermaptera*	Mandibles	Flowers and grains	Falling stamens
17	*Leptoglosus membranaceus*	*Pertatomidae*	*Heteroptera*	Sucking clamps	Leaves and panicle	Cause necrosis and chlorotic spots

Reading Table 1 on the insects identified during this study, it can be seen that several insects are enemies of the upland rice crop, each of which attacks according to its level, taking into account the organs, phase of the development of the crop and according to the mouthparts of the insects as well as on the phase of the development of the species.

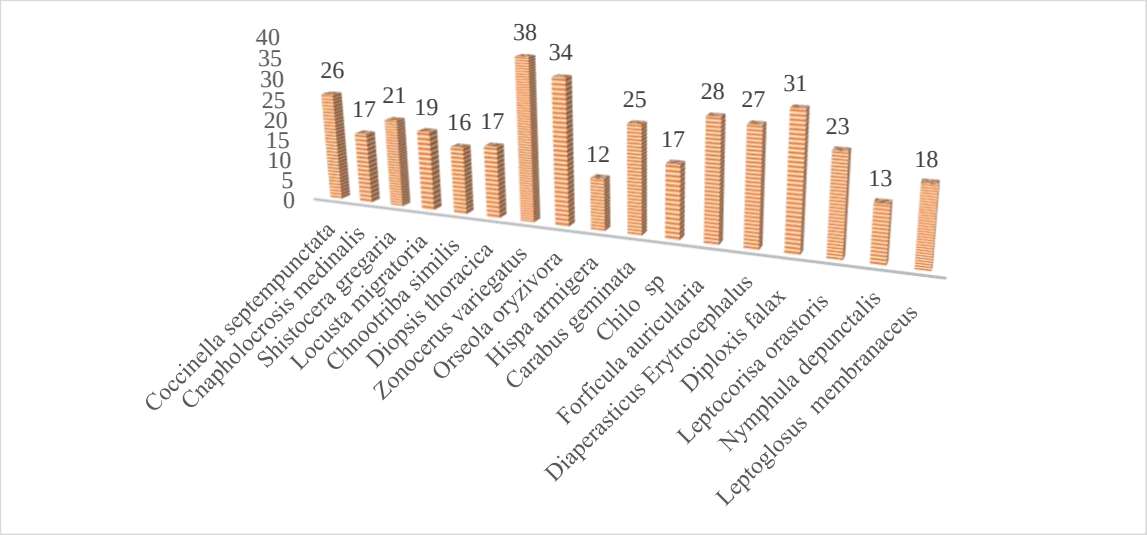

Figure 3: Number of insects

The figure above informs us that on the rice plant observed, we captured the highest number of insects on the following species: Zonocerus variegantus with 38 insects, Orseola oryzivora with 34 insects, Diploxis falaxis with 31 insects, forficula auricularia with 28 insects, Diaperastecus erytrocephalus with 27 insects, Coccinella semptempunctata with 26 insects and Carabus geminata with 25 insects. However, the average number of insects was recorded for the following species: Leptocorisa orastoris with 23 insects, Shistocera gregaria with 21 insects, Locusta migratoria with 19 insects, Leptoglosus membranaceus with 18 insects, Coccinella septempunctata, Diopsis thoracica, Chilo sp and Chnootriba similis with 17 insects each. Finally, the following species showed the low number of insects: Nymphula depunctalis with 13 insects and Hispa armigera with 12 insects.

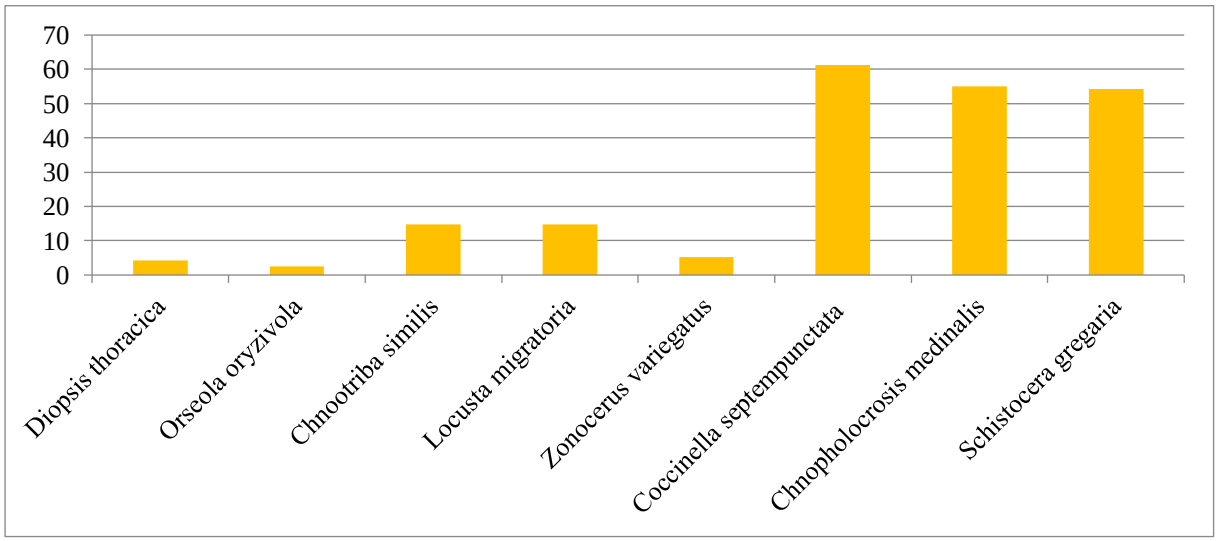

Figure 4: Incidence of damage to species in the vegetative phase

According to the results noted in Figure 4 above, it can be seen that the species Coccinella septempunctata obtained the attack rate of 60%, Cnapholocrosis medinalis and Shistocera gregaria attacked at 55%, Locusta migratoria and Chnootriba similis at 15%, Diopsis thoracica and Zonocerus variegatus at 5% and finally Orseola oryzivora at 2% harmfulness.

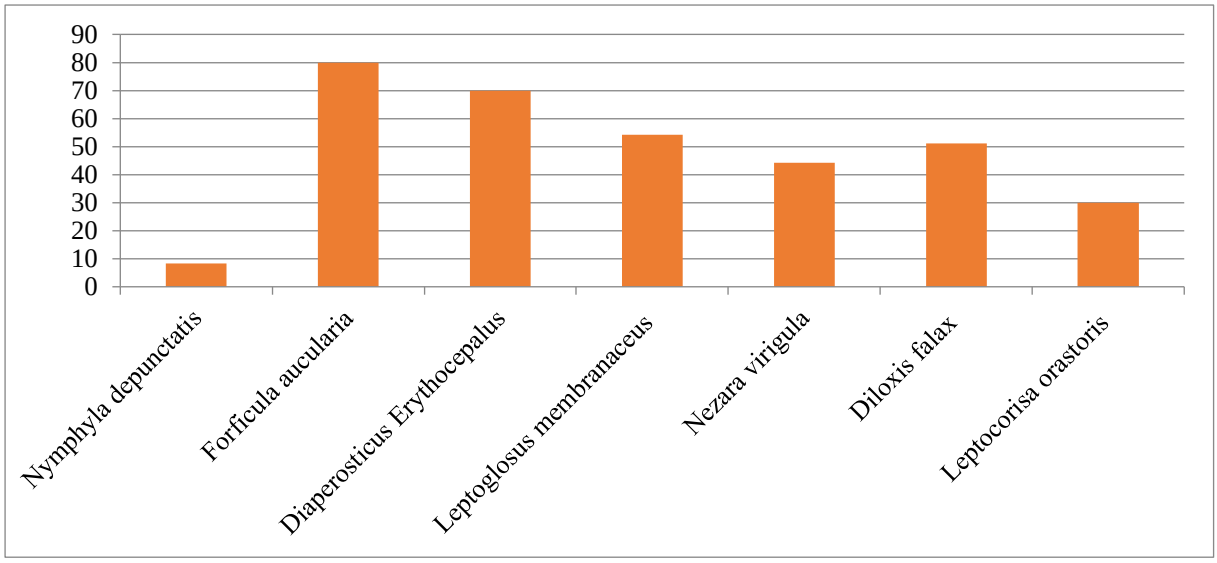

Figure 5: Incidence of Species Damage in the Production Phase

At the production stage, it was observed that the species Forficula auricularia caused damage at 80% attack, Diaperasticus Erytrocephalus at 70%, Leptoglosus membranaceus at 56, 1% Diploxis falax at 50%, Nezara Viridula at 43%, Leptocorisa orastoris at 30% and Nymphula depunctalis at 9.8%.

DISCUSSION

Samples in the plots showed the presence of different types of insects and their classification as well as their nuisance for upland rice cultivation.

The most harmful species inventoried responsible for the damage are:

- At the vegetative stage: Coccinella septempunctata 60%, Cnapholocrosis medinalis and Shistocera gregaria with 55%

- At the reproductive stage: Forficula auricularia 80%, Diaperasticus Erytrocephalus 70% and Leptoglosus membranaceus with 56.1%.

In addition, the behaviour of these pests suggests other unidentified species. The edges of the plots have played a role in hosting other rice pests because they are home to various insects.

Thus, all our hypotheses were verified by the fact that we inventoried insect pest species according to the two phases of upland rice production (vegetative and production).

According to Cohereau (2003), agricultural risk can be defined as a whole set of factors that are contrary to stable and satisfactory economic production. The insect pest of crops is one of these factors; it can in some cases become preponderant.

These results are similar to those obtained by Sadou et al (2008) and Heinrichs E.A. (2018). Indeed, these researchers found that there were a multitude of insects on irrigated rice such as:

The crickets and grasshoppers found in the experimental field are known to be very destructive. Being paurometabolous, larvae and adults feed on rice papers. Grasshoppers devour the leaves, while crickets dig galleries in the ground and consume the roots (Gauld I.D. 2015).

These results confirm those reported by Umesh et al. (2019) and Guigaz (2002), who discovered the leaf borer lepidoptera (Nymphula depunctalis) and Nezara viridula of the order Heteroptera on upland rice.

This also corroborates with Paulet (2021), who found the most damaging and consistent species on irrigated rice in Côte d'Ivoire: Diopsis thoracica, Maliarpha separatella and Chilo sp. At the young stage.

Ratmadass (2017) found the panicle bug Eurustylus oldi, a stem borer and white grub at all stages of tropical cereals (rice and sorghum). Abdoul et al. (2020), assessed the damage on upland rice: dead hearts, galls, white panicles and pre-imaginal populations of the main insect pests.

CONCLUSION

The present study conducted as an experiment in the Lwama I university site in Kindu in Maniema had as its main objective to identify the insect pests of rice (Oryza sativa) grown in Kindu.

Indeed, in a specific way, we have set the following objectives:

- Determine the types of insects that attack rice grown in Kindu,
- Observe the damage caused by insect pests to the organs of rice grown in Kindu.

To achieve these objectives and test our hypotheses, we used the experimental method with a randomized complete block design with 4 treatments and 4 replicates.

At the end of this study, the following results were obtained:

- The order of orthoptera 29.4% and beetle with 24% were important.
- 17 species of insect pests have been identified and described.
- 4 species showed the high number of insects inventoried: Zonocerus variegantus with 38 insects, Orseola oryzivora with 34 insects, Diploxis falaxis with 31 insects and forficula auricularia 28 insects.
- 3 species caused serious nuisance during the vegetative phase: Coccinella septempunctata with 60%, Cnapholocrosis medinalis and Shistocera gregaria attacked at 55%.
- 3 species were important for the nuisance in the production phase: Forficula auricularia caused damage at 80% attack, Diaperasticus Erytrocephalus at 70% and Leptoglosus membranaceus at 56.1%.

In view of these results, the production of rainfed rice cultivation in Kindu reinforces a problem related to attacks, especially since each species causes losses on the different organs and on each phase of the plant's development. Losses caused by insects that cut the stubble and destroy the panicles are more formidable.

RESEARCH PERSPECTIVES

Following the observations and the results obtained, the perspectives and studies envisaged for the continuity of the next investigations are:

- To study the development cycle of pest species in a complete way;

- To deepen the study on the relationships between the loss of upland rice yield following insect pest damage.

REFERENCES

Abdoul, B., Breniere, J., & Pouzet. D. (2020). *Chemical control of rice insects in Africa, its validity and limitations*. Montpellier Cedex, France, pp. 8- 41.

Aurélien, B (2018). Hortisologne gardening advice, planting cultivar, portager and harvesting. www.hortisologne.com

Cohereau, P. (2003). *Insects and risk in agriculture*. Paris: Arostom-INERA, p. 153.

Dobelman, J.P. (1976). *Riziculture practised in irrigation*. Paris: French-language internal council, p. 226.

Emongo (2014). Analysis of the effects of biopesticides for maize production at the Lwama I site. University of Kindu FSA unpublished dissertation.

Ekukolé G. & Ajayi O., 2003, some observation on scymnus floralis (F.) and Ischiodon aegyptius (Wiedmann), predators of the cotton aphid in North of Cameroon Journal of African zoology, 109, 93-97.

Gauld I. D. (2015). *The hymenoptera*. British Museum Natural history. London: Oxford University. Press, 332p.

Guigaz (2002). Method of capture 2. Insectarium of Montreal. 54p.

Heinrichs E.A. (2018). Biology and management of rice insects.

IRRI (2017). Annual report, pp. 25-38. Manila IRRI.

Kasongo K. M. (1997). The enemies of rice in the Sahel. In *Integrated pest management of food crop pests in the Sahel* (p. 15). INSAF. Seminars and colloquiums. John Libbey.

Laurentiaux (2017). Insect class, assistant at the National School of Mining. Paris, insects Linnaeus 1758, pp. 1-8.

Mignon, J., HauBruget, E., & François, F. (2022). Key to identifying the main insect families in Europe. The Agronomic Presses of Gembloux. Agro-Bio Tech (University of Liège). p. 21.

Ngama (2018). Special Phytopathology Course, University of Kindu UNIKI FSA I Grade Phytotechnics. Unpublished course.

Nwilene F.E. (2019). Current status and management of insect vectors of Rice Yeloz Motle Virus (RYMV) in Africa. *Insect Sci. Aplic. Kenya*, *19*, 179-185.

Ratmadass, G. (2017). Insect pests of legumes and cereals, biology of brown chinal sustainable pest control in Africa, p. 31.

Sadou, et al. (2008). Inventory of insect pests and vectors of yellow variegation of rice in the irrigated perimeters of Maga (Northern Cameroon), p. 41.

Umesh, E., Joshi, R., & Ukwungu, M. (2019). *Rice insect pests in the field in Africa: Biology and control method*. Research guide. IITA No. 41. Nigeria.