

# Study of *Cretonatos* sp. Distribution, Biology and Its Natural Enemy on Rice in South Gondar, Ethiopia

Geteneh Mitku

Ethiopian Institute of Agricultural Research, Fogera National Rice Research and Training Center, Bihar Dar, Ethiopia

**Email address:**

gete205m@gmail.com

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**Abstract:** One of the most significant biological limits on rice productivity is insect pests, but the extent of the damage depends on the crop's growth and the number of biotic and abiotic pressures that are influencing it. The study's objective was to evaluate the distribution, biology, and damage caused by novel insect pests in three rice-growing regions in Ethiopia's South Gondar Zone in 2021. Visual evaluation was used to identify the insects and to gather additional natural enemies using hand nets. Taxonomic keys were used to identify natural enemies morphologically. In this experiment, the natural enemy density was calculated using the frequency of insect pest presence on rice plants at various locations using 2m<sup>2</sup> quadrants. The biology of the insect was studied by using rearing cage in the FNRRTC entomology laboratory. The result implied that the insects, *Cretonatos* sp. found in all assessed area, and found in both upland and lowland rice. Even though, the insect found in all the assessed area, its damage seems less. The survey also found the diversity of natural enemy on rice paddy in south Gondar Zone. From the biological study *Cretonatos* sp are Holometabolous (Complete metamorphosis), insect life cycle passes 4 stage, which are egg, instars, pupa, and adult.

**Keywords:** *Cretonatos* sp, Insect Pest, Rice Crops, Complete Metamorphosis

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## 1. Introduction

Since it is consumed as a staple by more than half of the world's population, rice is the most significant food crop globally. Since more than half of the product is consumed on the fields where it is farmed, it is predominantly a subsistence crop. More than three billion people, or more than half of the world's population, depend on it as a staple diet, and it accounts for 20% of all calories consumed globally [1].

Nodaway, specially small-scale farmers develop rice in distinct components of the country, however it's also produced through large-scale farms in few locations specially in lowlands of the country. There are fundamental structures of rice cultivation; the dry or upland gadget, wherein the crop is grown on dry floor and the moist gadget, wherein the rice land is flooded and the crop is grown in status water from planting till close to harvesting. In Fogera plain (fundamental rice manufacturing place within side the country) agronomic practices executed through rice manufacturer are draining a rice field, transplanting, crop rotation, and fertilization, only

a few farmers used row planting methods, with rain-fed gadget and is in cluster base. In evaluation to farmers exercise the modern test changed into performed in row planting, which won't be appropriate for stalk eyed fly [2].



**Figure 1.** The larvae of *Cretonatos* sp. and its feeding on rice, Source current survey result.

Rice productiveness in Ethiopia restrained via way of means of one of a kind elements, loss of advanced varieties, scarcity of pre-harvest mechanization and post-harvest processing technologies, loss of professional manpower, scarcity of seed supply, insufficient economic resources, terrible infrastructure for commercialization of rice

manufacturing, and terrible advertising and marketing channel. Of those constraints, biotic and abiotic elements are the maximum important [3]. There are many constraints to rice manufacturing inclusive of terrible land preparation, horrific irrigation management, insufficient drainage main to the improvement of salinity and alkalinity, inefficient distribution of inputs and yield instability because of pests and diseases [4]. Abiotic stresses include: variable rainfall, with drought and flooding going on within side the identical season; poorly-tired soils of the coastal lowlands, and alkalinity in dry areas. Biotic stresses include: weeds, insect pests (stem borers inclusive of stalk eyed flies, African rice gall midge), diseases (blast, brown spot, and viral diseases), rats and birds [5]. Further, the writer diagnosed the subsequent pests as insect pest of rice vegetation in Ethiopia a) rice stem borers, b) The rice armyworm, c) The rice bug, d) The caseworm, e) The rice leaf folder, f) The inexperienced leafhopper, g) The rice ear bug, h) The rice brown plant hopper. Creatonatos sp. categorized in Scientific classification Kingdom: Animalia Phylum: Arthropoda Class: Insecta Order: Lepidoptera Superfamily: Noctuoidea Family: Erebiidae Subfamily: Arctiinae Subtribe: Spilosomina Genus: Creatonatos. Lepidoptera are Holometabolous, their life cycle consists of four phases: egg, multiple instars, pupa, and adult. "Complete metamorphosis" is the common term for this life cycle. Insect orders with this life cycle are grouped under the term Endopterygota because immature never have visible wing buds.

A new insect pest, named as Creatonatos sp. also identified by the above author in 2021, but the insect detail distribution, biology and its natural enemy did not considered. Hence the current study intended to investigate the Creatonatos sp. Distribution, biology and its associated damage on rice.

To assess the distribution, biology and natural enemy of Creatonotus sp., on upland and lowland rice in south and central Gondar, Ethiopia.

## 2. Material and Method

A survey carried out in fields of most important rice developing regions of south Gondar in 2021 cropping season. The altitude of surveyed fields ranged from 1774 to 2415 m.a.s.l. Rice crop increase is split into 3 distinct levels, i.e. seedling (thereafter panicle initiation), flowering and ripping. The pests had been gathered withinside the 3 divided increase levels of every field. At each 5-10 Km durations alongside handy roads, numerous flowers in a cross-dimensional line had been tested for the presence or absence of insect pests and related herbal enemies. The pests had been gathered in levels; the 3 divided increase levels of rice from every field, i.e. seedling (thereafter panicle initiation), flowering and ripping. Growth levels of paddy flowers: The complete existence cycle of a paddy plant is split into 3 distinct levels, i.e. seedling, transplanting and flowering. The seedling level began out whilst the seeds had been seeded to germinate.

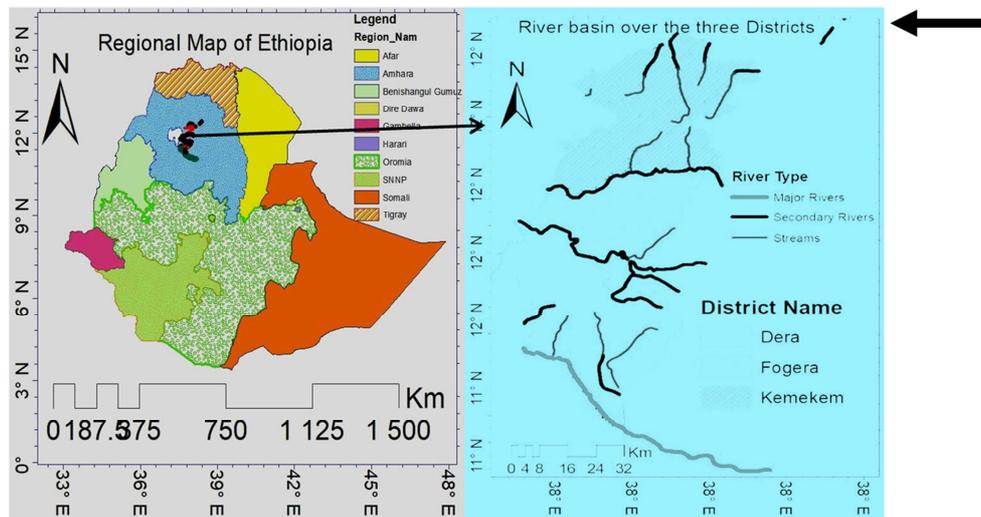


Figure 2. Showing all surveyed districts in south Gondar, Amhara Region, Ethiopia.

### 2.1. Sample Collection

Each farm decided on for the survey becomes divided into 4 quadrants and from every element 4 flowers had been decided on at random inside the rectangular meter. After a brief visible remember of the bugs at the flowers, they had been then captured from the ones flowers and brought to the laboratory for identification. The populace length of every of the insect species become additionally taken into

consideration.

### 2.2. Data Collected and Analyzed

The kind of insect and herbal enemy, rice harm taken (Insect infestation), wide variety of insect pests and herbal enemies in step with field, Farmers perception (approximately harm), GPS facts and rice verity (upland or lowland rice), facts become analyzed the use of SPSS software.

### 3. Result and Discussion

#### 3.1. The *Creatonatos* sp. Feeding Habits and Its Damage on Rice

The *Creatonatos* sp. is a new pest for the study area which occurs mostly during periods of flowering and grain formation. Larvae feed the plants, typically by chewing surface of the leaves. They also feed on the panicle rachis near the developing kernels. It's feeding nearly similar to Armyworms feeding, on leaf tips and along leaf margins. But the difference, the seriousness of the damage, Armyworms eats whole leaves; they can remove them completely or leave

only the midribs, in contrast the *Creatonatos* sp, which feed only some part of the leaves.

#### 3.2. Occurrences and Distribution

Regarding the *Creatonatos* sp. occurrences, it observed at three different crop growth stage, but dominantly it occur at reproductive stage compared with other rice insects. The insect mostly found from September and thereafter, until the rice harvest. This is one of rice leaf feeding, which attack rice from flowering to maturity stage, leading to simple damage to rice plant in different parts of study area.

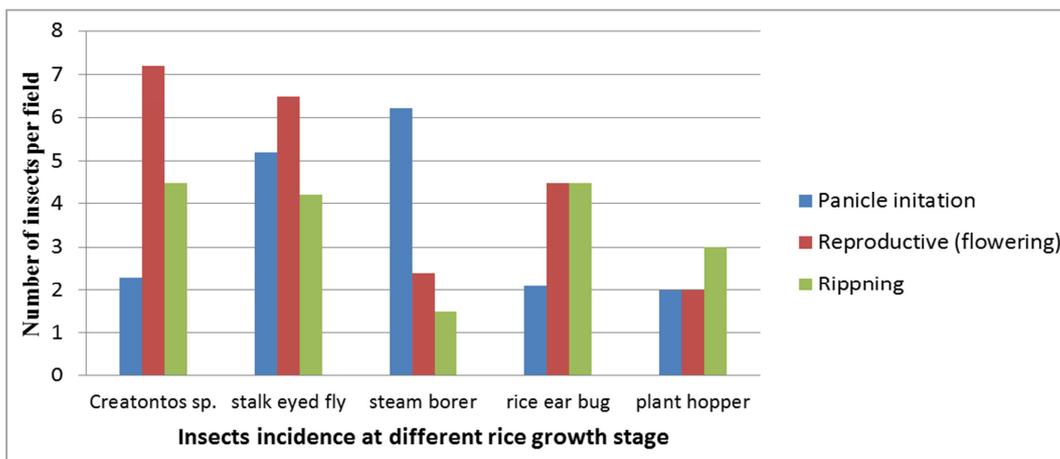


Figure 3. *Creatonatos* insect pest occurrence compared with other rice insect.

#### 3.3. Comparison of Insect Pest Presence in Upland and Lowland Rice

The insects, *Creatonatos* sp. found in all assessed area, and it found in both upland and lowland rice. Even though, the insect found in all the assessed area, its damage seems less

than other major insect pest like stalk eyed fly. The damage effect of the insect also asked to the farmers, and the farmers response was similar to our observation, most of the farmers response implied that no more damage due to these mentioned insect on rice yield.

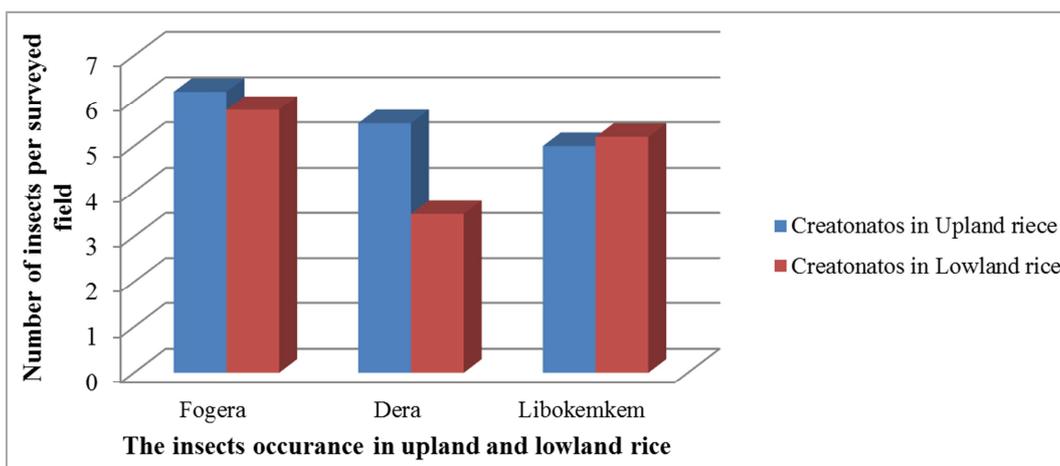


Figure 4. Insects occurrence in upland and lowland rice at different districts.

#### 3.4. Infestation of the Insect

This new insect's infestation level assessed on rice crops assessed visually, the infestation range from 7 to 15.5%.

Actually the infestation is the leaf damage, which may bring the yield loss of the plant. Amongst the district the representatives of the infestation of this new sp. Fogera district

on both upland and lowland rice was seen in the flowering stage, but their number was comparatively lower infestation was observed in Dera, similarly in Libokemkem districts.

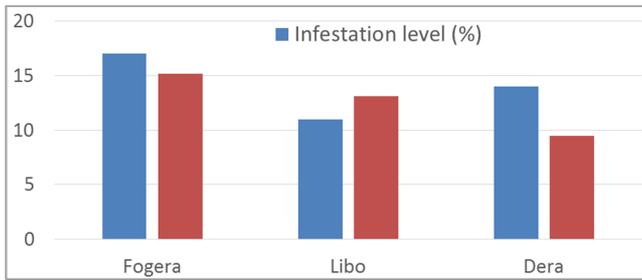


Figure 5. Represent Infestation level insect pest.

### 3.5. Natural Enemy of Rice Insect Pest

Beneficial residing organisms which lessen pests and illnesses are normally found in any crop until vast spectrum pesticides (which kill a extensive variety of arthropods) were used. These so-known as herbal enemies may be conserved through taking care with farming practices in order that they're now no longer killed or are definitely encouraged. Biological manipulate of insect pests is characterized through a persistent, robust discount within the pest populace following the creation of a herbal enemy. Pest manipulate through herbal enemies arises as an ecologically and

economically promising solution [6].

Natural enemies have been envisioned to account for at least 50% of pest manipulation happening in crop fields [9], imparting a critical atmosphere provider valued at \$ thirteen billion in step with 12 months within the USA alone [7]. Among herbal enemies, each predatory and parasitic bugs had been proven to be powerful in suppressing pest species [8] and [10]. The survey within the rice fields confirmed the range of herbal fields within the rice paddy in South Gondar. Four predatory and one parasitoid are extensively dispensed with and particularly in rice developing areas (Table 1). Parasitic parasitoids and predatory, dames and dragon flies play a crucial function in regulating the density of rice pest bugs; the parasitoids can preserve pests and decrease the harm threshold. The bugs within the observing vicinity have been located under the financial threshold level. This can be because of the impact of the above-stated herbal enemy. Dragon and Damsselfly are discovered as capable sellers for organic manipulation of crucial rice insect pests within the observed vicinity, particularly within the moist land. According to a [4] observation, the low density of rice insect pests is possibly because of the presence and impact of herbal enemies. The writer, in addition, encouraged the conservation of herbal enemies is the important thing to the improvement of strong and a hit included pest management (IPM) systems.

Table 1. Recorded natural enemy of rice insect pest (*Cretonatose* sp.) in the surveyed area.

Common name	Scientific name	Types of natural enemy	Distribution
Damsselfly	<i>Chrysoperla carnea</i> (Stephens)	Predator	Found in Fogera, Dera and libokemkem wet area of the districts
Dragonfly	<i>Diplacodes</i> spp.	Predator	Found in Fogera, Dera and libokemkem wet area of the districts
Spiders	Spiders	Predator	Found in Fogera, Dera and libokemkem in upland and lowland area of the districts
Wasp	<i>Meteorus autographae</i> M.	Parasitoid	Found in Fogera, Dera and libokemkem in upland and lowland area of the districts
Coccinellid	<i>Chilocorus stigma</i> (Say)	Predator	Found in Fogera, Dera and libokemkem in upland and lowland area of the districts

### 3.6. Biology of the *Cretonatos* sp.

Different bugs have exceptional styles of lifestyle cycles. The maximum unusual place bureaucracy is slow and the whole metamorphosis. The lifestyle cycle is crucial in coping with bugs, due to the fact the habitat, conduct and appearance of an insect might also additionally alternate dramatically over the path of a lifestyle cycle, relying on the shape of the lifestyle cycle. Insects with slow metamorphosis undergo 3 lifestyles degrees: egg, nymph and person. The nymph level normally resembles the person's level, and bugs in each degree are commonly discovered in comparable habitats, displaying comparable conduct and consuming comparable food. Managing bugs with slow metamorphosis normally does now no longer require exceptional processes to goal immature and person degrees.

Hence, to apprehend the lifestyle cycle of the *cretonatos* sp. The test tested the biology of it. Egg mendacity takes 3-7 days. Eggs; the character egg is white. Eggs are laid in clusters at the floor of the leaves, every cluster containing a median of 23 eggs. It takes 3-nine days to be larvae. The time from larvae to pupa takes 18-23 days.



Figure 6. Represent the Adult of the insect.



Figure 7. Represent pupa of the insect.



Figure 8. Represent the larvae of the insect.

The figure represents the *Cretonatus* sp. Adult, pupa and larval stage (Figure 6, Figure 7, Figure 8 respectively).

Larvae, the larvae pass through four instars, during passing of the different instars, there are different changes in larval colors. The full-grown larva has a white color, and the larval period is 18-23 days. Pupae, the pupa stage lasts for 8-11 days.

#### 4. Summary and Conclusion

The *Cretonatus* sp. is discovered in all assessed districts in each upland and lowland rice developing regions. The insect density and occurrence is excessive in the rice flowering. However, it's also discovered in the rippling degree. The unfavorable impact, in addition to the density of this new insect pest, is much less than different vital insect pests, just like the stalk-eyed fly. The unfavorable degree of the insect is the larvae and its feeding dependency is chewing the rice leaf. Around five herbal enemies, predatory and parasitoids are discovered inside the rice fields. Low density and decreased infestation degrees within the examination location can also additionally possibly be the presence of enemies. When plants are grown, it unavoidably disturbs the herbal balance. However, the useful results of predators and parasitoids remain very vital. If they're effectively managed, they'll help save you a number of the pest issues which farmers encounter.

#### 5. Recommendation

It is suggested for researchers to pick out and classify not unusual places and precise herbal enemies in upland and lowland rice within the essential rice manufacturing regions of Ethiopia, determine the impact of the herbal enemies on rice insect pests and train farmers concerning pest management.

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