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Report on the studies on damselflies and dragonflies in rice paddies



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Report on the studies on dragonflies in rice paddies – Results of the field work in January 2025 carried out in rice paddies in An Giang province

1. Preliminary remarks

In January 2025 we continued our studies on dragonflies in Vietnamese paddy fields in An Giang, as the study area was changed to this province from Vinh Long, where we studied last season. The paddy fields in Vinh Long were not any more accessible for our studies, so we had to change the locality for the following investigations.

In An Giang (Vong Dong, Thoai Son) we should now investigate some paddy fields of Mr. Bac, which were selected by Prof. Chau Minh Khoi (Can Tho University) to evaluate the effects of the conversion to organic use. The paddy fields of Mr. Bac are presently in transition from conventional to organic use in the future.

The aim of the study was to investigate

- # which species occur in the rice paddies being in transition (general biodiversity)
- # which species occur in adjacent biotopes, such as ditches, channels, other types of wetlands (general biodiversity)
- # If there are obvious differences in the paddy fields in transition and in conventionally cultivated paddy fields (possible effects of pesticides).

2. Locality

The locality of the studies were the paddy fields of Mr. Bac in An Giang Province, see the figure 1.



Fig. 1: Locality of the studies in January 2025

3. Methods

Our studies were carried out from the 5th of January until the 14th of January 2025, the field work was carried out from the 7th until the 11th of January by Dr. Jürgen Ott and Nga Ott. We started field work generally at 7 am, as already shortly after sunrise it was warm and sunny and the dragonflies were already active.

Dragonflies were documented via photos and sometimes after catching them with an insect net (diameter 50 cm, 2-meter telescope stick). Determination was carried out immediately or after checking the specimen in the field or via the photos.

Sweep netting was carried out by netting in the vegetation of the rice paddies covering an area of ca. 5 sqm and netting in this area in total 20 times, or in a transect – by walking ca. 10 meters on the dams and sweep netting in both directions and on both sides.

At promising locations (e.g. the well vegetated channel in the fruit plantation), attempts were made to catch larvae and exuviae (larval skins which are left behind after emerging) were also searched for along the shorelines.

The rice paddies were mostly in a younger to middle stage, the rice had already grown tall, but still had nearly no grains. Partly the fields were with water, but in general they were dry with muddy ground and no open water surface (except the ditches in between).

The broader ditches and channels near the paddy fields had a good water level, they had partly open water surface and they were partly overgrown by water plants (e.g. (*Pontederia* subg. *Eichhornia*, an invasive species with its origin in the Neotropics’).

The banks and shoreline of the ditches were mostly with dense vegetation, partly also with higher vegetation such as palm trees etc. Consequently, along the ditches there were both sunny and shady parts, what is favourable for dragonflies.

In the chemical analysis of the waters were carried out during the studies and the parameters water temperature, pH and conductivity were taken.

The data of the investigated fields are averages of three measurements which were carried out at the 8th and 9th of January in the morning.

Some more data were taken at a Ta Pa Lake and at Oc Eo lake (both An Giang province) at the 10th of January.



Fig. 2: Sweep netting in the rice paddies while walking along a transect

4. Results

General observations

The rice fields we were assigned to study were all very intensively used, large, and had few natural structures at the border.



Fig. 3: Investigated rice paddies



Fig. 4: Brown stripes - a consequence of pesticide use - were often visible on the field edges and along the paths near the fields.

No flower strips etc. were registered along the margins of the fields; trees or hedgerows were only found along the channels.

The water of the channels in the area were pretty turbid and several piles of waste were found along the canals and fields, some of which were also burned. This results in further environmental pollution through emissions and the entry of pollutants into the neighbouring biotopes, which is particularly problematic in water bodies (entry into the aquatic food chain).



Fig. 5: Burned garbage heap at the shoreline of a channel - mainly consisting of plastic packaging of the pesticides. Sometimes nearby people are fishing.

Analysis of the water parameters

Water parameters were taken at several places in and near the paddy fields of Mr. Bac. The data are averages of three measurements.

locality	water temperature [°C]	pH	Conductivity [$\mu\text{S}/\text{cm}$]
Wide channel (vegetated)	25,1	6,40	260
Wide channel	27,4	6,19	256
Narrow ditch in the rice paddy	23,5	6,93	281
Ditch in fruit plantation	25,8	6,31	259
Ta Pa Lake	31,1	2,94	241
Oc Eo Lake	27,6	8,11	98



Fig. 6: Measuring water parameters on the field

The data of the water analysis were comparable and relatively similar, which means that all the waters are in close contact and exchange – they are highly connected. On the other hand, this also means that environmental pollution is transported everywhere, as here are no real boundaries between the water bodies. Furthermore, the water from the channels is used for irrigation and pumped from the channels into the neighbouring fields and ditches, which also results in a constant water exchange.



Fig. 7: Installation to pump the water from the channel into the neighbouring fields and biotopes

Water is pumped from the channels into the neighbouring fields – this also leads in a transport of contamination into the paddy fields, at these pumping installations also water and soil is contaminated by oil.

Biodiversity of dragonflies and damselflies in the rice paddies

Only seven species of dragonflies could be registered during the entire (!) field work – all are common species and all were found only in very small numbers or even only with one individual:

- *Orthetrum sabina*: very typical for paddy fields, only 2 individuals
- *Pantala flaccescens*: flying in small numbers over the fields (very typical for paddy fields and normally occurring there in large numbers, also autochthonous)
- *Brachythemis contaminata*: typical for channels and ponds, 3 individuals only

- *Rhodothemis rufa*: generally found in well vegetated waters, only one individual at the shoreline of a channel
- *Diplacodes trivialis*: sitting on open grounds, two male individuals between the paddies
- *Potamarcha congener*: only one sighting of a resting male near the channel
- *Ceriagrion* cf. *praetermissum*: only one sighting in the fruit plantation



Fig. 8: *Brachythemis contaminata* male sitting at the shoreline of a channel



Fig. 9: On the open ground of a dirt road between the fields a *Diplacodes trivialis* male was sitting in the morning sun



Fig. 10: Very promising biotope within the rice paddies – a vegetated channel in a fruit plantation, but only one damselfly was captured (*Ceriagrion cf. praetermissum*)

During sweep netting not a single damselfly or dragonfly – not even the typical species for rice paddies *Agriocnemis femina* or *Ischnura senegalensis* – was captured. The fields, at least the netting places, were so to say free of damselflies and dragonflies.

Due to these small numbers of dragonflies which were registered and since no exuviae were found during the investigations, no statements can be made if the species which were seen are autochthonous or just migrating.

This means that the pesticide pollution in this area must still be very high. This statement is also supported by the fact that other insects - such as butterflies - were practically also not seen there and no larvae of dragonflies and damselflies were caught in the water either.

In this investigation in the rice paddies and the surrounding biotopes we did not find typical sensitive species of clean running waters, such as species belonging to the Calopterygidae, Clorophycidae, Gomphidae etc. or species with endophytic oviposition, such as Aeshnidae. The damselfly registered here belongs to a species preferring more general environmental conditions. All of the few dragonflies listed here belong to the family Libellulidae. This is easily explained by their life cycle with exophytic oviposition and being able to survive in the cycle of wet-dry-phases of paddy fields and a general lower demand on the biotope quality.

Biodiversity of dragonflies and damselflies in other biotopes

On the 10th of January at the lake ... also very few dragonflies were registered, but this was surely a consequence of the very low pH in this lake, here only a pH of not even 3 – a very acidic water body – was measured. This is certainly due to geogenic factors, as no pollution was registered or is known by the local people.



Fig. 11: Secondary water with very low pH at Ta Pa Lake (An Giang province)

Here the following species could be registered:

- *Orthetrum sabina* – a pairing wheel/couple was sitting at the shoreline
- *Urothemis signata insignata* – a male was sitting and flying near the banks
- *Neurothemis fluctuans* – a male was sitting in the vegetation of the banks



Fig. 12: Pairing wheel of *Orthetrum sabina* and a male of *Urothemis signata*



Fig. 13: *Neurothemis fluctuans* male resting at the shoreline

At the lake in Thoai Son (An Giang province) only two males of *Orthetrum sabina* was registered.

Dragonflies as bioindicators

Damselflies (Zygoptera) and dragonflies (Anisoptera - here we call both of them dragonflies) are good indicators for different aspects.

Firstly, we have some stenoeious species, which depend on some particular environmental factors (pH and oxygen content of/in the water, plants for oviposition etc.). These species react quickly on changes in some parameters and so indicate an environmental change or an impact.

Secondly the abundance or density of some species is of importance, as they react with their population size on good environmental conditions or an impact (such as exposure to pesticides).

Thirdly the whole dragonfly coenosis could be regarded as an indicator, as they show the biotope complexity or landscape heterogeneity (more habitats, more species) and also an impact via the pesticide application.

In the present study the diversity of damselflies and dragonflies was very low – only seven species were registered – and also the density was very poor. This only can be explained by the high contamination by pesticides of the area, as we registered also in general very few insects (e.g. butterflies) and also spiders (another group of predators, showing that there is no food) and only one frog during all the days of the study.

Management proposals

As the diversity of biotopes in the investigated area was pretty poor, no special proposals for further management measurements were made. Only small ponds with shallow open waters would be a senseful addition.

As all waters are connected, the transformation of paddies to organic use can only take place, if there will no (contaminated) water from the channels will be brought to the rice paddies – this is a real challenge!

5. Summary

During our studies of the rice paddies carried out in January 2025 in An Giang a remarkable low diversity of dragonflies and damselflies was registered. Only seven species in the paddies were found, all species only in very few numbers or even only single specimen.

This could only be interpreted as a consequence of the high contamination of the paddies with pesticides, as no other reason seems to explain this fact. Also, in the neighbouring wetland biotopes – channels, ditches etc. – there were nearly no dragonflies or other insects/amphibians were found.

Analysis of water parameters – water temperature, pH, conductivity – point out, that all waters are connected. This means that the contamination is transported everywhere and a permanent exchange of pollutants takes place (from the channels to the paddies and vice versa).

Acknowledgement

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Attachment

Attachment 1: Seminar on dragonflies at Can Tho University

On the 13th of January a seminar at Can Tho University on the biology and ecology of dragonflies was organised by Prof. Chau Minh Khoi and Cao Dinh An Giang.

More than 20 students attended the seminar and after the seminar there was a lively discussion on several ecological topics.



Attachment 2: Environmental education on dragonflies

As for several reasons it was not possible to do a planned environmental education in An Giang or Can Tho, so such an activity was carried out in Bac Son Village.

Here a group of interested farmers were introduced in the biology and ecology of dragonflies and their value in the food chain of rice paddies.



Fig. 14: After catching a dragonfly with an insect net it is demonstrated.



Fig. 15: The biology of dragonflies is explained.