Measuring Exposure of Nocturnal Wildlife to Pesticides in Agrarian Ecosystems

Benedikt Gießing[1], Markus Ebeling[2], Dorothee Höller[1], Tina Städtler[1], Christian Wolf[1]

Abstract

For the risk assessment on birds and wild mammals according to the EU guidance document SANCO/4145/2000 the dietary exposure to pesticides needs to be assessed. In nocturnal species in particular, observations of feeding behaviour is nearly impossible with the established methods such as radio tracking and live trapping. However, this can be achieved by means of a thermal image camera. This technology visualizes an animal through the difference of the body heat of animals and the lower environmental temperature. Furthermore it is possible to quantify the nocturnal abundance of wild animals by using the 'scan sampling approach'. For this purposes a defined area of observation is marked and scanned with the camera in fixed time intervals during the night to register all present animal species. Thus the use of a thermal image camera can supply valuable information which complements data from live trapping and telemetry of nocturnal species.

Introduction

According to the EU guidance document SANCO/4145/2000 the effects of pesticides on birds and wild mammals have to be evaluated. In particular information on their dietary exposure are required for risk assessment purposes. With the established methods such as live trapping and radio tracking of mammals observations on feeding behaviour of nocturnal animals are nearly impossible. Also activity and abundance survey of nocturnal wildlife on agriculturally used areas is yet insufficiently. These problems can be solved by using a thermal image camera (thermography).

Figure 1: *Apodemus* sp. viewed via thermal image camera

Figure 2: Wood mouse with radio collar (around the neck)

Methods & Results

With the thermography method heat sources in long wave spectral range can be displayed. Therefore the camera visualizes an animal through the difference of the animals' body heat and the lower environmental temperature.

The thermal image camera was used for observations of wood mice (*Apodemus sylvaticus*) that where featured with a radio collar for radio tracking (Figure 2). With telemetry equipment it was tried to follow the animal at close range and thereby visualising this individual and its behaviour with the camera. Therefore additionally to the results of telemetry (identification of habitat choice) it is possible to determine the behaviour in the chosen habitats.

Another method with the thermal image camera was the ‚scan sampling approach' on freshly drilled arable crops: Over the night a defined observation area was scanned with the camera for all mice and other active animals. Much clearer than indicated by live-trapping results (data not shown), the small mammal abundance declined after drilling (Figure 3).

Discussion & Conclusion

Work with nocturnal species is simplified and more accurate with a thermal image camera. By following a radio collared animal it is possible to observe the individuals' behaviour and to better interpret the portion of time spent in pesticide treated areas.

Additionally all animals visiting the scanned area can be detected, including individuals not captured by the live-traps and other species (e.g. hares, roe deer, foxes, badgers, wild boars and skylarks were noticed). Broader conclusions on the nocturnal wildlife abundance on arable fields and thus on their potential exposure to pesticides can be drawn. Finally with the camera such observations are possible without disturbance and on a wide area.

Thus, the thermal image camera adds valuable information which complements data from live trapping and radio tracking of wild nocturnal animals. Interestingly, and in contrast to default assumptions in the risk assessment, the activity of small mammals (incl. the granivorous *Apodemus* sp.) on freshly drilled fields was reduced rather than increased.

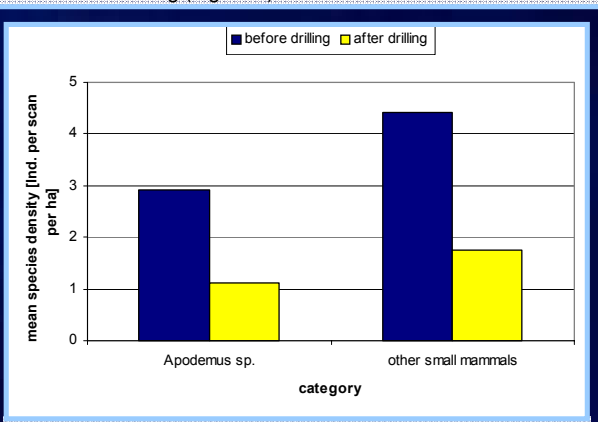

Figure 3: Illustration of abundances on freshly drilled arable fields before and after drilling

[1] RIFCon GmbH, Breslauer Straße 7, D-69493 Hirschberg, Tel +49 (0) 6201 – 879777, www.rifcon.de
[2] Bayer CropScience AG, Alfred-Nobel-Str. 50, D-40789 Monheim,
Tel +49 (0) 2173 38 – 5415, www.bayercropscience.com