The host-finding behaviour of Venturia canescens (GRAVENHORST) (Hymenoptera: Ichneumonidae), a potential natural enemy for the biological control of Corcyra cephalonica (STAINTON) (Lepidoptera: Pyralidae) in stored bagged rice

Charles Adarkwah1,3, Daniel Obeng-Ofori2, Christoph Reichmuth3, Carmen Büttner1, Sabine Prozell4, Matthias Schöller4

1Humboldt University Berlin, Faculty of Agriculture and Horticulture, Institute of Horticultural Sciences, Department of Phytopharmacy, 
2Department of Crop Science, School of Agriculture, College of Agriculture and Consumer Sciences, University of Ghana, Legon, Accra, 
3Federal Research Centre for Cultivated Plants, Institute for Ecological Chemistry, Plant Analysis and Stored Product Protection, Berlin 
4Biological Consultants Ltd., Germany

INTRODUCTION

Venturia canescens (Hymenoptera: Ichneumonidae) is a solitary koinobiont endoparasitoid that is known to attack and successfully develop within the larvae of several lepidopteran pests of stored products, mainly pyralids. V. canescens has primarily been used as a model organism for population dynamics, evolutionary ecology and immunology, amongst other studies. The rice moth Corcyra cephalonica is an important pest moth on stored rice in tropical regions.

GOAL

The present study examines the potential of V. canescens in biological control of its host C. cephalonica in bagged rice at a small scale storage environment.

MATERIAL AND METHODS

Venturia canescens

Webbings formed on the jute bag

Daily parasitism of C. cephalonica with V. canescens were investigated in the laboratory using Petri-dishes at 25°C and 65.5-70% rh (see fig. 1). The host C. cephalonica were reared in a growth cabinet at 25°C (LD 16:8 h) and 65±5% RH in 1-litre glass jars. The original population of the parasitoid V. canescens was obtained from Biological Consultants Ltd. in Berlin. Approximately one hundred fourth-to fifth-instar moth larvae were placed in each jar together with five adult wasps. This procedure was repeated every four days. The glass jars were left until adult wasps emerged.

5 kg jute bag containing rice grain artificially infested with Corcyra cephalonica larvae

Four jute bags were placed on a small pallet and introduced into a climatic chamber (room size 13 m², temperature 26°C and 65.5% relative humidity). 35 moth larvae aged four weeks were introduced into each of the bags. The openings were sealed. All bags remained for five days for larvae of the moths to further develop and form webbings inside and outside the bags. Only four bags were additionally treated with V. canescens and transferred in one chamber. 25 adult V. canescens aged five days were released in the chamber. The other four bags were left only with C. cephalonica as control in another chamber. The whole experiment was replicated five times. After 15 days, the rice from all the jute bags was transferred into glass jars. Parasitisation of C. cephalonica larvae was then expected to be completed. Additionally, areas on the jute bags where moth webbings had been located were cut out and placed in jars. The emergence of V. canescens and C. cephalonica was recorded every two days in rice samples either treated or untreated until the 20th day.

DISCUSSION

V. canescens was able to parasitise the hosts both on and inside the jute bags in the experimental chamber. The wasps used their ovipositors to sting through the jute fibre as well as through the C. cephalonica webbings. On average, only 27.1% of 35 larvae emerged as moths from the treated samples (Fig. 2). In the samples that were not exposed to V. canescens, out of 35 larvae of C. cephalonica 95% on average developed into adult moths. V. canescens reduced the emergence of C. cephalonica significantly in bagged rice.

RESULTS

Figure 1: Parasitism of C. cephalonica larvae by unfed (no honey) V. canescens adult aged 0-7 days old in grain of rice at 25.5°C, 65.5% rh.

Mean % of emergence of C. cephalonica larvae

Figure 2: Mean percentage emergence of C. cephalonica adults (+SD) with or without exposure to V. canescens (P=<0.001), student-Newman-Keuls Test

CONCLUSION

The use of biological control agents in suppressing bagged stored product pests could become a valuable alternative to the use of synthetic pesticides. Therefore, it is important that appropriate technology is developed to promote biological control of stored product.

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Contact Address: Charles Adarkwah: adarkwac@cms.hu-berlin.de/lesadark@yahoo.com