

Distribution of abundance and genome size variability in the grain beetle *Oryzaephilus surinamensis* (Linnaeus, 1758) (Coleoptera: Silvanidae)

by Kamal Sharaf, Petr Bureš, Lucie Horová, Tomáš Pavlíček and Eviatar Nevo

Abstract. We examined the distribution of abundance and genome size (GS, 2C-value) variability of the saw-toothed grain beetle *Oryzaephilus surinamensis* on the opposite slopes of the microsite “Evolution Canyon” (“EC”), Mt.Carmel, Israel. As controls, we used one sample of beetle population from a grain silo in Haifa and one sample from Upper Galilee (Sabalan Mts). The study showed that *O. surinamensis* is abundant in acorns of *Quercus calliprinos* (Palestine oak). The observed number of adults of *O. surinamensis* per acorn ranged from 0 to 12 at “EC” and 54% of acorns were not infected. At “EC”, *O. surinamensis* was more abundant on the “European, garrigue-like” north-facing slope (“ES”) than on the “African, savannah-like” south-facing slope (“AS”), reflecting the interslope differences in the number of oak trees. There was a significant positive correlation between beetle abundance and number of acorns. Both the number of acorns and the number of beetles decreased with the “ES” altitude. No significant intersample differences were found in the infestation rate (number of beetles per acorn) at “EC”. The study of the GS variability showed significant differences between the natural population at “EC” and the indoor silo pest population. Likewise, we found significant differences between males and females at both “EC” and in the silo, probably associated with the heteromorphism of the sex chromosomes. At “EC”, the slopes had significantly more effect than the intraslope stations on the female GS differences, indicating larger genomes in females at “AS” than at “ES”. The multispecies comparison of four diploid species (*O. surinamensis*, and the plants *Ceratonia siliqua*, *Cyclamen persicum* and *Lotus peregrinus*) supports the premise that increased tolerance to drought stress is associated with larger GS.

Key words. *Oryzaephilus surinamensis*, genome size, abundance, 2C-value, Evolution Canyon, *Quercus*, Israel.

Introduction

The saw-toothed grain beetle, *Oryzaephilus surinamensis* (Linnaeus), known as a cosmopolitan pest of different kinds of starchy food in particular and as an invader of packaged consumer food, has been present in human food storages since the Late Neolithic era (VALMOTI & BUCKLAND 1995). The species is probably of Old World origin, and subsequently became widely distributed through trade, but its precise origin is unknown. The outdoor habitats of this species in Israel have not been mentioned (e.g. AVIDOV & HARPAN 1969) and no studies have been made of the interactions between outdoor feral (or native) and indoor “pest” populations. One could, for example, ask the question: “Do migrants from the natural populations re-colonize storage places from which the beetles have been eradicated”? It would also be interesting to know whether natural habitats could serve as a reservoir of agents for the biological control of this species. An intriguing problem might be, for example, the triangular relationship between environmental conditions, fitness of the obligatory bacterial endosym-