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Survey of dermestids of the genus *Trogoderma* in grain storages in Spain

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Several *Trogoderma* species of the family Dermestidae are important pests of stored products. Among them, *Trogoderma granarium* Everts, is one of the most harmful pests of cereal grains for all countries that are major exporters of agricultural commodities and for their trading partners (Athanassiou et al., 2016). Therefore, in most countries a very strict quarantine legislation exists to prevent the introduction of this pest (Myers and Hagstrum, 2012).

Trogoderma granarium is considered an endemic species in the southern Mediterranean region, and it has been intercepted or eradicated in many European countries. Nevertheless, global warming and the increase in international trade of raw materials are favoring its expansion. The establishment of *T. granarium* can likely occur in countries with more than 4 months per year with an average temperature higher than 20ºC (EPPO, 2011). However, temperatures in storage facilities can be higher than in open field, so there is also a risk of establishment in colder climatic areas.

According to the EPPO, *T. granarium* is present in Spain with a restricted distribution. But, while it has been detected in the country, there is no evidence of its establishment. It was found in 1952, but, after that record, there have been no new records of its presence (Banks 1977, Rebolledo and Arroyo 1993). Therefore, it is important to know whether *T. granarium* is present or not in Spain to take the necessary measures for its eradication or management. In the present study, a survey of the species of the genus *Trogoderma* has been conducted to determine the species present in grain storage facilities in Spain and their phytosanitary importance.

In 2016 and 2017, we sampled with traps baited with the pheromone of *Trogoderma* spp. in fifteen warehouses and grain silos along the Spanish Mediterranean coast. Monthly samples were collected in each sampling location using five PC floor traps placed in the storage facilities and three probe traps inserted in the grain piles. Taxonomic keys were used for the identification of the specimens found, as well as *T. granarium*-specific molecular markers by conventional PCR analysis.

A total of 3,276 *Trogoderma* specimens were captured in almost all locations sampled. However, no *T. granarium* were found. The majority of them were *T. inclusum* Leconte, and some were *T. variabile*

(Ballion), which can be distinguished by the male genitalia (Green, 1979) (Fig. 1). Captures were particularly abundant from June to September. These species are considered secondary pests affecting stored grain, processed dry foods, and animal feeds. Some other pest species were captured with both type of traps, including the Coleopteran *Anthrenus* sp., *Sitophilus* sp., *Rhyzopertha dominica* (F.), *Oryzaephilus* sp., and *Tribolium*. sp. According to our results, the presence of *T. granarium* in the sampled areas is not confirmed. Therefore, this species does not seem to be established in Spain.

Fig 1. Male genitalia of *T. inclusum* (left) *T. variabile* (center) and *T. granarium* (right):

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Performance Assessment off a Commercial Scale Solar Biomass Hybrid Dryer for Quality Seed Maize Production

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Abstract

Though several maize varieties have been developed and introduced over the years in Ghana, farmers still face challenges of access to quality seed maize. Among the major constraints is lack of proper drying systems to quarantee quality of seed produced. Peculiar to most parts of Africa, drying of maize in the open, on bare ground along shoulders of roads is still a common practice in Ghana. In this study, a 5-tonne capacity solar biomass hybrid dryer was developed for drying maize for seed and food/feed in Ghana. Effect of drying air temperature in the dryer on the physiological quality and germination of maize kernels was investigated. Maize grains were dried in the open sun simulating farmers practice and using the dryer at 4 varying levels (L1, L2, L3 and L4) with corresponding heights (0.6m, 1.2m, 1.8m and 2.4m) respectively. Harvested maize at 22.8% moisture content