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INSECTS IN TRAPS FOR *TROGODERMA GRANARIUM* EVERTS IN LITHUANIA AND WAREHOUSE INSECTS IN IMPORT, EXPORT AND REEXPORT STORE PRODUCTS

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ABSTRACT

38 Lithuanian company warehouses were investigated using pheromone traps for Trogoderma granarium and 518 samples from warehouse import, export and reexport products were tested during 1997-1999. Trogoderma granarium - a quarantine pest was not found or intercepted in Lithuania from warehouse products during those investigations. 17 insect species and 4 insect orders were registered in pheromone traps. Sitophilus granarius, Ptinus fur and Psocoptera predominated over the findings. 25 insect species and 6 insect orders from import, export and reexport warehouse products were registered. Sitophilus zeamays, Caryedon gonagra, Ahasverus advena, Cadra cautella were found in Lithuanian import store products for the first time.

Key words: species, registration, abundance, pheromone traps.

INTRODUCTION

Trogoderma granarium - EPPO and Lithuanian quarantine pest (Quarantine, 1997; State News, 2000). This khapra beetle is an economically important species among other pests in warehouses (Varshalovich, 1963; Zakladnoj, 1973). One of the best way to detect store insects in warehouses is to use traps and for *Tr. granarium,* especially with pheromone (Smetnik, 1987; Barak, 1989).

The aim of this study was to search for *Tr. granarium* using traps and determine warehouse insects in import, export and reexport store products.

MATERIAL AND METHODS

The traps were used in Lithuanian warehouses during 1997-1999 investigations. 35 Delta traps sticky inserts and pheromone lures (L 128) for *Tr. granarium* produced by AgriSense company were operated during 1997; 11 Delta traps sticky inserts, 14 Pitfall cone and 8 Grain probe traps (all with the same kind of pheromones produced by AgriSense company) were used during 1998; 3 Delta traps sticky inserts. 29 Pitfall cone, 12 Grain probe traps of AgriSense company - all with pheromone lures for the same beetle species that were produced by Republican laboratory on plant quarantine in Russia (Pyatigorsk) - were used during 1999; 112 traps in total during three investigation years. The attractivity of pheromone was guaranteed for one month after the placement dispensers in a warehouse. One dispenser was used per one trap.

The majority of traps were placed in June (when small quantity of stored grains left after sowing time) and in October-November (after new harvest placing in warehouses). The traps were operated by Lithuanian State Plant Protection Service inspectors in warehouses of 18 companies during 1997. 11 during 1998, 13 during 1999, in total 38 during three years of investigation in different administrative districts. The stored crops in warehouse were following: wheat, barley, maize, rice, buckwheat grains, cacao and coffee beans, soy-beans, hazel nuts, walnuts, groundnuts, sunflower crumbs, rape seeds and mixed grains.

Other samples (from 0,3 to 3 kilograms) were taken from import, reexport and export products by Lithuanian State Plant Protection Service inspectors and delivered to Phytosanitary research laboratory for insects check: 100 samples during 1997, 232 during 1998, 186 during 1999, in total 518 during three years investigation. These products from 37 countries were following: haricot (26 samples tested during 1997-1999), broad beans (3), pea (36), barley (7), rye (4), wheat (13), wheat-flakes (1), oat-flakes (1), buckwheat (18), buckwheat husks (3), rice (22), soy-bean (13), soy-bean-

cake (I), maize (239), maize-cake (1), grain medley (25), sunflower seeds (45), sunflower seeds-cake (I), rape seeds (7), linseeds (2), mustard seeds (1), pumpkin seeds (1), poppy seeds (8), lupine seeds (2), caraway seeds (1), coriander seeds (1), tobacco (7), cotton (2), nuts (20), cacao nibs (10). The sample of product was shaken out from plastic bag on the tray under a lamp (thermal and light effect) according to the insects reaction (Būda, 1996).

All found insects were collected. Living adults were killed by ethylester, and living larvae boiled and fixed into alcohol liquid with a glicerine drop.

Genitalia were preparated using standard method (Komarova, 1983; Ivinskis. 1996). To determine insect species special keys were used (Key, 1964, 1965, 1981, 1986; Handbook, 1999). The insects system was applied as presented in the checklists (Aleksandrovitch, 1996; Lepidoptera, 1996) and for oders as in the keys (Key, 1964, 1965. 1981, 1986).

Frequent abundance of pests (%) was counted as ratio of number warehouses in which species were trapped to quantity of all investigated warehouses.

RESULTS AND DISCUSSION

There were found insects in 14 traps (warehouses of 9 firms) during 1997, in 9 traps (warehouses of 6 firms) during 1998, in 8 traps (warehouses of 5 firms) during 1999, in total 31 traps (warehouses of 20 firms) during three years investigation. It contains 27,7% of all placed traps and 52,6% of warehouses of the investigated firms. Table 1 gives a list of species with indicated number of individuals, living stage of insects, district, localities and date of capturing, crop name, the number of traps and the total number of traps used on the same crop.

Tr. granarium was not found. *Haplotinea ditella* was not earlier registered in Lithuania (Ivinskis, 1993), but it occured in Belarus. According to the latest data (Ivinskis, 1999), this moth species was caught in Palanga bakery, western part of Lithuania, although it usually occurs in bird nests. Other listed species are common in Lithuania and some are well known as pests (Ivinskis, 1993; Pileckis, 1997; Zubrys, 1967). We can see some difference between material collected in Lithuanian farm warehouses during 1962-1964 (Zubrys, 1967) and Lithuanian warehouses during 1997-1999 (presented authors data). Our list of insects is wider, it shows that some beetles (Mycetophagidae) fed on moniliaceous asexual fungi and some (Aphididae) occasionally were brought with fresh harvest. We have determined that frequent abundance of pests in warehouses during 1997-1999 was highest for *Sitophilus granarius* (21,1%) compared to former 5,8%, the abundance of *Psocoptera* (13,9%) was not mentioned in a previous study. Frequent abundance of *Ptinus fur* (10,5%) in our study and earlier registered abundance (13,7%) is similar, as some others (2,6-5,3% in our data and 0,4-5,4% in Zubrys data).

The main pest *Tenebrio molitor* (frequent abundance 42,5% during 1962-1964) was not found during our investigation. Maybe this beetle was a serious pest earlier in other countries. *Tenebrio molitor* is mentioned among 5 other warehouse pests in Poland during 1985-1988 investigations (Pradzynska, 1989), among 9 - in Belgium during 1986-1988 studies (Schiffers, 1988), but isn't pointed out in the latest studies (EPPO Review Service). The level (52,6%) of pest abundance in warehouses during 1997-1999 investigations was similar to a previous study during 1962-1964 (Zubrys, 1967). In Germany the situation of warehouses pest was better: 11% in 1976 and 1,2% in 1986 (Reuter, 1988). The main species were *Orizaephilus surinamensis* and *Cryptolestes* sp. (50% of attacked warehouses), *Sitophilus granarius* and *S. oryzae* (25% of attacked warehouses). A abundance for *Typhaea stercorea* and *Ahasverus advena* was registered.

9 samples with insects were found during testing import, export and reexport store products in 1997, 42 samples in 1998 and 13 samples in 1999, in total 64 samples (12,4% of total number samples) during three investigation years. (In some samples products were damaged, neither living nor dead insects were found). Table 2 gives a list of species with indicated number of individuals, living stage, country, crop name, date of capturing, number of samples in which insects were found, total tested number of samples on the same crop.

Tr. granarium was not found. *Acanthoscelides obtectus, Tenebrioides mauritanicus* are known as import species from earlier sources (Pileckis, 1995, 1997). *Sitophilus zeamays, Caryedon*

gonagra, Ahasverus advena, Cadra cautella determinated were caught in imported products for the first time, but those were eradicated. *Cadra cautella* is registered in Latvia (Ivinskis, 1993). The list of species discovered in import production in our country is similar to interceptions in other countries during the same period (table 3).

CONCLUSIONS

1. The quarantine pest *Trogoderma granarium* was not found or intercepted in Lithuania in warehouse products during 1997-1999.

2. *Sitophilus zeamays, Caryedon gonagra, Ahasverus advena, Cadra cautella* were found in import store products for Lithuania for first time.

3. *Sitophilus granarius, Ptinus fur and Psocoptera* were most abundant pests in *Trogoderma granarium* traps in Lithuanian warehouses during 1997-1999 investigations.

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