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Identification of Species Composition of Harmful Entomofauna in Seed Storehouses of Some Field Crops

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ABSTRACT

In 2018-2019, 8 species of pests were registered in the warehouses of seeds of different crops, which were located in the cities of Yerevan, Abovyan and Masis, (*Sitophilus granaries L., Trogoderma granarium Ev., Tenebrioides mauritanicus L., Sitophilus oryzae L., Rhyzopertha dominica F., Acanthoscelides obtectus Say., Callosobruchus maculatus Fabr., Sitophilus oryzae L., Bruchophagus roddi Guss*). In all three warehouses, wheat and barley were the most infected with pests, while sainfoin was not damaged in any of the warehouses.

Introduction

The high yield of each crop and qualitative characteristics are determined by its seed properties. Seed is the bearer of all the economic and biological features of the variety. The quality of seed depends to a large extent on both cultivation and storage conditions.

One of the important factors influencing the quality of seeds is the creation of necessary conditions for their storage in warehouses. Storage of grain under membrane in enclosed areas often contributes to the development of barn pests, as there is a favorable microclimate and a rich selection of food.

If, as a result of insufficient ventilation, the temperature and humidity of the warehouse increase, reaching the optimal conditions for the development of the pests in the warehouse, then their massive reproduction is expected. The rate of pest damage in stored seeds varies greatly, which depends not only on the geographical location, storage method and quantity of stocks, but also on the species composition of pests, the nature and degree of harm caused by them. The most damage is caused by those types that lead a hidden life, feed on the endosperm and spend their entire lives inside the grain.

Materials and methods

The studies were conducted in 2018-2019 in the warehouses of seeds of different field crops, which were located in the cities of Yerevan, Abovyan and Masis.

The object of the research was the stored seeds, and the aim was to identify the taxonomic composition of pests

therein. In order to identify harmful entomofauna, visual, biological, staining methods accepted in entomology were implemented. Sampling was carried out in accordance with the RA Government's Decree No. 514-N of April 8, 2004 and in line with the procedure of "Providing test samples for phytosanitary examination". The process was carried out in the warehouses under study from seed material packages – bags.

Spot sampling of seed material was performed from each batch. Each spot sample of large-seeded crops should be 20-25 grams, and small-seeded crops should be no less than 10 grams. Spot sampling of stored seed material is done from 5 points. At each indicated point, point samples were taken from 3 layers (www.arlis.am). Samples were taken from different sections and then an average sample was formed, for each layer separately. If there are damaged grains on the surface of the mound and larval molting, then these pieces were selected by hand and attached to the middle sample (www.docs.cntd.ru). The samples of the taken seeds were taken to the laboratory and the species of pests therein were detected with the help of determinants.

Results and discussions

The research was conducted in 2018-2019, in the seed warehouses of various crops, where the seeds of alfalfa, sainfoin, wheat, barley, beans, cicer, peas, buckwheat and corn were stored. Research has shown that some of the seeds in the same warehouse were not infected with pests at all, while others were very strongly infected. The following types of pests have been registered:

1. *Sitophilus granaries L.* (www.cabi.org, www.pesticidy.ru)
2. *Trogoderma granarium Ev.* (Agapova, 2012)
3. *Callosobruchus maculatus Fabr.* (Agapova, 2012, A Handbook on Bean Beetles, Callosobruchus maculatus, 2014)
4. *Acanthoscelides obtectus Say* (Akhremovich, et al., 1976)
5. *Tenebrioides mauritanicus L.* (www.agroxxi.ru)
6. *Sitophilus oryzae L.* (Akhremovich, et al., 1976)
7. *Rhizopertha dominica F.* (Alesho, et al., 2015, www.pesticidy.ru)
8. *Bruchophagus roddi Guss.* (Akhremovich, et al., 1976, www.agroatlas.ru).

The survey results are presented in Tables 1-3.

Table 1. Species composition of pests found in the seed warehouse of the Masis city*

Crop	Pests							
	Sitophilus granariusL.	*Trogoderma granarium Ev.*	*Callosobruchus maculatus Fabr.*	*Acanthoscelides obtectus Say*	*Tenebrioides mauritanicus L.*	*Sitophilus oryzaeL.*	*Rhizopertha dominica F.*	*Bruchophagus roddii Guss.*
Wheat	+	+	-	-	+	+	+	-
Barley	+	+	-	-	+	+	+	-
Buckwheat	-	-	-	-	-	-	-	-
Corn	-	-	-	-	-	+	-	-
Cicer	-	-	+	+	-	-	-	-
Peas	-	-	+	+	-	-	-	-
Sainfoin	-	-	-	-	-	-	-	-
Alfalfa	-	-	-	-	-	-	-	+

*Composed by the authors.

From the data of Table 1 it can be seen that in the considered seed warehouse, the most species composition of pests was recorded in wheat and barley seeds (*Sitophilus granaries L.*, *Trogoderma granarium Ev.*, *Tenebrioides mauritanicus L.*, *Sitophilus oryzae L.*, *Rhizopertha dominica F.*) (Figure 1), then – in cicer, peas (*Callosobruchus maculatus Fabr.*, *Acanthoscelides obtectus Say.*), while corn seeds were infected with one type of pest each.

Figure 1. Batch of barley and wheat seeds infected with pests in the seed warehouse of the Masis city.

Table 2. Species composition of pests found in the seed warehouse of the Abovyan city*

Crop	Pests				
	Sitophilus granaries L.	*Trogoderma granarium Ev.*	*Tenebrioidesmauritanicus L.*	*Sitophilus oryzaeL.*	*Rhizopertha dominica F.*
Wheat	+	+	+	+	+
Barley	+	+	+	+	+
Buckwheat	-	-	-	-	-
Corn	-	-	-	+	-
Sainfoin	-	-	-	-	-

*Composed by the authors.

Figure 2. Batch of barley and wheat seeds infected with pests in the seed warehouse of the Abovyan city.

From the data in Table 2 it can be seen that in the seed warehouse of the Abovyan city, as in the seed warehouse of Masis, wheat and barley seeds were infected with the most types of pests (*Sitophilus granaries L., Trogoderma granarium Ev., Tenebrioides mauritanicus L., Sitophilus oryzae L., Rhizopertha dominica F.*) (Figure 2), whereas corn was infected with one type of pest.

From the data in Table 3, it becomes clear that in the Yerevan seed warehouse, as in the previous 2 warehouses, wheat and barley seeds were again infected with the most types of pests (*Sitophilus granaries L., Trogoderma granarium Ev., Tenebrioides mauritanicus L., Sitophilus oryzae L., Rhizopertha dominica F.*) (Figure 3), then cicer, peas (*Csllosobruchus maculatus Fabr., Acanthoscelides obtectus Say.*) and corn (*Rhizopertha dominica F., Sitophilus oryzae L.*), alfalfa (*Bruchophagus roddi Guss.*) was infected with one pest each and again no damage and pest presence was observed on onobrychis.

Table 3. Species composition of pests found in the seed warehouse of Yerevan*

Crop	Pests							
	Sitophilus granaries L.	*Trogoderma granarium Ev.*	*Callosobruchus maculatus Fabr.*	*Acanthoscelides obtectus Say.*	*Tenebrioides mauritanicus L.*	*Sitophilus oryzaeL.*	*Rhizopertha dominica F.*	*Bruchophagus roddi Guss.*
Wheat	+	+	-	-	+	+	+	-
Barley	+	-	-	-	+	+	+	-
Corn	-	-	-	-	-	+	+	-
Cicer	-	-	+	+	-	-	-	-
Peas	-	-	+	+	-	-	+	-
Sainfoin	-	-	-	-	-	-	-	-
Alfalfa	-	-	-	-	-	-	-	+

*Composed by the authors.

Figure 3. Batch of barley and wheat seeds infected with pests in the seed warehouse of the Yerevan city.

Conclusion

Thus, in 2018-2019, when examining the seed warehouses of different field crops located in the Yerevan, Abovyan and Masis cities, we have identified 8 types of storage pests (*Sitophilus granaries L., Trogoderma granarium Ev., Tenebrioides mauritanicus L., Rhizopertha dominica F., Callosobruchus*

maculatus Fabr., Acanthoscelides obtectus Say., Sitophilus oryzae L., Bruchophagus roddi Guss.),7 of which were representatives of the Coleoptera class, and one – of Hymenoptera. In all three warehouses wheat and barley seeds were infected with the most types of pests and the onobrychis was not damaged in any warehouse.

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