

Insects found in stored-products entering the port of Ravenna, Italy during 1976–91

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Abstract

The paper reports on the insects most frequently found in stored products brought into Italy through the port of Ravenna over the last 15 years.

In order to detect latent infestations, checks were carried out both on arrival of the goods and six months later. A total of 6129 samples was examined, of which 794, or 12.5%, were infested to a varying degree on arrival, while a further 478, or 7.8%, remained infested after six months.

The data recorded for each individual product included country of origin, total number of lots delivered, the number of lots found to be infested on arrival and after six months, and the species of insect involved.

The data recorded for each country of origin included the number of lots found to be infested on arrival and after six months, and the species of insect involved. From the data collected it is possible to identify which products pose the greatest risk in relations to the country of origin, the frequency of infestation and the species present.

The insects found most frequently belong to the following genera, listed in descending order of occurrence: *Tribolium* (*Colydium*), *Oryzaephilus*, *Cryptolestes*, *Sitophilus*, *Rhyzopertha*, *Lasioderma* and *Plodia*.

Introduction

One of the tasks of the Emilia Romagna Regional Authority Plant Protection service is to perform checks on the vegetables and vegetable products arriving at the port of Ravenna, Italy. A laboratory equipped for conducting entomological was established in Ravenna in 1966. In 1976 a specific 'samples store' was established to identify any latent infestations present in the vegetable products imported. This paper reports on the insects encountered in the course of 15 years, from 1976 to 1991.

Materials and Methods

Samples of the various products were taken on arrival, either on board the vessel or immediately after unloading. After being subjected to a detailed entomological analysis, the samples were placed in 2 L glass jars, closed with a cap fitted with a very fine mesh nylon net, and stored in a darkened room at a temperature of 22–27°C.

All perishable products, such as fresh fruit were excluded from the test.

After 6 months the samples were subjected to a second entomological analysis, so that two items of data were recorded for each sample: the situation on arrival and the situation after 6 months.

Results and Discussion

The results of the study are shown in Tables 1 to 3. The numerical values shown in the infestation columns indicate the number of lots of that product found to be infested by the particular species. To avoid making the tables inordinately complex, the degree of infestation is not shown; it should however be noted that lots exhibiting only slight infestation (up to one live insect/kg.) were not, for the purposes of this study, regarded as infested. Moreover, the data on products received fewer than 5 times in the period considered are not included.

The Tables cover a total of 6129 lots, 794 of which (12.9%) were found to be infested on arrival, while a further 478 (7.8%) were found to be infested after 6 months. Overall, more than 20% of the lots received were infested.

Table 1 shows the infestation percentage of the individual products; it will be seen that some products are more likely to be infested than others. Listed in descending order, these products are sorghum (61.8% infested lots), castor-oil seeds (55.5%), crushed carob beans (54.9%), sliced sweet-potatoes (53.9%), sunflower seed (52.4%), tapioca (52%), cotton seeds (50.6%), etc.

Moreover there are some goods, like tapioca, rice, bran and mais extract, that are infested by many species. Other products arrived without infestation, for example: alfalfa meal, sesame extract, soya bean hulls, sugar beet pulp, almonds, origanum and raisins. The other products exhibit varying degrees of probability of being infested.

Table 2 groups the infestants found according to country of origin. A number of interesting findings emerge from a study of this table. Many infested lots arrive from relatively near countries which one would not expect to have this type of problem. This is the case with Spain (59.7% infested lots), the United Kingdom (43.8%), Denmark (42.8%), Albania (34.6%), Yugoslavia (34.5%), Greece (33.2%) and Holland (28.6%). A number of particularly high-risk countries can be identified; excluding those from which less than five lots were received, these include: Colombia (83.3% infested lots), Indonesia (78.3%), Benin (69.6%), Tanzania (69.2%), Spain (59.7%), Sudan (55.8%), Sri Lanka (50.0%), etc. The region posing the greatest potential risk was found to be Central Africa, with an average infestation percentage of 55%.

Table 3 groups the infestants according to the products in which they were found. An examination of this table reveals that the commonest species belong to the following genera, listed in descending order: *Tribolium* (17.8%), *Oryzaephilus* (12.9%), *Cryptolestes* (10.2%), *Sitophilus* (10.0%), *Rhyzopertha* (9.0%), *Lasioderma* (6.5%), *Plodia* (5.9%).

With regard to the infestants, it is noted that most of the mites arrive in Ravenna from the United Kingdom (58.4%) and belong most frequently to the *Glycyphagus* and *Cheyletus*

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Table 1. Infestation (%) by product type

Goods	No. parcel	Infestation (%)		No. of species found
		Arrival	After 6 months	
Alfalfa meal	8	/	/	/
Alfalfa seeds	17	23.5	23.5	4
Almonds	16	/	/	/
Apricot seeds	66	10.6	24.2	5
Barley	377	16.7	21.2	10
Beans	128	3.9	7.03	2
Bran	408	16.9	31.9	16
Broad beans	42	2.4	4.8	3
Canary grass	5	/	25.0	1
Cannabis seed	9	11.1	22.2	2
Carob seeds	135	25.1	41.4	10
Chickpeas	157	5.7	7.0	6
Cinnamon	10	10.0	10.0	2
Coffee	5	20.0	20.0	1
Copra expeller	11	27.3	27.3	6
Coriander seeds	13	/	38.5	2
Cotton seed extr.	73	5.5	16.4	4
Cotton seeds	85	45.9	50.5	11
Crushed carobs	91	41.7	54.9	8
Cytrus pulp	24	/	12:5	4
Dates	38	28.9	44.7	7
Fennel seeds	36	13.8	33.3	2
Fenugreek	16	/	16.2	1
Groundnuts	307	8.8	14.0	11
Groundnuts extr.	89	34.9	42.7	12
Hazelnuts	15	/	/	/
Lentils	244	4.9	5.3	1
Linseed expeller	300	23.0	38.3	12
Linseeds	8	/	12:5	1
Mais extraction	234	5.9	15.8	15
Maize	519	6.1	19.4	15
Millet	32	6:2	12:5	5
Niger seeds	22	9.1	9.1	1
Oats	28	/	3:6	2
Origanon	70	/	/	/
Pepper	20	10.0	10.0	2
Pistachios	75	6.7	32.0	5
Pumpkin seeds	51	13.7	25.5	6
Raisins	471	/	/	/
Rape seed extr.	16	6:2	12:5	4
Rapeseeds	8	/	12:5	1
Rice	277	35.1	40.4	17
Ricinus	18	50.0	55.5	9
Sal seed extr.	12	8.3	41.2	1
Sesame	28	10.7	17.8	2
Sesame extr.	6	/	/	/
Sorghum	34	47.1	61.8	11
Soya bean hulls	5	/	/	/
Soya bean meal	425	3.5	8.0	9

Table 1. (contd.) Infestation (%) by product type

Goods	No. parcel	Infestation (%)		No. of species found
		Arrival	After 6 months	
Soya beans	97	1.0	4.1	4
Sugar beet pulp	26	/	/	/
Sunflower	21	19.0	52.4	8
Sunflower extr.	46	10.7	15.2	5
Sweet potato	76	36.5	53.9	13
Tapioca	50	40.0	52.0	18
Trifolium seeds	49	22.4	24.5	2
Vetch	235	9.4	10.2	2
Walnuts	15	6.7	20.0	3
Wheat	270	23.3	30.7	10
Total	6129	12.9	20.7	35

Table 3. Type of pest found in various commodities.

Pests	Total	Cereals	Leguminous	Oil seeds	Feed products	Various goods
Mites	113	105		1	4	3
<i>Acanthooscelides obtectus</i>	8		8			
<i>Ahasverus advena</i>	31	12		4	15	
<i>Alphitobius</i> spp.	10		1	1	8	
<i>Araecerus fasciculatus</i>	12				12	
<i>Bruchidius perparvulus</i>	12		12			
<i>Bruchophagus gibbus</i>	2		2			
<i>Bruchus</i> spp.	37		37			
<i>Callosobruchus</i> spp.	4		4			
<i>Carpophilus</i> spp.	24		6	1	12	5
<i>Coccotrypes dactyliperda</i>	1					1
<i>Cryptolestes</i> spp.	214	70	5	11	122	6
<i>Dinoderus minutus</i>	1				1	
<i>Ephestia</i> spp.	91	18	24	8	29	12
<i>Gnatocerus cornutus</i>	3			1	2	
<i>Lasioderma serricorne</i>	136	9	23	5	94	5
<i>Latheticus oryzae</i>	23	5			18	
<i>Liposcelis</i> spp.	72	35	6	8	20	3
<i>Lophocateres pusillus</i>	3		2	1		
<i>Necrobia rufipes</i>	6				6	
<i>Oryzaephilus</i> spp.	270	66	51	5	116	32
<i>Palorus</i> spp.	9	1			8	
<i>Plodia interpunctella</i>	123	50	20	12	11	30
<i>Ptinus</i> spp.	1	1				
<i>Rhyzopertha dominica</i>	189	53	2		133	1
<i>Sitophilus</i> spp.	210	160	8	2	40	
<i>Sitotroga cerealella</i>	9	8			1	
<i>Stegobium paniceum</i>	29	1	4		24	
<i>Systole albipennis</i>	16					16
<i>Tenebrio molitor</i>	3				3	
<i>Tenebroides mauritanicus</i>	25	8	2	1	14	
<i>Thaneroclerus buqueti</i>	1				1	
<i>Tribolium</i> (Colydium)	374	67	26	40	225	16
<i>Trogoderma granarium</i>	19	8	2		9	
<i>Typhaea stercorea</i>	17	9		2	6	

families; most of the *Cryptolestes* come from Argentina (19.6%) and China (14.0%); most of the *Oryzaephilus* come from Greece (23.3%); most of the *Rhyzopertha* from Argentina (35.4%); most of the *Sitophilus* from Greece (25.7%) and most of the *Tribolium* from Argentina (21.7%).

The *Tribolium* (*Colydium*) genus is the most widespread and cosmopolitan (together with *Cryptolestes* and *Oryzaephilus*) and was found in lots coming from 36 countries on all the continents except for Australia.

With regard to the individual species, the one found most frequently was *Tribolium* (*Colydium*) *castaneum* Herbst. The commonest species in the *Sitophilus* genus was *S. zeamais* Motsch, followed by *S. oryzae* (L.) and *S. granarius* (L.) With regard to the Lepidoptera, it should be pointed out that the species *Cadra cautella* Walker was included in the *Ephestia* genus.

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