

Conclusions

Due to the fact there are definitely several steps within this treatment needed, it should fall into the above-mentioned Biocide Regulation. For fumigation purposes, only biocide products for product type 18 should be used, which have an approval.

Official feedback given by the German Authority BAuA (Federal Institute for Occupational Safety and Health):

"The storage protection of processed tobacco and tobacco products falls into the regulatory scope of the Regulation (EC) No 528/2012 and it needs a biocide approval. "Processed tobacco" correlates to tobacco after the pass of fermentation, which is in our opinion no simple pass."

ECHA confirmed this opinion too:

"The German competent authority has the possibility to consult with the other national competent authorities and/or to raise formally the issue to the European Commission by requesting a decision according to Article 3 (3) of the Biocidal Products Regulation. The fact that the German competent authority has not made a request for an Article 3 (3) decision indicate that they are confident in the validity of the answer they have provided you with."

Future prospects

However, a same product can be used in several situations and fall under both legislations. Dual authorizations would mean two dossiers, two contacts with different rapporteur Member States respectively evaluating Competent Authorities and two fees. Objective should be a better coordination at EU level and experience sharing between the Member States within the European Union.

A distinct answer by the legislator is required, under which regulatory scope the registration process should be started.

We need a pragmatic solution for the fumigation industry to reduce regulatory workload and costs. To avoid any confusion the industry would welcome a solution again, consisting of a document or database compiling all the answers relating to possible borderline cases. We need clear regulatory guidance.

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Customer complaints about insect contaminated ready meals

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DOI 10.5073/jka.2018.463.239

Abstract

More than one-hundred food complaints about ready meals, coming from mass catering, were analyzed from 2003 to 2017. Even if insects in meals have an enormous negative impact on customers, the percentage relevance, considering the long period and the number of meals served, is negligible. Coleoptera (34%) was the most represented order, followed by Lepidoptera (27%), and Diptera (23%). Coleoptera insects were mainly field

pests, found in salads and spinach, moths were represented by species infesting vegetables (58%) and by stored product pests (42%). Species of hygienic concern were found in Diptera. Few cases of cockroach contamination were reported on different food, but it is important to underline their presence in the meal, as it indicates a heavy environmental infestation and a high hygienic risk.

Keywords: mass catering, food serving, canteen, stored product pests, field pests.

1. Introduction

In Italy, mass catering is worth 6.6 billion euros and each day more than 5 million citizens lunch in schools, hospitals, and companies canteens (Anonymous, 2016). In 2016, Italian mass catering companies amount to 3117 (FIPE, 2017) and provide lunch formed by one portion of pasta or rice, one portion of meat, eggs or fish with vegetables, a piece of bread and fruit.

Complaints about ready meals from customers concern sanitary and hygienic aspects, including insects (Balzaretti and Locatelli, 1993). Insects that contaminate processed food can originate in crops, food industries, and stores (Trematerra and Fleurat-Lessard, 2015). The presence of insect in food repulses consumers and moreover, pests can cause hygienic problems, e.g. cockroaches, domestic flies, and rodents can contaminate food with pathogens (Gorham, 1991). Furthermore, the detection of pests in meals served to children in school canteens is often reported on TV and local press.

Complaints about insects in ready meals served in companies and school canteens, and delivered to Department of Food, Environmental and Nutritional Sciences, Università degli Studi di Milano over the last years, were analyzed.

2. Materials and Methods

Contaminated ready meals, coming from mass catering, were analyzed in the entomological laboratory of University of Milan from 2003 to 2017. Samples delivered by companies following customer complaints amount to 107. The insects were cooked with the food and most of the times the specimens were damaged and lacked features important for identification to species.

3. Results

The insects present in the contaminated samples were mainly Coleoptera (33.6%), followed by Lepidoptera (27.1%), and Diptera (23.4%). Coleoptera were principally field pests, found in salads and spinach, moths were represented by species infesting vegetables (57.7%) and by stored product pests (42.3%).

In table 1, complaints are grouped according to the environment infested. Almost half complaints concern field pests, stored product pests correspond to 23.4%. Occasional pests are predators or parasitoid insects, that are not directly linked to the food. In sanitary concern insects, flies and cockroaches are grouped. In one school canteen, a student found a head-lice in one serving of pasta. Evidently, it came not from the kitchen, where workers wear caps, but from a student's head, as in the primary schools, head-lice problems are seasonally common.

Tab. 1 Percentage of insects detected in ready meals, grouped according to the colonized environment (n=107).

Origin of the insect	Percentage (%)
Field	49.5
Stored product	23.4
Occasional	7.5
Sanitary concern	19.6
Total	100

All food courses were contaminated by insects, but vegetables constitute 40.2% complaints (table 2). Coleoptera adults and moth larvae were detected in salad and spinach, as they can hide among the leaves. Larva of *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) was recorded in a tomato

salad. In pasta and rice, *Plodia interpunctella* (Hübner) (Lepidoptera: Pyralidae) larvae were mainly found; in a few cases, adults of *Sitophilus oryzae* (L.) (Coleoptera: Dryophthoridae), *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae) and *Lasioderma serricorne* (F.) (Coleoptera: Anobiidae) were detected.

Tab. 2 Percentage of courses where insects were detected (n=107).

Food type	Percentage (%)
Bread	10.3
Pasta or rice	28.0
Meat, fish	19.6
Vegetables	40.2
Fruit	1.9
Total	100

In pasta with vegetables, field pests were recorded, e.g. wireworm and noctuids larvae. One adult of *Fannia canicularis* (L.) (Diptera: Faniidae) contaminated one serving of pasta with tomato.

In portions of cooked meat or fish, the main contaminants are flesh-flies or blowflies adults. Only in two cases, field pests were found, coming from the vegetables used in the recipe. An adult of *L. serricorne* was detected in one serving of meat cooked with spices. Larvae of *Piophilidae* (Diptera: Piophilidae) were present in ham plates.

Contaminants of bread belong to different categories. Only three contaminants are flour pests, in three cases insects are of hygienic concern, that is, adults of *Blatta orientalis* L. (Dictyoptera: Blattidae) and *F. canicularis*. Hymenoptera also were recorded, e.g. a parasitoid, an ant and one head of *Polistes* sp. (Hymenoptera: Apocrita: Vespidae).

Only in two cases complaints concerned fruit serving: an adult fruit fly in a fruit salad and one *Periplaneta americana* (L.) (Dictyoptera: Blattidae) adult found by the consumer picking the fruit from a crate.

4. Discussion

Even if the detection of extraneous materials in food rarely happens, this fact causes significant loss of revenue and image to the companies involved. Among foreign matter reported in food, insects are considered one of the most important problems (Lewis, 1993; Edwards and Stringer, 2007). In the cases we reported, insects were detected only in one portion, not in the daily production, and the number of samples, considering the long period of time is negligible.

Insects that contaminate processed food can originate in crops, food industries, and stores (Trematerra and Fleurat-Lessard, 2015; Limonta et al., 2016). The presence of insect in food repulses consumers and moreover, the presence of pests can cause hygienic problems, e.g. cockroaches, domestic flies, and rodents can contaminate food with pathogens (Macovei et al., 2008; Sulaiman et al., 2011; Pava-Ripoll et al., 2012; Wasala et al., 2013). Insects of hygienic concern in this work are mainly represented by Diptera, but also few cases of cockroach contamination were reported on different food. It is important to underline their presence in the meal, as it indicates a heavy environmental infestation and the possibility that good sanitation practices were not strictly followed.

The presence of field insects in vegetables, in particular, if the insect hides inside or in folded leaves, can easily go undetected if there is only one specimen. The matter is different when all the servings are contaminated, as it means that the crop wasn't correctly managed and the kitchen assistants didn't properly control and wash the vegetables.

Staff training is essential, as a careful examination of ingredients and of meals by kitchen assistants that serve food will greatly limit the risk of contamination. The adoption of good practices and regular monitoring is mandatory to guarantee safe meals.

5. References

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Moulds infesting local and imported rice (*Oryza spp*) in Cameroon

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DOI 10.5073/jka.2018.463.240

Abstract

Loss in quality and quantities of rice during storage is an important issue to focus on. Moulds contaminating rice were investigated and their injuries on rice during storage were evaluated. Local and imported rice samples sold in markets and mills were stored for 3 months under laboratory conditions. The contaminated grains were counted and analyzed to characterize storage moulds.

All rice samples evaluated were contaminated by moulds, right from sampling date. The quantity of mouldy grains varied from 1.1% for the rice sample from UNVDA to 4.2% rice brand 'Main dans la Main'. The highest mould infestation in terms of quality and quantity, was recorded on imported rice samples of world rice and 'Main dans la Main' 22.3 and 25.3% respectively; meanwhile 'Tox 3145 parboiled', Uncle Benz and Neima presented 7.5, 8.9 and 8.9% respectively.

In general, imported rice samples contained the highest fungal load with a proportion of 65.9% compared to 34.3% for local samples. Among the 67 isolated strains, the genus *Aspergillus* dominated, followed by *Penicillium*, *Mucor* and *Circinella* with 13.4, 8.9, and 4.4% respectively. Therefore in Cameroon, some locally produced, but mostly some imported rice contain moulds from different genera, which damage rice at different proportions. It is urgent to develop methods to inhibit the growth of potential storage moulds and preserve the quality of rice consumed.

Key words: Rice, contamination, storage, loss, quality.