RESULTS ON DEVELOPMENT OF MONITORING TOOLS FOR STORAGE GRAIN INSECTS

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ABSTRACT

For the purpose of monitoring poisonous insects in storage of grain, flour mills, food industry, and plant originated products it was developed a rapid method to reveal it and insects' density, distribution, level of harm and control method was determined.

Two different pest traps were developed: paper trap and cylinder trap. Results of experimental study showed that these traps were suitable in order to reveal and catch the pests and possible for the use in monitoring studies for the storage poisonous insects. The distribution and density of poisonous insects was established using these traps. The number of caught poisonous insect and their distribution was established by the method of G.A. Zakladnoi and level of harm was determined.

KEY WORDS: Pest trap, wheat, food, plant product

INTRODUCTION

Grain storage is a crucial component of the post-harvest chain. It is practiced by farmers, traders and governments to facilitate marketing and ensure food security. In Mongolia the cereal, wheat, flour meal product, and other plant originated food are used broadly for food application.

Widely used in our country food with plant origin, particularly, grain and wheat products are afflicted by various poisonous insects, mite, and rodents during in saving in grain storages. Therefore the qualities of products are decreased and grain is contaminated with carrion and excretes, thereby becomes resources of causing diseases to human and animals.

Today, when the market economy is rapidly developing in Mongolia, according to the tendency to supply the population with variety of demand the grain, rice, sugar, wheat, vegetables, fruits, and various plant products are imported from neighbor and other countries in the world.

In correspondence to this, even though the changes were made to the control measures of the quality of imported products with plant origin and selling system, implementing measures and standard requirements are still in version that was used during planned economy, standard to collect samples from plant and products with plant origin and to expertise was not innovated since 1976.Therefore, in safety of food it is important to evaluate the quality of imported plant originated products, to keep the safety of products, to meet the requirements for the food hygiene, to provide ecologically-free condition without negative impact to the live organisms, introduce improved modern methods to

analyze rapidly in short time, and to use those methods in monitoring study.

In correspondence, we worked on establishment of revealing the storage pests and determining the distribution and density in short time and a convenient trap for pests was designed under base of studying the widely used pest-trap from other countries, which is suitable in condition of our country and instructions were developed, following to the purpose.

OBJECTIVE

To reveal the poisonous insects and pests at storages and establish the distribution and density with pest-traps.

MATERIALS AND METHODS

Thereby, development for 2 kind of pest trap, one is for catching the pests in grain storage, another one is for catching the pests in flour and food factory and checking in laboratory and factory conditions in order to reveal the pests and establish the distribution and density was successful.

In the frame of the implementation for the "Training for rural development project", provided by Canada, according to the sub-project for the "Methods of monitoring of poisonous insects and pests at storage" in order to reveal the

poisonous insects and pests at storages and establish the distribution and density the pest-trap was developed with cooperation with professors at the School of Engineering, Mongolian State University of Agriculture.

The number of caught pests in pest-trap for the control the poisonous insects and pests in grain sample and products with plant origin at storages was determined by counting and observing every 6, 24, and 48 hours in wheat samples imported from China by placing the trap by 1, 3, and 5 each of them in Laboratory of Pesticide at the Plant Protection Institute.

The pest-trap for catching the pests at storages for the flour and food factories was set up in the "Spirt BalBuram" Co. LTD in every 1st, 2nd, and 3rd floors and every 6, 24, and 48 hours observations and countings were performed. As a result, the number of caught pest was identified and their distribution was established by the method of G.A. Zakladnoi and Level of harm was determined by GOST 13586.6-93 standard.

$$СПЗ \ экз / м^3 = \sum (Пв \ Кв)$$

СПЗ – 1 м^3 – damage coefficient

К$_в$ – damage coefficient

Table 1

Number of insects detected in cylinder trap

Replicates	Time					
	6 h	6 h	24 h	24 h	48 h	48 h
	mite	louse	mite	louse	mite	louse
Trap 1	2	2	3	3	3	4
Trap 2	1	3	3	5	3	4
Trap 3	2	3	4	2	4	3
Trap 4	2	2	3	3	4	4
Trap 5	3	1	2	4	3	4
Total	10	11	15	17	17	19

Table 2

Number of insects detected in counting method

Replicates	Variable					
	1		2		3	
	Mite	louse	Mite		Mite	louse
1	3	2	3	26	2	2
2	4	1	3	22	3	1
3	2	3	3	25	2	2
4	2	2	3	17	2	1
5	3	2	4	17	2	2
Total	13	10	16	108	11	8

Table 3

Number of insects detected in paper trap

Replicates	Time		
	1 stage	2 stage	3 stage
Trap 1	2	1	3
Trap 2	2	2	2
Trap 3	1	1	3
Total	5	4	8

The method to determine the storage insects:

$$X^1_c, X^2_c, \ldots X^1_c = n_1 + n_2 + n_3 / 2Nm$$

$N_1 + n_2 + n_3$ – number of insects detected in sample
2 – Equilibrium coefficient of distributed insects in grain
N – Number of average sample
M – Dimension of average sample, kilo

The method for determination of summa of distribution storage insects;

$$СПЗ = (x^1_c \, k^1_b) + (X^2_c \, k^2_b) + (X^i_C K^i_B)$$

$X^1_c, X^2_c, \ldots X^i_c$ – average density of storage pest insects, kilo
$K^1_b, K^2_b, \ldots K^i_b$ – insect damage coefficient

DISCUSSION

The trap that was developed for the first time in Mongolia is similar with those widely used traps that are used in other countries. Our experimental results of using this trap are in accordance with those of using the trap at the various storages in countries where agriculture and industry are highly developed, like United Kingdom, USA, Canada, Switzerland, and Israel.

CONCLUSION

We have successfully developed the methods for the pest-trap to reveal the poisonous insect and pest in short time. It was demonstrated and determined that this newly designed pest-trap is very useful and suitable for the monitoring studies. Also, instructions on application of trap were developed.Above pest-trap is possible for the use in monitoring studies for the storage poisonous insects and pest. This will be a main tool for quarantine inspectors,

who are able to use this cylinder and paper insect trap in order to reveal the poisonous insects and pest at flour and food factories and grain storages.

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