

Comparison of Mycotoxin Contamination levels of Local and Imported Corn in Iraq

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Abstract

The study included determining pollution level of mycotoxin (aflatoxin, Ochratoxin, T2 / HT2) in local and imported corn in Iraq because it causes health damage and economic losses. In this study, 100 samples were collected from 50 samples of local corn, and 50 samples of imported corn and assayed for mycotoxins test using ELISA technique and the results indicated the presence of the highest infection rates of mycotoxin in the local corn especially aflatoxin, where 28 sample at 56% were ranged between (20.1 - 157) ppb, which is higher than the allowable limits and 22 samples at (44%) were ranged between (5.1 to 2.9) ppb which is within the allowable limits, T2 / HT2 in 16 samples at (32%) of the total samples recorded less than (150) PPb which ranged between lowest value (25.8) ppb and the highest value (74.5) ppb and 34 samples at 68% with the value (0.0)ppb were is within the allowable limits, Ochratoxin, in 33 sample at 66% of the total samples less than (15) PPb recorded readings were ranged between lowest value (1.5) ppb and the highest value (14.3) ppb, and 17 samples at 34% with the value (0.0)ppb, which is also within the allowable limits in our country. Imported corn recorded readings in 24 samples at 48% as found by the three toxins and ranged the results of aflatoxin between the lowest value (0.8) PPb and the highest value (5.6) ppb and 26 samples at 52% with the value (0.0)ppb and T2 / HT2 results were ranged between the lowest value (3.1) ppb and the highest value (148) ppb and 26 samples at 52% with the value (0.0) ppb ochratoxin results were ranged between the lowest value (1.1) ppb and the highest value (5.7) ppb, and 26 samples at 52% with the value (0.0)ppb and all of these results are within the allowable limits in our country. So we conclude from this study that the local corn was highest mycotoxin contamination than imported corn.

Keywords: Aflatoxin; Corn; Elisa ; Mycotoxins ; ochratoxin ; T2 / HT2.

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1. Introduction

Corn is one of the most important economic crops. corn constitutes a large proportion of the components of an concentration diets are more likely to infect with fungi during the growth in the field or during handling and transport or when stored after harvest if it does not dry well [1] fungi infect many economic plants that benefit from it human and animal nutrition and results from such fungal infections lot of diseases that vary in severity resulting many losses, no doubt that the widespread fungi on various types 1.

of food and feed, whether plant or animal in the form of raw material or product a large factory in occurrence of many diseases that infect humans through what is produced from mycotoxins outputs of metabolism of developing environment and it assisted by the ability of different types of them to grow under different environmental conditions [6] Which the researchers made more attention with mycotoxin in various aspects in terms of fungi secreting to it method of secreting secretion and the factors influencing them, as well as the most important environments, along with methods of appreciation and mycotoxin affect human health and animal and observed in animals fed diets containing Mycotoxins decrease the rate of growth or stop completely and reduced milk production, and the animals are more infecting with diseases (reduced immunity) [4,2] adverse impacts on human health, causing liver cancer and virus hepatitis C [9,3].

Toxins t2 also toxic and genetically, and carcinogenic, or toxic nervous and immunologically, and other impacts negatively on the cardiovascular. as well as the severity of toxicity to mammals [5] ochratoxin secreted on oil crops such as corn and its effect depending on the type of animal or bird. Ochratoxin mainly affects the kidneys and cause kidney failure as it affects the metabolism of carbohydrates in the body along with its impact on the membranes of mitochondria which leading to inhibit [10,14,15].

2. Methods and Materials

2.1 Materials

50 samples were collected from imported corn from border points and 50 samples of local corn were withdrawn from state stores.

2.2 Preparation of samples

100 grams of sample taken to be tested and grind by an electric grinding machine to get grinding powder at 70% and then weight 5 grams each of aflatoxin and T2 / HT2 and 10 g for ochratoxin from each sample were conducted by the extraction process by adding (25) ml of methanol 70% for aflatoxin test and T2 / HT2 test and (40) ml of methanol 50% for ochratoxin test and then sampling were shake by shaker for (2) minutes then samples were filtrate by filter paper (WHATMAN NO.1) to obtain the sample extraction, which must be at least (5 ml) for the purpose of completing the examination (measuring the amount of toxins) and according to the recommended way by the manufacture company(NEWGEN) for mycotoxin .

2.3 Measuring

The quantity of aflatoxin , T2 / HT2 , ochratoxin in the extract of each corn sample by (ELISA) Enzyme - linked Immuno sorbent Assay using a (aflatoxin - T2 / HT2 - ochratoxin), which was obtained from VERATOX NEOGEN company.

3. Results

Preliminary results for the quantification of aflatoxin in the local corn reported readings in 28 sample at 56% were ranged between (20.1- 157.1) which is higher than the allowable limit 20 PPb and in (44%) were ranged between (5.1 - 9.1) which is within the allowable limits as it shown in fig(1), while in imported corn aflatoxin readings in 24 samples at 48% were ranged between less value (0.8) ppb and the highest value (5.6) ppb and 26 samples at 52% with the value (0.0) ,which is within the allowable limits .

T2 / HT2 in the local corn recorded 16 samples (32%) of the total samples less than 150PPb readings, which ranged between less value (25.8) ppb and the highest value (74.5) ppb and 34 samples at 68% with the value (0.0) and imported corn results T2 / HT2 recorded in 24 samples at 48% between the lowest value (3.1) ppb and the highest value (148) ppb and 26 samples at 52% with the value (0.0) which all within the allowable limits.

Ochratoxin in the local corn, in 33 sample at 66% of the total samples recorded readings less than 15PPb, which ranged between less value (1.5) ppb and the highest value (14.3) ppb and 17 samples at 34% with the value (0.0) and ochratoxin in imported corn, in 24 sample at 48% of the total samples between the lowest value (1.1) ppb and the highest value (5.7) ppb, and 26 samples at 52% with the value (0.0) and all of these results are all within the allowable limits in our country as it shown in table(1)

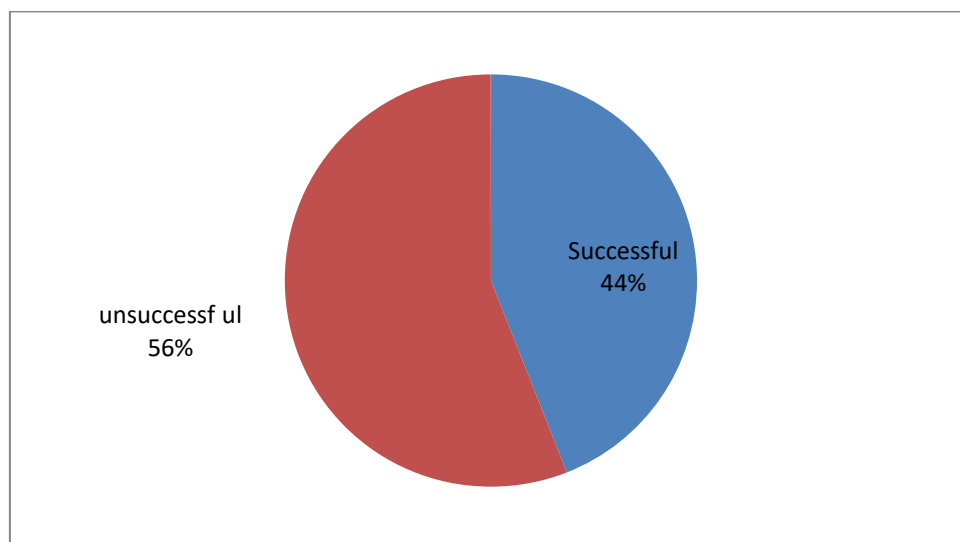


Figure 1: Percentage of Aflatoxin in Local corn

Table 1: Results of samples and Percentage Mycotoxin in local and imported corn

Mycotoxin	Results local corn	No.samples	Percentage ⁽¹⁾	Results	No.samples imported corn	Percentage ⁽²⁾
Aflatoxin (20PPb)	1.5 -9.2	22	44%	0.8 -5.6	24	48%
	20.1 – 157.1	28	56%	0.0	26	52%
T2/HT2 (150)PPb	25.8 - 74.5	16	32%	3.1 – 148	24	48%
	0.0	34	68%	0.0	26	52%
Ochratoxin (15)ppb	1.5 – 14.3	33	66 %	1.1- 5.7	24	48%
	0.0	17	34%	0.0	26	52%

1. The total number of local corn (50)

2. The total number of imported corn (50).

4. Discussion

The study showed the presence of amounts of mycotoxins in samples as it shown in Table (1) in the local corn appeared in the examination of aflatoxin presence of 22 samples (44%) of the total samples were ranged from the lowest value (1.5) ppb and the highest value (9.2) ppb and this results were successful and within the allowable limits in our country, where the limits of rejection is (20) ppb.

It gave 28 sample results at 56% between the lowest value (20.1) ppb and the highest value (157.1) ppb these results failed in a aflatoxin test where it's higher than the allowable limits In imported corn readings were recorded in 24 samples at 48% as found by the aflatoxin and ranged between lowest value (0.8) PPb and the highest value (5.6) ppb and 26 sample at 52% with the value (0.0) which is within the allowable limits and many high rates above the allowable limit of the aflatoxin caused many diseases of animals and humans (which it cause liver damage with blocs fatty and enlarged gall bladder channels and can be transmitted its effects from the mother to the fetus during pregnancy period and the occurrence of defects and death of the embryos , and for humans also cause liver cancer and jaundice liver and lung cancer and analyzed greasy where The reference [8] found that corn is the most widely used in poultry diets, where it was registered 100% total aflatoxin injury.

The average level of contamination and the maximum level total aflatoxin of 80 sample is 110 micrograms / kg, and higher than found in the reference [6] that the maximum level total aflatoxin (18.6) PPb,

5. Recommendations

The cultivation of good varieties with high resistance to toxins, so must assess the mycotoxin test for corn to make sure it is free of mycotoxin before it used for animal feed, as well as the provision of appropriate. Storage conditions and moisture and ventilation and anti-fungal crop corn grains to reduce the growth of fungus.

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