

Development of Detection Method and Occurrence of Citrinin in Corn and Rice from China

Shi-Chun Pei^a, Yu-Ping Zhen^a, Jian-Wei Gao^a, Yan-Li^a, Won Jong Lee^b/^aCollege of Food and Biological Engineering, Qiqihar University,^{161006, P.R. China, ^bDepartment of Food and Nutrition, Gangneung-Wonju National University, 210-702, Korea}**Abstract**

Citrinin (CIT)-protein conjugates antigen was prepared with bovine serum albumin (BSA), ovalbumin (OVA) and keyhole limpet hemocyanin (KLH) using CIT-BSA, CIT-KLH, CIT-OVA, CIT-DCC-BSA and CIT-DCC-OVA. Titration results showed that only anti-CIT-KLH serum highly combines to CIT-BSA conjugate and CIT. Total 88 samples of corn and rice were collected from farms and supermarkets in northeastern China. Among total 88 corn and rice samples tested by IC-ELISA, CIT was not detected in 85(96.6%) samples. Only 1 corn and 2 rice samples were positive.

Introduction

Citrinin is a fungal metabolite and a common food contaminant which can cause the deterioration of liver or kidney function in animals. Corn and rice used in the brewing process have frequently been reported to be contaminated with fungi. In some countries, beer samples have been reported to be contaminated with high concentration of citrinin for the summer season. In this study, we synthesized citrinin-protein conjugates antigen and used mice antiserum to evaluate the occurrence of CIT contamination in corn and rice samples collected from northeastern China.

Materials & Methods

Grain samples were collected from northeastern China in 2013 and were comprised of a total of 88 samples. Citrinin-protein conjugates were synthesized via NHS and DCC. Six 6-week-old female BALB/c mice were divided into 5 groups. Mice in 5 groups were injected subcutaneously with antigen (20 μ g/mouse) of CIT-BSA, CIT-KLH, CIT-OVA, CIT-DCC-BSA, CIT-DCC-OVA, respectively. Indirect ELISA was used for determining antibody titers. To assess the cross-reactivity of the mice antiserum, tests were made using patulin, salbutamol, ractopamine and monascorubin.

Results and Discussion

Anti-CIT-KLH serum can highly combine to CIT-BSA and can less combine to CIT-DCC-BSA, but it cannot combine to CIT-OVA, CIT-DCC-OVA. The cross-reactivity was less than <1% for monascorubin, salbutamol, ractopamine and patulin. ELISA recovery value of CIT from the grain samples was between 81.6%-132%, and the average recovery value was 107.4% for CIT range of 5-500 ng/g, and it proved the method to be accurate. Among total 88 corn and rice samples tested by IC-ELISA, CIT was not detected in 85 (96.6%) samples. Only 1 corn and 2 rice samples were positive.

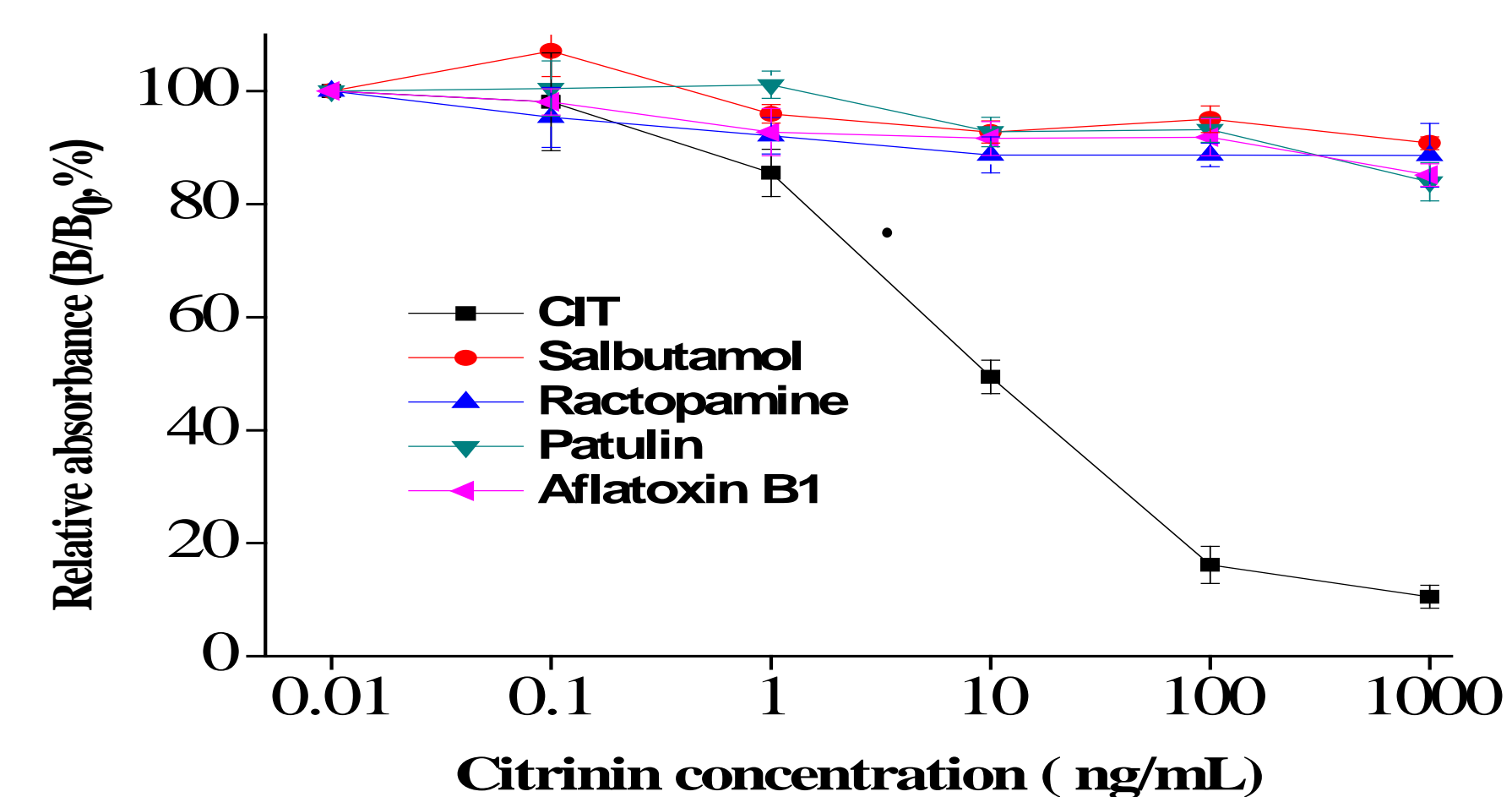


Table 1. Occurrence and range of CIT in samples determined by indirect competitive ELISA

Type sample	of	Total No. of samples	No. of samples with CIT contents in the ranges (μ g/kg)	
			<0.1	>0.1
Corn		45	44(97.8%)	1(2.2%)
Rice		43	41(95.3%)	2(4.7%)
Total		88	85(96.6%)	3(3.4%)

Conclusions

This study shows that the contamination rate of CIT is small in corn and rice samples harvested from northeastern China. However, the risk of CIT in corn and rice from northeastern China seems still exist for public health concern and the CIT concentration should be continuously monitored.