

Report of Arsenic Content in Rice

Introduction

Arsenic is a toxic element naturally present in our environment. It is divided into two groups, organic and inorganic arsenic, with inorganic arsenic being more toxic. Seafood contains arsenic, but mostly the organic form. Rice and rice-based products may contain high levels of the inorganic (more toxic) form. Rice efficiently absorbs arsenic from irrigation water, soil and even cooking water. Some of that arsenic is of natural origin, but pollution is often responsible for higher levels.

The toxic symptoms of dietary arsenic usually take a long time to develop. Long-term ingestion may increase the risk of various health problems, including cancer, heart disease, type 2 diabetes and decreased intelligence. Arsenic contamination is a serious concern for the millions of people who rely on rice as their staple food. Young children are also at risk if rice-based products make up a large part of their diet. You can follow a few simple cooking methods tips to reduce the arsenic content of rice. Also keep in mind that some types of rice, such as basmati and jasmine, are lower in arsenic.

Arsenic is a naturally occurring element in the Earth's crust. It is present in many foods due to absorption from the soil and water. Rice in particular can take up more arsenic than other foods and due to its high consumption can contribute significantly to arsenic exposure.

Long-term exposure to arsenic from drinking-water and food can cause cancer and skin lesions. It has also been associated with developmental effects, heart disease, diabetes, and damage the nervous system and brain.

To protect consumers from excessive exposure, the Codex Alimentarius Commission recommends that the level of Inorganic arsenic in rice should not exceed 0.2 mg/kg.

Methodology

As a part of regulator monitoring activities, NFTL have subcontracted 14 numbers of rice samples to National Food Institute, Bangkok, Thailand to test against Total Arsenic and Inorganic Arsenic. Rice was targeted as it is staple diet in Bhutan and also rice usually contains high level of inorganic arsenic.

Results

The test result shows that, out of the 14 rice samples, in local Japanese rice arsenic was not detected, 13 rice samples contained total arsenic at the detectable level below quantification including 4 rice varieties namely; Basmati Biryani Special, Basmati Mongar, Sencet and local red rice which contained total arsenic at level of 0.373, 0.282, 0.257 and 0.318 mg/kg respectively which is below the maximum level of total arsenic (1.1mg/kg) permitted in food in India.

However, none of the rice samples contained detectable amount of inorganic Arsenic, toxic form of Arsenic.

Table: Inorganic arsenic and Total arsenic in Rice

SL No.	Rice Samples	Inorganic Arsenic (mg/kg)		Total Arsenic (mg/kg)	
		Result	ML (Codex)	Result	ML (India)
1.	Basmati Biryani Special	Not detected	0.2	0.373	1.1
2.	Basmati Mongar	Not detected	0.2	0.282	1.1
3.	Rangeet Parboiled Rice	Not detected	0.2	0.18	1.1
4.	Madan Mohan Boiled Rice	Not detected	0.2	<LOQ	1.1
5.	S. K Gold Rice	Not detected	0.2	0.166	1.1
6	Sencet Rice	Not detected	0.2	0.257	1.1
7	Local Red Rice	Not detected	0.2	0.318	1.1
8	Bhog Rice	Not detected	0.2	<LOQ	1.1
9	Local Japanese Rice	Not detected	0.2	Not detected	1.1
10	Basmati Long grain rice	Not detected	0.2	<LOQ	1.1
11	Broken boiled Rice	Not detected	0.2	<LOQ	1.1
12	Raj Bhog Rice	Not detected	0.2	<LOQ	1.1
13	Shahi Dinner extra long rice	Not detected	0.2	0.197	1.1
14	301 sizer basmati rice	Not detected	0.2	<LOQ	1.1

Note: LOQ-limit of quantification

ML-maximum level permitted in food

Discussion and Recommendations

Since none of the rice samples were detected with inorganic arsenic, there is no potential food safety risk with regards to Arsenic poisoning at present. However, regular monitoring is necessary to avoid exposure to arsenic.

The following are some of the general best practices for Rice which would be helpful in reducing exposure to Arsenic:

- Using plenty of water when cooking.
- Washing the rice before cooking. This method may remove 10–28% of the arsenic.
- Brown rice contains higher amounts of arsenic than white rice. Choosing white rice over red rice, If rice consumption is high
- Choosing rice from the Himalayan region
- Avoiding rice that is grown during the dry season. The use of arsenic-contaminated water is more common during that time.
- Diversifying diet by eating many different foods.