

Agenda Item 11 – Other Business and Future Work

Proposal for ML for arsenic in ric

1. Rice (*Oryza sativa* L.) is the most important staple food for a large part of the world's human population, with over 700 million tones of rice produced annually (Food and Agriculture Organization, 2008). China, India, Indonesia, Vietnam, Thailand and Myanmar currently grow more than 90% of the world's rice, and the vast majority of this rice is consumed in the country in which it is produced. With rice being an important dietary component for many people in Asia, its quality needs to be assured. It is the grain with the second highest worldwide production, after maize ("corn").[1]

2. Rice is eaten directly or processed into breakfast cereal, rice cakes, package mixes, and pet food. Rice is recommended as a substitute for wheat for people with celiac disease, a condition in which the wheat protein gluten damages the intestinal lining and impairs absorption.

Following tables show the export prices from 2000 until 2009, imports of milled rice and exports of milled rice from 2000 until 2006 and rice consumption by geographical region between 2000 and 2008.

Table 1. Export prices (US\$/t foba) of rice, wheat, and maize, 2000-2009.

YEAR	Rice ^b	Wheat ^c	Maized	G5-MU ^e (index 1990=100)
2000	202	147	89	97.18
2001	173	152	90	94.32
2002	192	176	99	93.14
2003	198	177	105	100.12
2004	238	187	112	107.03
2005	286	198	99	107.03
2006	305	217	122	108.74
2007	326	300	164	114.72
2008	650	455	223	125.05
2009 (Jan-Jul)	570	319	169	...

a fob = free on board. b 5% brokens, milled, fob Bangkok. c Canadian No.1 Western Red Spring 13.5%, in store Thunder Bay, domestic, from 1985 St. Lawrence export. d US No.2 yellow, fob Gulf ports. e This index (weighted average of export prices of manufactured goods for the G-5 economies (the United States, Japan, Germany, France, and the United Kingdom), with local-currency based prices converted into current U.S. dollars using market exchange rates) is generally accepted as a proxy for the price of developing country imports of manufactures in U.S. dollar terms. Weights are the relative share in G-5 exports of manufactured goods to developing countries in a base year. The November 4, 2008 file contains the revised time series history 1960-2007; projections 2008-2020

Sources: World Bank. 1984: Commodity trade and price trends, 1983-84. The Johns Hopkins University Press, Baltimore & London. World Bank. 1992: Revision of commodity price forecasts and quarterly review of commodity markets. Washington. IMF. International financial statistics, February 1994, Washington, D.C. 1995-2009: Compiled Data from Development Policy Group (PinkSheet) www.worldbank.org.

Table2. Imports of milled rice (000 t), by geographical region, 2000-2006. (FAO)

Year	World	Asia	South America	N&C America	USA	Africa	Europe
2000	22822.12	11529.16	910.15	2107.28	304.51	4963.37	2977.81
2001	23445.52	9754.95	1035.69	2333.66	405.80	6896.20	3021.70
2002	26837.20	12879.77	761.56	2460.08	409.86	7070.02	3261.58
2003	27377.68	11633.89	1386.64	2482.68	431.30	8100.35	3337.03
2004	27402.52	11825.72	1132.77	2742.05	480.75	7700.66	3548.73
2005	26596.87	10754.34	779.22	2995.67	407.60	8338.95	3321.16
2006	27909.94	12131.91	994.60	2782.43	622.20	8175.56	3533.38

Table 3. Exports of milled rice (000 t), by country and geographical region, 2000-2006. (FAO)

Year	World	Asia	South America	N&C America	USA	Africa	Europe
2000	23545.81	16688.22	1572.00	2759.03	2736.46	422.71	1480.83
2001	26685.41	19813.02	1600.79	2648.27	2622.09	720.64	1287.13
2002	27350.19	20547.79	1186.94	3291.98	3266.87	579.93	1412.32
2003	27858.67	20711.21	1048.53	3810.89	3784.54	666.67	1474.80
2004	29051.38	22153.74	1214.04	3089.29	3066.77	967.61	1566.30
2005	29488.89	21049.58	1700.76	3845.68	3821.59	1186.03	1653.68
2006	30536.67	22034.35	1983.43	3328.76	3303.18	1183.20	1685.97

Table 4. Rice consumption (000 t), by geographical region, 2000-2008. (USDA)

Year	World	Asia	South America	USA	Africa	Europe
2000	393778	353526	12985	3676	15963	2608
2001	413027	371130	13098	3850	17318	2567
2002	406320	363676	13386	3534	17851	2697
2003	412184	366475	14910	3656	19046	2627
2004	407239	360526	14930	3934	19582	2631
2005	412519	366613	14002	3828	19977	2664
2006	418271	371725	13418	4102	20470	2939
2007	426407	378135	14314	4057	21088	3255
2008	432039	383432	14709	4313	21350	2673

4. Arsenic is the chemical element that is a naturally occurring element in the environment. Arsenic is an odorless and tasteless semi-metal that occurs naturally in rock and soil. The World Health Organization says consumption over long periods of time of drinking water containing arsenic in excess of 10 micrograms per liter can lead to arsenicosis, a chronic illness that produces skin disorders, gangrene and cancer of the kidneys and bladder.

5. Arsenic-contaminated inorganic compounds are found in industry, in building products (arsenic-treated wood), and in arsenic-contaminated water. This is the form of arsenic that tends to be more toxic and has been linked to cancer.

6. Arsenic enters the food chain mainly through crops absorbing contaminated irrigation water. Millions of shallow tube wells have been installed throughout Asia over the last three decades pumping water from contaminated shallow groundwater aquifers.

7. Arsenic has been linked to epigenetic changes which are heritable changes in gene expression that occur without changes in DNA sequence and include DNA methylation, histone modification and RNA interference. Toxic levels of arsenic cause significant DNA hypermethylation of tumour suppressor genes p16 and p53 thus increasing risk of carcinogenesis. These epigenetic events have been observed in in vitro studies with human kidney cells and in vivo tests with rat liver cells and peripheral blood leukocytes in humans.

8. Studies have shown that high concentrations of arsenic in soil and irrigation water often lead to high levels of arsenic in crops and are posing an increased food safety risk. At present, twelve countries in Asia have reported high arsenic levels in their groundwater resources. Recent studies have indicated that elevated arsenic in rice may additionally contribute significantly to dietary arsenic intake. Rice is particularly susceptible to arsenic accumulation compared to other cereals as it is generally grown under flooded conditions where arsenic mobility is high. Baseline levels of arsenic are w10-fold higher than other cereal grains, with baseline levels of arsenic being of concern. [2]

9. Arsenic-contaminated rice could aggravate human health when consumed with arsenic-laden drinking water. The widespread addition of arsenic to soils, for example in Bangladesh, is degrading soil quality and causing toxicity to rice. Arsenic contamination is threatening food production, food security and food quality.

10. Legally enforceable maximum contaminant levels for arsenic in drinking water of 10 mg/L have been adopted by most countries that can afford compliance costs, such as in the EU, US and China.[2]

11. While arsenic in water is highly regulated internationally, food arsenic has received much less attention. It is the rural poor in Asia, South America and perhaps continental Africa that will likely suffer most from the contamination of rice by arsenic. In addition, if production yields are also affected as arsenic species are phytotoxins, then a downward spiral of increased poverty and ill health could be what subsistence rice farmers might have no other option but to endure if science and policy ignore this issue. [2]

12. There is no regulation for arsenic level in rice. The Codex Alimentarius Commission (CAC) also does not regulate for arsenic concentrations in rice; indeed, discussions on the regulation of arsenic in foodstuffs have been suspended since 1999 but the CAC concluded at that time that it was necessary to set standards for inorganic arsenic in foodstuffs in the near future [3]. In the UK, there is a general limit of 1 mg/kg (milligram per kilogram) for arsenic in food. Separate limits apply to certain food categories. For instance, ready-to-drink non-alcoholic beverages have a limit of 0.1 mg/kg. The UK regulations were set in 1959 before it was known that inorganic arsenic can cause cancer.

RECOMMEDATION

10. Taking into consideration the social and economic importance of the rice and based upon the above mentioned points, Iran proposes Codex Alimentarius Commission and Codex Alimentarius Commission Contaminants Committee to start a new work to determine a maximum level for arsenic in rice in order to facilitate international trade of this nutritious grain and covering the safety of it.

REFRENCES

1. "ProdSTAT". FAOSTAT. <http://faostat.fao.org/site/567>.
2. Yong-Guan Zhu, Paul N Williams, Andrew A Meharg (2008). Exposure to inorganic arsenic from rice: A global health issue?, *Environmental Pollution* 154 (2008) 169–171
3. "Profile report" , The Ministry of Agriculture, Forestry and Fisheries of Japan, <http://www.maff.go.jp/syohi-anzen/Profiles/arsenic.pdf>