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Control of Ochratoxin A in Coffee to Meet the Standards of Importing Countries: The Guatemalan Experience

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Abstract

For a small country like Guatemala, heavily dependent on the coffee industry for employment, income and foreign exchange earnings, responsiveness to importing country norms on ochratoxin levels in coffee is a necessity. Guatemala produces essentially arabica coffee, processed by the wet method, which may account for the relatively low levels of ochratoxin revealed in laboratory tests of its green coffee. Nevertheless, the industry aims to conduct more in-depth analysis of possible sources of contamination along the supply chain, and to provide information on good practices to the range of key actors (technicians, producers, exporters) to guarantee quality levels. Given the importance of coffee in the country, this should have a positive impact more widely in the agrifood sector with respect to food safety management.

Introduction

Recent publications have discussed the topic of ochratoxin A (OTA) in coffee, related to molds (PETRACCO, 1999; LE BARS and LE BARS, 1999). The first reference to OTA in green coffee beans is in LEVI et al. (1974): it was found that despite very damaged, moldy green coffee beans, only small traces of mycotoxins were detected in commercial roasted coffee. The presence of OTA in samples of commercial roasted coffee was noted by TSUBOUCHI et al. (1988). Over the past few years, the sensitivity of analysis techniques for the detection of OTA has improved, but within certain limits (PETRACCO, 1999)

A study aimed at limiting the consumption of OTA was proposed by the FAO/WHO (Food and Agriculture Organization and World Health Organization) Joint Expert Committee on Food Additives (JECFA), which established a “Provisional Tolerable Weekly Intake” (PTWI) for OTA of 100 ng/kg of body weight. For coffee, STUDER-RHOHR et al. (1995) calculated that the likely intake of OTA was approximately 25 ng per day per person, which is 2.5% of the PTWI. Even though coffee contributes just marginally to OTA intake, some countries have set very strict limits on OTA, constituting a de facto barrier to the importation of coffee. The European Union is currently setting a common limit for its member countries.

One important aspect to be considered is that the negative publicity surrounding OTA could cause a sharp decrease in consumption, jeopardizing the economic and social conditions of the producing countries. This poses a particularly serious problem for countries whose sole cash crop is coffee.

The responsibility of the producing countries regarding the OTA problem is clear. They must make extensive efforts to reduce and prevent the development of molds throughout the coffee supply chain. On this topic, FRANK (1998) shows that prevention programs are the sole means of controlling quality loss caused by molds in coffee. This proposal was supported by the Codex Alimentarius Commission in its 1997 declaration: "As prevention is the best cure, the surest way to protect the consumer from the toxic effects of ochratoxin A is to ensure safe agricultural practices" (cited in PETRACCO, 1999).

Coffee in Guatemala

The cultivation of coffee is fundamental to the Guatemalan economy. Over the last twenty years, it has represented an average of 6.6% of GDP and a third of exports. In the best years (1977-78 and 1986-87), it has represented as much as 10% of GDP and half of total export earnings.

The coffee crop production area is 262,500 ha, which is relatively small. Nevertheless, Guatemala is the world's sixth largest exporter of coffee. There are 61,524 producers, made up of 59,646 small-scale producers, 1,345 small enterprises, 317 medium enterprises and 213 large enterprises. The coffee industry continually employs 11% of the active population, and this proportion rises to 20% during the harvest period.

The Production System

Guatemala produces essentially arabica varieties. The producing regions are located around a latitude of 15° north in mountainous and volcanic areas. Coffee is grown in various microclimates at altitudes of between 500 and 1,900 m with annual rainfall between 1,000 and 5,500 mm. The coffee trees are grown under shade, with conventional cultivation practices. During the harvest, which is done by hand, only the ripe coffee fruit are picked. These are washed in order to obtain a clean parchment coffee, which is then dried directly on the ground, or by mechanical systems if the climatic conditions require it. The majority of coffee is sold by farmers in parchment form, at a 10 to 12% humidity level. A small amount of coffee is sold in fresh cherry form, and processed by third parties.

Altitude is the defining factor in the types of coffee produced. Over the past ten years, the number of low-altitude cultivated areas has markedly decreased, while cultivation in higher-altitude zones has increased, a change that has been brought about by the small-scale producers. Currently, most of the coffee grown is of the "Hard Bean" and "Strictly Hard Bean" varieties (from 1,220 to 1,900 m), making up 70% of the Guatemalan production. These types of coffee are considered high quality, and are harvested during the dry season, which facilitates post-harvest techniques on the farm.

Table I presents the different types of coffee produced in Guatemala as a function of altitude, expressed in meters above sea-level. Table II shows the distribution of export destinations.

Preventive Measures and Outlook

In our opinion, actions taken in order to guarantee the physical and sensory quality of coffee during its processing are also useful in terms of protecting consumer health. In any case, numerous modifications are called for at the critical control points which are already known, and others will need to be determined on the basis of studies underway.

Given the importance of preventing the formation of mold and mold-related toxins throughout the coffee production process, national and international coffee experts were called upon to look at the situation in Guatemala. OTA detection tests were carried out in laboratories on different types of green coffee for export. The results showed either the absence of OTA, or its presence in infinitesimal quantities. Although these findings are reassuring, it is clear that we must continue to be vigilant on this question, following up with the analysis of different samples taken at different stages of the supply chain. The results of the Common Fund for Commodities (CFC)-funded project aimed at improving coffee quality through the control of mold growth will also be of great importance for the producing countries.[1]

In the short term, we plan to organize seminars and disseminate information to various types of actors in the coffee supply chain on control of mold (technicians, producers, exporters) (ANACAFE, 2000a and b). In our view, given the importance of the coffee sector in Guatemala, the effort put into quality control should have a positive spillover effect on other agricultural supply chains in terms of management and reduction of risks of food contamination.

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[1] This project is described in the article by DURIS in this proceedings volume.

Table I. Exports of Guatemalan coffee by type, 1999-2000

(in bags of 46 kg of green coffee)

Type of coffee	Altitude in meters	Volume (bags)	%
Strictly Hard Bean	> 1 364 m	2.92 million	45 %
Hard Bean &	1 212 - 1 364 m	1.52 million	24 %
Semi Hard Bean	1 060 - 1 212 m		
Extra Prime Washed	909 - 1 060 m	1.53 million	24 %
Prime Washed	758 - 909 m		
Other	----------	0.43 million	7 %

Source: ANACAFE.

Table II. Export destinations of Guatemalan coffee, 1999-2000

Country	Share*
USA	48 %
Canada	3 %
Japan	9 %
Germany	14 %
Italy	4 %
Belgium/Luxembourg	4 %
Switzerland	3 %
Finland	2 %
Other	13 %

Source : ANACAFE.

* Volume exported : 6.39 millions bags of 46 kg (green coffee)