

## **Inhibition of *Aspergillus parasiticus* Growth and Reduction of Aflatoxin by Yeast Isolated from *Ragi*, an Indonesian Traditional Culture Starter**

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### **Abstract**

Aflatoxins are secondary metabolites of *Aspergillus flavus* and *A. parasiticus* frequently found to contaminate both food and feed. The toxins have been found to be carcinogenic and their presence in food or feed is strictly regulated. Indonesia's climate with high humidity, temperature and amount of rainfall are supportive of mold growth and hence aflatoxin production. Control of aflatoxin production can be achieved by using competitor microorganisms such as mold and yeast. The objective of this research was to isolate yeasts capable of reducing aflatoxin from *ragi*, an Indonesian traditional culture starter and to evaluate the yeast or its metabolite's activity in inhibiting *A. parasiticus* growth, aflatoxin synthesis and degradation of preformed aflatoxin.

The research showed that *all* isolates reduced aflatoxin production by *A. parasiticus*. *Saccharomyces* sp. of *ragi* NKL gave the highest reduction of aflatoxin (AF) production, i.e. 95.9% for aflatoxin B1 (AFB1); 97.1% for aflatoxin B2 (AFB2); 89.4% for aflatoxin G1 (AFG1); 99.1% for AFG2 and 98.1% for total aflatoxin. The metabolites of the *Saccharomyces* sp. also decreased aflatoxin production by *A. parasiticus*. The yeast also showed ability to degrade preformed AFB1, AFB2, AFG1, AFG2 by 36.4 %; 55.6 %; 37.8 %; and 46.7 %, respectively.

### **Introduction**

Aflatoxins are secondary metabolites produced by mold such as *Aspergillus flavus* and *A. parasiticus*. The molds are frequently found to contaminate both food and feed and may produce the toxin to a harmful level.

The toxins have been reported as class 1 carcinogens and their presence in food or feed is strictly regulated.

Indonesia's tropical climate with high humidity, temperature and amount of rainfall are supportive of mold growth and hence aflatoxin production. The mold could grow during the plantation and may also enter during uncontrolled storage of some cereals and nuts. Several studies had reported high prevalence of aflatoxin in peanut (Dharmaputra *et al.*, 1991) and maize (Roedjito *et al.*, 1994) in Indonesia.

Control of aflatoxins in food can be carried out using physical, chemical and biological approach. Due to their resistant to heat, heating is not an effective mean of reducing the toxins. Chemical treatment to reduced aflatoxin using ammonium has been reported by yielded unacceptable food by sensory evaluation. Biological control of aflatoxin using molds or yeast that competes with aflatoxin producer has been reported, such as the use of "afla-guard" in peanut plant (Gardener, 2005).

In Indonesia, several traditional culture starters, called *ragi*, are commonly used in producing various fermented food. Such *ragi* is usually composed of mixtures of molds and yeasts. These microorganisms are potentially capable of competing with *A. flavus* or *A. parasiticus* thus can be used for controlling aflatoxin production in food. Since *ragi* has been used as food ingredient; the mold and or yeasts contained in *ragi* are generally non toxigenic.

## **Objectives**

The objectives of this research were to isolate yeasts capable of reducing aflatoxin production by *A. parasiticus* from *ragi*, evaluate yeast and its metabolites' ability to inhibit *A. parasiticus* growth and aflatoxin synthesis as well as determine its ability to reduce preformed aflatoxin.

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