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Rice microbial community responses to drying by 915 MHz industrial microwave

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The typical convective heated air-drying methods for rice are not metered to inactivate harmful fungal spores that produce mycotoxins. Some mycotoxins such as aflatoxin are highly toxic and present health hazards to grain consumers. The objective of this study was to investigate the effectiveness of utilizing microwaves (MW) at 915 MHz frequency to achieve rapid rice drying and decontamination of aflatoxigenic fungal spores. Medium-grain rough rice (cv. CL721) at initial moisture content of 23% (w.b.) was dried using a 915 MHz industrial MW set to transmit energy at power levels 5, 10 and 15 kW for 4, 6 and 8 minutes and for rice bed thicknesses 5, 10 and 15 cm. Inactivation of the afaltoxigenc fungal spore (*Aspergillus flavus*) and other bacteria across the bed thickness was studied. For the studied range of processing conditions, aflatoxigenic fungal load was reduced by 2.75 log CFU/g and anaerobic bacterial load was reduced by 3.00 log CFU/g, respectively. Microbial loads were significantly affected ($p<0.005$) by increasing specific energy input; increasing rice bed thickness up to 15 cm had negligible effects on microbial load reduction and variability among the rice layers. This work showed that MW drying of rough rice, especially using the 915 MHz frequency, holds promise as a rapid drying method with potential benefits of microbial decontamination; this may help grain producers combat fungi related problems such as those resulting from mycotoxin contamination, especially aflatoxin, a highly toxic and known carcinogen.

Biography

Griffiths G. Atungulu is an Assistant Professor of Grain Process Engineering in the Food Science Department at the University of Arkansas, Division of Agriculture. His education has been in agricultural engineering with research specialization in grains process engineering. He holds Bachelor of Science degree in Agricultural Engineering from Jomo Kenyatta University of Agriculture and Technology, Kenya and MS and PhD degrees in Agricultural Engineering from Iwate University, Japan. Presently, his program is focused on engineering effective strategies to maintain grain quality and prevent mycotoxin development.

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