

Micro Plasma an Emerging Technology to Eradicate Pesticides from Food Surface

Authors : Muhammad Saiful Islam Khan, Yun Ji Kim

Abstract : Organophosphorus pesticides (OPPs) have been widely used to replace more persistent organochlorine pesticides because OPPs are more soluble in water and decompose rapidly in aquatic systems. Extensive uses of OPPs in modern agriculture are the major cause of the contamination of surface water. Regardless of the advantages gained by the application of pesticides in modern agriculture, they are a threat to the public health environment. With the aim of reducing possible health threats, several physical and chemical treatment processes have been studied to eliminate biological and chemical poisons from food stuff. In the present study, a micro-plasma device was used to reduce pesticides from the surface of food stuff. Pesticide free food items chosen in this study were perilla leaf, tomato, broccoli and blueberry. To evaluate the removal efficiency of pesticides, different washing methods were followed such as soaking with water, washing with bubbling water, washing with plasma-treated water and washing with chlorine water. 2 mL of 2000 ppm pesticide samples, namely, diazinone and chlorpyrifos were individually inoculated on food surface and was air dried for 2 hours before treated with plasma. Plasma treated water was used in two different manners one is plasma treated water with bubbling the other one is aerosolized plasma treated water. The removal efficiency of pesticides from food surface was studied using HPLC. Washing with plasma treated water, aerosolized plasma treated water and chlorine water shows minimum 72% to maximum 87 % reduction for 4 min treatment irrespective to the types of food items and the types of pesticides sample, in case of soaking and bubbling the reduction is 8% to 48%. Washing with plasma treated water, aerosolized plasma treated water and chlorine water shows somewhat similar reduction ability which is significantly higher comparing to the soaking and bubbling washing system. The temperature effect of the washing systems was also evaluated; three different temperatures were set for the experiment, such as 22°C, 10°C and 4°C. Decreasing temperature from 22°C to 10°C shows a higher reduction in the case of washing with plasma and aerosolized plasma treated water, whereas an opposite trend was observed for the washing with chlorine water. Further temperature reduction from 10°C to 4°C does not show any significant reduction of pesticides, except for the washing with chlorine water. Chlorine water treatment shows lesser pesticide reduction with the decrease in temperature. The color changes of the treated sample were measured immediately and after one week to evaluate if there is any effect of washing with plasma treated water and with chlorine water. No significant color changes were observed for either of the washing systems, except for broccoli washing with chlorine water.

Keywords : chlorpyrifos, diazinone, pesticides, micro plasma

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