Study of the sugarcane (Sacharum spp.) antimicrobial activity against the fungi Aspergillus sp. and Fusarium sp.

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Preservatives and synthetic pesticides are commonly used to increase the shelf life of food, however, the uncontrolled use of these substances, especially antibiotics, have shown at times to be either inefficient or more harmful to humans. Therefore, there have been more and more studies on how natural substances are able to inhibit pathogenic or spoilage microorganisms[1, 2, 4]. Given the need of obtaining new antimicrobial substances that may replace the conventional synthetic ones, arises the current work which aims to analyze the antimicrobial activity of the pasteurized sugarcane juice against Aspergillus sp. and Fusarium sp; two fitopathogenic and spoilage fungi, usually found in the food industry. Sugarcane was chosen on account of recent studies that suggest that its β-defensin is highly responsible for its antimicrobial activity. In fact, the defensins are a very specific group of peptides generally featured for being cationic, their low molecular weight (between 5 and 7 kDa), being widely distributed in different tissues and produced by different living beings, fundamental characteristics to determine their action mechanism. Some advantages of the applicability of substances as such, lie, for example, in the fact that most are considered harmless by the World Health Organization (WHO), most of them also add neither color nor odor, can be easily hydrolyzed by digestion and have high thermal stability against ranging in the pH and the action of some proteases as well. Besides, they are an object of studies on new low-impact environmental pesticides and less harmful therapeutic agents for humans and for the environment; they may also be applied to genetically modified plants, and act along with other antimicrobial agents[1, 2, 3, 5, 6, 7].

After juicing the sugarcane, the juice was immediately filtered and pasteurized during 25 minutes at a temperature of 70ºC. The inhibition analysis was performed according to Hillen (2012)[1], using different plates with SDA (Sabouraud Dextrose Agar), with 150 µL of the diluted sugarcane juice at 50, 60, 70, 80, 90 and 100%. The solution was homogenized by the surface of the medium solidified with Drigalsky handles, similar to a surface analysis. After homogenization, three holes were dug onto each plate with 5 mm (0.2 in) on diameter. Using disposable inoculation handles, the measure of a handle of each microorganism of the genus Aspergillus sp. and Fusarium sp was inoculated on the inner walls of each hole. For the purpose of controlling, a plate was prepared, dug and inoculated the same way, without the addition of juice. Once the plates were properly inoculated, they were turned upside down and stored in an oven at 28°C and observed after 24 and 48 hours, when the diameters of the colonies around each hole were measured. The inhibition analysis consists of verifying how much the fungal colony can grow from where it was inoculated to the point that it is inhibited by the antimicrobial agent present on the surface of the plate. The PIC (Percent Growth Inhibition) is the percentage of the colony growth inhibited compared to the control sample. By observing the measures, it concludes that the sugarcane juice has antimicrobial activity against the tested fungi. The juice diluted with water at 90% (90mL of pasteurized sugarcane diluted in 10 ml of distilled water) during 48 hours of action, a PIC of 84% was obtained against Aspergillus sp. The dilution of 70% during 48 hours, a 41% PIC was obtained against Fusarium sp.

Keywords: Antimicrobial peptides; defensins; Fitopathogenic fungi

References