

Influence of Geographical Area of Production on Lectin of Banana

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Abstract. Lectin concept defines a class of proteins or glycoproteins with agglutinating properties on other cells that can reversibly bind carbohydrates without altering their structure. The aim of the present study was to investigate the influence of geographical area of production on lectin of banana. The lectin content, after isolation and purification was evaluated by hemagglutination tests. It was observed that the haemagglutinating activity is different between bananas from different sources. The results suggest that these laboratory determinations can identify the source of origin of the bananas.

Keywords: haemagglutinating activity, *Musa sapientum* lectin

Introduction Lectins are ubiquitous, their isolation is possible from almost any living organisms, including plants, alga, fungus, microorganisms such as bacteria, viruses, invertebrates and vertebrates (Sharon and Lis, 2007). Lectins exhibit a wide range of biological roles, including mediation of cellular and molecular recognition, resulting in immunomodulation, hormone-like, antitumor, antiviral or metabolic activities (Varki *et al.*, 1999).

There is a specific lectin for bananas and it is called BanLec. This banana lectin is a member of the jacalin-related family of lectins, and belongs to the glucose-mannose specific subgroup.

It has been reported as an efficient tool in protecting the organism against HIV as two other HIV drugs already existing on market. These studies indicate that the BanLec is a new and promising member of the group of lectins that are able to inhibit HIV-1 infection through interaction with glycosylation sites on the viral envelope (Swanson *et al.*, 2010). Because glycosylation is not specific for HIV-1, lectins have the potential of inhibiting the replication of a broad spectrum of viruses included hepatitis C virus (Helle *et al.*, 2006).

Aims and objectives. The aim of the present study was to investigate the influence of geographical area of production on lectin of banana.

Materials and methods. For the experiment the vegetal material was bananas (*Musa sapientum*) from different origins: Martinique, Ecuador and Ivory Coast. The bananas were purchased from market and supermarket.

A precise amount of banana from each area was weighed, acetic acid 50 mM was added and were blended for 2-3 minutes. The extracts obtained were kept at 2 °C, for 24 hours to allow the foam to separate from the liquid. After removal of foam the extracts was filtered through filter paper and pH adjusted to 3.5 with acetic acid 1N.

For isolation and purification of lectins, raw extracts were centrifuged at 10000 rpm for 5 minutes. The supernatant was saturated with 80% ammonium sulfate, centrifuged at + 4 °C, 5000 rpm for 30 minutes. Proteins resulting from centrifugation were homogenized with 75 ml PBS. Finally, dialysis against the same buffer for proper removal of ammonium sulphate traces was performed.

The lectin content was evaluated by hemagglutination tests. This test consists in making a serial dilutions of each extract of lectin in wells, followed by adding a suspensions of rabbit erythrocytes, incubation and examining the degree of agglutination. Red blood cells aggregate as a result of interaction of the carbohydrate segment of membrane glycoproteins with agglutinins.

Samples are incubated at room temperature for 24 hours, then examined under a microscope.

Results and Discussion. Haemagglutinating titre corresponds to the highest dilution leading to erythrocyte agglutination. It is consider that this dilution contains one haemagglutinating unit.

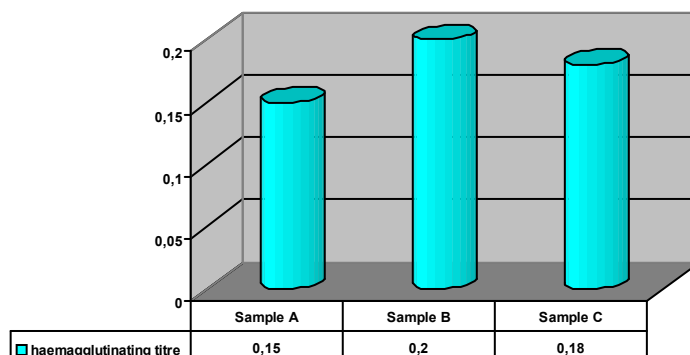


Fig. 1. Graphical representation of haemagglutinating titre
 Legend: Sample A: bananas from Martinique, Sample B: bananas from Ecuador, sample C: bananas from Ivory Coast

The largest amount BanLec lectins is found in bananas from Ecuador, the banana lectins from Ivory Coast are close in value to those. The lowest amount of lectins is found in bananas from Martinique. The differences observed between bananas from different sources analyzed can be determined by conditions of maturation, the particularities of soil and climate of the area of origin of the bananas.

Conclusion. Haemagglutinating activity is most intense in the bananas from Ecuador. The results suggest that these laboratory determinations can identify the source of origin of the bananas. However extensive research is needed to allow validation of specific methods to control and expertise bananas.

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