Centro Nacional de Ciencia y Tecnología de Alimentos
Convenio Cooperativo UCR-MICITT-MAG

Partial Report: Health Aging Project, Development of a model Functional Blackberry, Flaxseed and Soy Beverage

Presented to *International Life Sciences Institute* (ILSI)-Mesoamérica
Elaborated by: Ana Irene Bonilla (undergraduate student)
Approved by: Dra. Ana Mercedes Pérez and Ph.D. Jessie Usaga

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1. General information

1.1. Title: Development of a blackberry, flaxseed and soy beverage: evaluation of its sensory acceptance and profile of bioactive compounds.

1.2. Researchers

Graduation project major Advisor

- Dra. Ana Mercedes Pérez Carvajal, CITA

Graduation project minor Advisors

- Ph.D. Jessie Usaga Barrientos, CITA
- Lic. Carolina Cortés Herrera, CITA

Undergraduate student

- Ana Irene Bonilla, Food Engineering, University of Costa Rica

2. Objectives

2.1. General objective

Develop a functional beverage containing blackberry, flaxseed and soy, targeting the healthy adult population, considering its bioactive compounds content, physicochemical characteristics and sensory acceptance.

2.2. Specifics

2.2.1. Establish 3 prototype formulations to obtain a functional beverage containing bioactive compounds from blackberry, flaxseed and soy using Quality Function Deployment (QFD) technique.

2.2.2. Evaluate the effect of the heat treatment intensity (pasteurization vs commercial sterilization) on the bioactive compounds content and physicochemical characteristics of the prototypes developed.

2.2.3. Evaluate the consumer acceptance of the beverage prototypes using the focus group methodology.

3. Main results

3.1. Preliminary market survey

A comprehensive technical, scientific and commercial bibliographic review of beverages available in the local market (Costa Rica), with similar characteristics or composition that the targeted product, was conducted to obtain the baseline for the product development.

3.2. Consumers interviews

- Ten potential consumers of beverages with similar characteristics to the beverage to be developed were interviewed in order to compile information about types of beverages they usually consume, reasons of consumption, their habits and preferences in terms of flavor, color, texture, appearance and other sensory characteristics.

- Consumers profile: 5 women and 5 men with ages between 31 and 59 years old, belonging to middle class, concerned about their health status and interested in consume functional beverages and fruit or vegetable based beverages were interviewed.

- Main findings:
  - Consumers prefer sugar free beverages with no added artificial sweeteners.
  - Also, they are looking for "natural" products, with few ingredients and no added preservatives or colorants (clean label).
  - They mentioned that a thick consistence was preferred as it is related with more fruit content.
  - The characteristics or requirements of the consumers were ranked in order of importance (more important to less important) as follows: taste, no sugar added, nutritional content (benefits of consumption), texture and appearance.

3.3. Beverage development

- Three beverage prototypes prepared containing blackberry, flaxseed and soy, natural sources of bioactive compounds –ellagitannins, isoflavones and lignans, respectively–, were developed.

- Prototypes processing conditions and formulations (shown in **Table I**) were established based on the information compiled from bibliographic research, consumer interviews, and using the "Quality Function Deployment" (QFD) technique to translate consumer requirements to technical specifications and characteristics.

Table I. Prototypes' formulations

Ingredient	Percent (%)		
	Prototype 1	**Prototype 2**	**Prototype 3**
Press blackberry juice	38,00	45,00	35,00
Soy beverage	38,00	30,00	45,00
Ground flaxseed	9,00	10,00	10,00
Water	15,00	15,00	10,00
Total	100,00	100,00	100,00
Stabilizer*	0,10	0,10	0,10
Sweetener (stevia)*	0,01	0,01	0,01

*Relative to the total

• Prototypes process description: frozen blackberry fruit is crushed and pressed to obtain a press blackberry juice, then the flaxseed is ground, and the soy beverage powder is rehydrated with water (6:1 water: soy powder proportion). Rehydrated soy beverage, water, ground flaxseed, stabilizer and sweetener are mixed. Once mixed, the press blackberry juice is added. When all the ingredients are mixed, the prototypes are pasteurized and packed.

• Also, heat treatment conditions were stablished based on the formulations shown in Table I and the physicochemical characteristics of the prototypes (specifically pH value), in order to obtain a pasteurized beverage (71,1 °C, 3 s) and a commercially sterile beverage (85 °C, hot-filling process)

3.4. Development of analytical methods

High performance liquid chromatographic (HPLC) analytical methods were developed to determine the content of phenolic compounds in the beverage prototypes, specifically ellagitannins from blackberry, isoflavones from soy and lignans from flaxseed.

4. Pending activities

• Evaluation of the effect of heat treatment intensity (pasteurization vs commercial sterilization) on the content of bioactive compounds (ellagitannins from blackberry, isoflavones from soy and lignans from flaxseed) and physicochemical characteristics of the beverage prototypes.

• Evaluation of consumer acceptance of the beverage prototypes using the focus group methodology
- 2 sessions with 6-8 potential consumers each one
- Consumers profile: middle class healthy adults with ages between 30 and 64 years old, concerned about their health and interested in consume functional beverages and fruit or vegetable based beverages.