EFFECT OF COMPOSITE EDIBLE COATING FROM *AMARANTHUS CRUENTUS* FLOUR AND STEARIC ACID ON REFRIGERATED STRAWBERRY (*Fragaria ananassa*) QUALITY

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Abstract — A composite coating from *Amaranthus cruentus* flour and stearic acid (10 g stearic acid/100 g flour, 26 g glycerol/100 g flour and stirring speed at 12000 rpm) was applied on fresh strawberries in order to verify the effect on its quality. Other treatments were effected to comparison: PVC film, bilayer coating of the optimized formulation, optimized formulation without stearic acid and a control group of fruits (not coated). Fruit quality was evaluated by weight loss, mold spoilage, firmness retention and surface color development. The weight loss increased with the storage time for all treatments and the firmness decreased, however, the optimized coating was the most effective for the firmness retention of fruits among the edible coatings studied (excepting PVC film). The same trend was observed for the surface color development; the optimized coating resulted in a minor increase in the ratio of chromaticity parameters (a/b) as a function of storage time.

Keywords — edible coating, *Amaranthus cruentus* flour, stearic acid, strawberry quality.

I. INTRODUCTION

Edible coatings have long been known to protect perishable food products from deterioration by retarding dehydration, suppressing respiration, improving the textural quality, helping retain the volatile flavor compounds and reducing the microbial growth (Debeaufort et al., 1998). In this way, the application of edible coatings on fresh fruits like strawberries can provide an alternative method to extend the post-harvest life, reducing quality changes and quantity losses, and can also result in the same effect as modified atmosphere storage in modifying the internal gas composition (Park, 1999).

The types of materials used to elaborate edible coatings include lipids, resins, polysaccharides and proteins (Krochta and Mulder-Johnston, 1997). Each group of material has certain advantages and disadvantages and, for this reason, many coatings are actually formulations of any or all of the above (Baldwin et al., 1997). The use of natural mixtures of protein, polysaccharides and lipids from agricultural sources, to take advantage of each of these components in a ready system, appears as a new opportunity of material in the area of edible films.

Amaranth (*Amaranthus* spp.) is a tiny grain (~1 mm diameter) typical from South America. The *Amaranthus cruentus* specie presents a composition of 15-22% protein, 3.0-11.5% fat and 9-16% dietary fiber, depending on cultivation technique and environmental effects. The main constituent is starch, 48-62%, with small granule size (<1 μm), which can be easily dispersed and hence it may yield good properties of resultant films and coatings (Tosi et al., 2001). These characteristics of composition makes the *Amaranthus cruentus* flour an interesting source of raw material for the edible film technology (Tapia et al., 2005).

The aim of this work was to study the effect of a composite coating from *Amaranthus cruentus* flour and stearic acid on the quality maintenance of fresh strawberries under refrigeration.

II. METHODS

A. Raw material

Amaranth flour was prepared using the mature seeds of *Amaranthus Cruentus* cultivar “BRS Alegria”, provided by Embrapa Cerrados (Brazilian Company of Agropecuany Research - Federal District - Brazil). After harvest the seeds were cleaned and stored at 20 °C in sealed containers until tested. Flour was obtained using the modification of the alkaline wet milling method of Perez et al. (1993), such as proposed by Tapia et al. (2005). Glycerol and all chemicals used were reagent grade and were purchased from Synth (São Paulo, Brazil).

B. Preparation of Coating Formulation

The composite coating from *Amaranthus cruentus* flour and stearic acid studied in this work was prepared from an optimized formulation defined previously by Colla et al. (2006), using an experimental design (Central Composite Rotatable Design - 2³ with 6 axial and 3 central points, resulting in a sum of 17 experiments). The optimized parameters of this formulation were stearic acid concentration (10g/100g of amaranth flour), glycerol concentration (26 g/100g of flour) and stirring speed in the step of stearic acid incorporation on the amaranth flour suspension (12000 rpm). The coating suspension was prepared using the following procedure: amaranth flour and distilled water (4.0 g/100 mL solution) was