



UNIVERSITÄT
HOHENHEIM

INSTITUT FÜR AGRARTECHNIK

Agrartechnik Tropen und Subtropen

Prof. Dr. Joachim Müller

Master-Thesis

Environmental Protection and Agricultural Food Production

cand. M. Sc. Kristin Stadelmeyer

**Development and quality evaluation of pastries enriched with
coffee flour produced from Costa Rican coffee cherries**

This work was financially supported by the
Foundation fiat panis

Submitted: 21.12.2023

Abstract

Costa Rica is an important producer of high-quality Arabica coffee, with high levels of associated waste generation during coffee production. As an alternative, these residues can be processed into nutritious food products. One promising option is the production of coffee flour from the coffee cherry skin and pulp. Considering this, and to reduce food wastage, this study discusses the production and use of coffee flour as an ingredient in the development of dietary fiber rich pastries with baking powder (plain cake) and baker's yeast (sweet yeast bread). Additionally, this study seeks to evaluate the effect of coffee flour and its nutritional and physicochemical properties on the nutritional, physicochemical and sensory properties of the pastries.

Pastry recipes with 4.49 %, 8.99 % and 15.73 % coffee flour were produced and used in both plain cake and sweet yeast bread. Recipes made only with wheat flour served as reference. The content of ash, protein, total dietary fiber, caffeine, tannin was determined for coffee flour and the pastry formulations. Further sample evaluation were particle size distribution of the coffee flour, color and volume determination of both pastry types and yeast dough rise only for the sweet yeast bread formulations. Hedonic evaluation of the overall acceptance, crumb color, smell, taste and texture (consistency) of the coffee flour enriched pastries was conducted with a consumer panel.

The results show that the use of coffee flour led to a reduction in the protein content, and an increase in the ash, caffeine, and dietary fiber content of the pastry recipes. The dietary fiber content in coffee flour (36.46 g 100 g⁻¹ db) resulted in pastries fulfilling the European health and nutrition claims, "source of fiber" and "high fiber". Tannins were only detectable in pastry recipes with the highest coffee flour level. Baking trials demonstrate that coffee flour reduced volume of the pastries and the rise in yeast dough. The addition of coffee flour in pastries led to a darker crumb color with a higher red and a lower yellow content. Sensory quality of pastries enriched with coffee flour was found to be generally lower compared to the respective control recipe. However, the results of the sensory analysis demonstrate that acceptable plain cake and sweet yeast bread recipes were obtained by lowest coffee flour addition, thus making coffee flour a promising food ingredient for pastry recipes.

Increasing the proportion of coffee flour not only influenced the nutritional value but also increasingly impaired the physicochemical and sensory properties of the pastries. Thus, further research is recommended with the aim of optimizing plain cake and sweet yeast bread recipes to find an optimal compromise between nutritional, physicochemical and sensory properties. On top of that it is necessary to investigate whether phenolic compounds and natural plant color pigments occur in coffee flour and are therefore responsible for changing the taste and color of pastries enriched with coffee flour.

Key words: Coffee by-product, Coffee cherry skin and pulp, Coffee flour, Dietary fiber enriched pastries