



UNIVERSITÄT
HOHENHEIM

INSTITUT FÜR AGRARTECHNIK

Agrartechnik Tropen und Subtropen (440e)

Prof. Dr. Joachim Müller

Master thesis

Environmental Protection and Agricultural Food Production

Agricultural engineering

cand. M. Sc. Anne Schlösinger

**From waste to taste: Recycling of the coffee by-product
“fresh pulp” into fruit spreads**

This work was financially supported by the Foundation fiat panis

Submission: 01.02.2024

Abstract

During coffee production, only 40 % of the coffee cherries (i.e., the coffee beans) are used. The remaining 60 % of the coffee cherries are usually regarded as waste and disposed as, e.g., part of animal fodder, incinerated, or used as landfill mass, causing health and environmental problems. As coffee cherries are known to contain health-beneficial ingredients, recycling of these by-products into foods has the potential of making those health-beneficial ingredients available for human consumption, reducing the waste amount and the issues linked with the disposal substantially and providing an additional income source for coffee farmers, which often suffer financially from the low coffee prices on the world market.

This study investigated the recycling of coffee pulp into fruit spreads and evaluated them considering their taste and nutritional composition. Therefore, three formulations have been developed, each in a high and low-sugar version: plain coffee pulp, coffee pulp with pectin, and coffee pulp with guava.

Typical stability parameters (moisture content, water activity (a_w), Brix degree ($^{\circ}\text{Bx}$), and pH) were analyzed in the developed products together with the main nutritional values, including the total sugar profile, mineral matter, dietary fiber, and fat content. Secondary plant metabolites (caffeine and tannins) were also analyzed as well as the color. The consumer acceptability of the products was evaluated by a sensory evaluation (hedonic test) on three of the developed fruit spreads.

The high-sugar versions met the requirements for stable food products concerning the stability parameters. In contrast, the low-sugar versions did not reach the desired values, implying that further optimization should be sought. Both versions showed high mineral matter and dietary fiber contents within the product group of jams and fruit spreads, whereby the low sugar versions showed more than double of the contents measured in the high sugar versions. Considering the caffeine content, the herein developed products had a maximum caffeine content of 60 mg/g per serving (20 g). They can thus be considered safe for adult consumption. However, higher contents in such products might be possible depending on natural variations of the caffeine content in the raw material. Regarding the sensory evaluation, the high-sugar recipe with guava was rated best by the consumers, followed by the high-sugar plain recipe and the low-sugar plain recipe on the last place.