PhD Topic CLIFOOD - 5 - UHOH
Long-term Scholarship 2021 – 2024 (South-North)

Within the German-Ethiopian SDG Graduate School: Climate Change Effects on Food Security (CLIFOOD) coordinated by the Institute of Farm Management (410b), University of Hohenheim, Germany and Hawassa University, Ethiopia

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DEVELOPMENT OF FAST IN-LINE CYANIDE DETECTION METHOD AND CASSAVA LEAF-BASED FOOD PRODUCTS

Discipline
Agricultural Engineering

Main discipline
Food Science & Technology, Nutritional Science

State of the art
Cassava (Manihot esculenta Crantz) ranks as one of the most important crops grown nearly in 105 tropical and subtropical countries. It is considered as a 21st century crop because it responds positively to the food security, global economy trends and climate change challenges. It is a staple food for one billion people and an important source of diet in tropical countries. Cassava is mainly grown for its starchy roots while the stem, leaves and petioles are mainly considered as waste. In addition to the roots, a huge economic value lies in cassava leaves which contain 17-38% (on dry weight basis) protein. In some countries, cassava leaves are used as a source of protein, vitamins and minerals. However, in many countries cassava leaves are not consumed at all due to low digestibility, antinutrients, toxicity and taste. By using a green bio-refinery approach, cassava leaves can be exploited as a sustainable source of protein, minerals and vitamins and can contribute to food and nutritional security. On the other hand, the cassava by-products (stem, leaves and petioles) and cassava root processing by-products can be utilized for food and feed by developing simple processes and education.

Casssava toxicity is mainly due to cyanogenic glucosides, which are present in cassava plant tissues in three forms, that is, mainly linamarin (95%), lotaustralin, cyanohydrins and free cyanide. Therefore, cyanogenic potential or total cyanide is the amount of HCN released from the above mentioned three cyanogen forms. Different analytical methods such as enzymatic assay, picric paper method, liquid chromatography/tandem mass spectrometer (LC-MS/MS) method are used for determining the cyanide content in cassava and cassava products. However, these methods are expensive, time consuming, require hazardous chemicals and require specific skills. There is a need to develop accurate, fast and economical detection of cyanide content in cassava-based products.

Research objectives
- Develop accurate, fast, in-line and economical detection of cyanide content in cassava-based products
- Establish correlation between the results obtained by picrate paper method, colorimeter Near-infrared (NIR) spectroscopy, and imaging techniques
- Simultaneous detoxification of the cassava-products during processing
- Develop cassava leaf-based food products according to local preferences

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Federal Ministry for Economic Cooperation and Development

Study program and expected results
The study program at our institute will provide knowledge, skills and training to the Ph.D. student about the state-of-the-art postharvest technologies developed in Hohenheim.

Logistics
Samples of cassava leaves will be required

Target region (in Ethiopia) or country (in East Africa Region)
Ethiopia

Work content
- Field work: 20%
- Lab work: 50%
- Desk work: 30%

Required qualifications of the applicant
M.Sc. in Agricultural Engineering, Food Science, or Food Technology

Methodological competence of the applicant
- The applicant should have chemical and lab expertise
- Data processing and management
- Good knowledge of one or two programming languages

Supervisor and Institute
Advisory team: Dr. Sajid Latif, Prof. Dr. Joachim Müller, Agricultural Engineering in the Tropics and Subtropics, University of Hohenheim

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