**University of Hohenheim**

Institute of Crop Science

# Nutritional profile and yield of various amaranth accessions grown at different locations and altitudes in Peru

Master Thesis

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Matriculation number: 621832

submitted

in November 2017

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***This work was financially supported by the Foundation fiat panis***

**Abstract**

Amaranth is an Andean grain, considered native to central and southern America. Its valuable nutritional content, excellent adaptability to different environments, genetic diversity, food culture and traditions associated with its grains, have been the basis of its extensive use in the Andes over centuries. As knowledge and information about nutritional values on existing local amaranth accessions in the Region of Cusco, Peru was scarce, this research study aimed to identify promising amaranth accessions with regard to their nutritional value and grain yields, and to gain more insight about their comparative advantages. The determined traits included yield, protein content, oil content, fatty acid profile, and total phenolic content. Different accessions including different grain colors grown at five different locations and altitudes ranging from 2800 to 3200 m.a.s.l. were investigated in this study. A farmer's survey was conducted by face to face interviews, where the gathered information included general farm details, soil properties and amaranth cultivation on the farm from the seeding over the harvest until the usage. Soil samples were taken during the field work and analyzed for their properties and nutrient status. These results showed the different kinds of nutrients available in the soil in some of the investigated locations, which could have an effect on the composition of the grains. Total protein, total phenolic and crude oil content ranged between 9-17 %, 17-164 mg GAE 100 g-1 DW, and 6-9 %, respectively over all investigated grain colors and altitudes. Although the amaranth oil content was in a lower range when compared to oilseed crops, its fatty acid profile showed a high level of unsaturated fatty acids, relevant for a healthy diet. The findings in this study regarding the nutritional health benefits of different amaranth accessions in the Region of Cusco, Peru revealed their potential to contributing to food security where it is cultivated and consumed. The grain yield was measured using the parameter thousand grain weight (TGW), which ranged between 0.54 and 1.22 g over all investigated grain colors and altitudes. TGW might be genetically influenced as different accessions were investigated. The yield aspects are particularly important in the development of small-scale agriculture as many farmers wish to optimize yields and profits for their efforts. As a consequence, farmers' income can be increased and rural poverty decreased. Finally, it was concluded that characterizing the nutritional value could also improve the market development of new amaranth products for specific purposes and contribute to an increased used of amaranth grains in human nutrition.