





Bundesministerium
für Ernährung
und Landwirtschaft

HealthyLAND: Agricultural Production Systems for Human Nutrition – Work Package 3

Country	Kenya, (Malawi), and Uganda
Funding Agency	Federal Ministry of Food and Agriculture – BMEL
Project executing Agency	Federal Office for Food and Agriculture – BLE
Coordinator	Justus–Liebig University Giessen, Germany
Partners	Justus–Liebig University Giessen, Germany; University of Hohenheim, Germany; Egerton University, Kenya; Makerere University, Uganda; and Lilongwe University for Agricultural and Natural Resources (Lilongwe), Malawi.
Project Budget	2813FSNu05 (UHOH): 159.188,23 €
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Key Words	Plant Production

Background	<p>The “Hunger statistics” of the UN nutrition program shows malnutrition as a cause of death yearly for 1.5 million children worldwide under the age of five. Even though the global agricultural system produces enough food, local access to nutritious, affordable and culturally acceptable foods remains a large problem.</p> <p>The HealthyLAND program conducts research on the connections between Agriculture, Nutrition, and Environment. The main hypothesis is that through improved agricultural production methods based on ecology and an increased biodiversity, the diversity of foods and therefore the access to nutrients increases. The project includes three research areas: Agriculture, Nutrition and Health, and Socio-economics, and is present in two regions of East Africa: Kapchorwa, Uganda and Teso South, Kenya.</p>
Objectives	<p>The more specific goals of the University of Hohenheim included: (a) the knowledge-base and motivation for using current production systems, the importance of a diversified agricultural system, and collecting the current production and income generating methods; (b) assessing the readiness to try different agricultural production methods; (c) find and analyse the connection between agricultural innovation and nutritional quality in a regional context; (d) calculate labour budgets of different agricultural production methods; and (e) generate and transfer knowledge about improved agricultural production systems considering human nutrition aspects for all project regions.</p>
Results	<p>Soils and the plants growing on them provide the base for human nutrition. The choice of cultivated plants and their management (e.g. fertilisation) can, in the smallholder systems of East Africa, influence the quality and amount of produced foods. Household surveys, farm maps, crop lists, and yields were captured. In addition, soil and plant samples were collected and analysed for fertility and nutrient concentration.</p> <p>The data can be used to create recommendations for possible agricultural management options to improve the quantity and quality of produced foods. Additionally, recommendations can be made to improve agrobiodiversity levels, as well as soil fertility.</p> <p>To capture the current situation, 400 households were interviewed, anthropometric measurements taken, the dietary diversity captured, as well as gathering information on their health situation (e.g. vaccinations). The Body Mass Index (BMI) was calculated for the different family members to identify potential signs of malnutrition. Combining the BMI with the dietary diversity, can give indicators of missing nutrients and therefore interventions can be identified. Training courses to improve dietary diversity were created taking the above mentioned points into account, as well as considering local conditions.</p> <p>Diversifying agricultural production offers an increased income security as well as an increased food and nutrition security. To measure the possibilities of a higher diversification in agricultural production, income and expenses of households were measured as well as the labour availability and current cost.</p> <p>The data was used to identify possible bottlenecks for a higher on farm diversity. The collected data was used as a base for developing training materials for farmers on agriculture, health, and nutrition.</p> <p>Areas with a higher soil fertility produced crops with a higher nutrient concentration and yields. A higher crop diversity showed a positive effect in the region with a higher fertility, whereas the region with lower fertility showed a neutral effect to crop diversity. A dilution effect was also identified in the food crop part with nutrient concentration compared to yield when the soil fertility was higher. The effect of soil fertility was independent of plant type and produced foods with a higher nutrient concentration.</p> <p>The results of the project showed that micronutrient content in produced foods and their yields are strongly affected during drought. Different drought intensities led to different effects on nutrient concentrations in foods, an effect that has not been researched deeply before. While severe droughts reduce food nutrient concentrations, mild droughts can actually increase nutrient concentrations.</p>

<p>Photos</p>	 <p>Low yields are highly correlated with soil degeneration.</p>	 <p>Farmers during an agricultural training session in the farmer field schools in Uganda</p>
	 <p>Data collection in the agricultural sector</p>	 <p>Local possibilities to diversify diets</p>
<p>Recommendations</p>	<p>In the context of climate change, the findings could identify a potential “double burden”, affecting both quantity and quality of foods, which has not been identified before. The natural dilution effect that has been identified in soils of medium fertility should be further researched as it can potentially severely affect food quality. A higher crop diversity on soils with medium fertility can lead to higher nutrient concentration in produced foods. In addition, following recommendations for improving food and nutrition security can be made:</p> <ul style="list-style-type: none"> • Investments and improvement in infrastructure and improved road networks to decrease transport costs • Improved communication technologies and internet access for better information concerning market price changes and organising smallholder farmers • Improved market access and increasing the intraregional 	