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Assessment of the importance and utilization of cowpea (*Vigna unguiculata L. Walp.*) as leafy vegetable in small-scale farm households in Tanzania – East Africa

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Introduction

Among African leafy vegetables, cowpea (*Vigna unguiculata*) is one of the highly appreciated species according to a comprehensive survey from four African countries, namely Malawi, Uganda, Rwanda and Tanzania (KELLER 2004; WEINBERGER AND MSUYA 2004) conducted within the collaborative project 'Promotion of Neglected Indigenous Vegetables for Nutritional Health in Eastern an Southern Africa' (ProNIVA). Cowpea is an important food legume, and its use as a leafy vegetable is essential in many African countries. Drought tolerance, short growing period and its multi-purpose use make cowpea a very attractive alternative for farmers who cultivate in marginal, drought-prone areas with low rainfall and less developed irrigation systems, where infrastructure, food security and diminishing malnutrition are major challenges.

However, despite its regional importance, cowpea's use as leafy vegetable in many African countries has been widely neglected in research and improvement programs (BARRETT 1990; SCHIPPERS 2002), and it can, therefore, be considered as a neglected crop. Although lately, some research has been carried out on African indigenous vegetables, especially leafy ones, cowpea research continued to focus on improvements of the grain and/or the entire herbage for animal feed (SINGH ET AL. 2003). Yet it is the leaves of some legumes, like cowpea, that show much promise for producing part of the vastly increased supplies of nutrients that the world population needs. Therefore, the need remains to further intensively research and promote leafy vegetables and their benefits to show the importance of their use. Hence, the ProNIVA project was launched by the World Vegetable Center (AVRDC) and partners, within which this study took place.

The main objective of this research was to investigate the current status of cowpea used as leafy vegetable from small scale farmers in Tanzania. Special objectives aimed at (i) identifying useful traits and constraints in cultivation and consumption of cowpea in order to foster a sustainable cowpea production in smallholder households; (ii) determining smallholders' benefits of cowpea vs. other leafy vegetables according to district; and (iii) identifying site-specific characteristics of demand on plant material, cultivation pattern and perception of product quality and marketability of cowpea. The collected knowledge will help plant breeders in targeting attributes and

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characteristics for improvement. Furthermore, it will support the identification of traits of local importance, which are crucial for site-specific/local breeding approaches by the public sector both within national agricultural research systems (NARS) and international research institutions.

Material and Method

The overall project was comprised of a household and a market survey, in order to gather information directly from both farmers and traders. Criteria for collection and evaluation of farmers' knowledge of cowpeas included cowpea diversity, cultivation and use as leafy vegetable, quality patterns for leaves and market value characteristics. These results were compared across representative cowpea cropping areas in different agro-ecological zones of Tanzania. Semi-structured questionnaires were applied in non-standardised interviews, and group meetings were held in three main cowpea-growing districts of Tanzania (Arumeru, Mwanga and Dodoma). A total of 165 farmers and traders participated in the surveys, which were conducted from May to August 2008. For the household survey (138 participants), either individual or group interviews were used. Whereas, the market survey (27 participants) was carried out with individuals only. Generally, in planning and accomplishing a survey, either individual or group interviews can be used. These two ways of achieving a successful survey are established methods used in the initial stages of assessment research (ATTESLANDER 2008). KAPLOWITZ AND HOEHN (2001, cited by KELLER 2004) concluded from a comparative study that focus groups and individual interviews are not substitutes but complimentary and, therefore, it is suggested to use both. The questionnaires were pre-tested in Arumeru district both for the household and the market survey. The analysis was stratified by different levels of infrastructure and agro-ecological conditions. Mainly descriptive statistics were used to explain the data gathered.

Results and Discussion

In the following, selected results of the two surveys, which address the potential of cowpea use as leafy vegetable, are presented.

Women crop – In order to get valuable and important data on the status of cowpea, it is the women who have to be addressed. This study showed their importance in responsibility of cultivation, food preparation, as well as their major role in decision-making whether to cultivate cowpea (Tab. 1). These results indicate the importance of the women's knowledge when gathering information on cowpea. Furthermore, in accessing women farmers, more topics could be discussed due to their strong contact and resulting experiences with cowpea used as leafy vegetable. Hence, for further research and breeding activities, women farmers play a key role.

Tab. 1: Responsibilities of farmers as stated by 138 participants in the household survey, carried out in three cowpea-growing districts of Tanzania in 2008

District	Gender	Who is responsible for the cowpea **production**?		Who decides whether to **cultivate** cowpea?		Who is responsible for the majority of **food preparation**?	
		Frequency (no.)	%	Frequency (no.)	%	Frequency (no.)	%
Mwanga	Both	33	54	29	48	3	5
	Women	22	**36**	26	**42**	56	**92**
	Men	6	10	6	10	2	3
Arumeru	Both	3	11	7	26	4	15
	Women	24	**89**	17	**63**	23	**85**
	Men	0	0	3	11	0	0
Dodoma	Both	10	20	16	32	0	0
	Women	40	**80**	34	**68**	50	**100**
	Men	0	0	0	0	0	0

Health benefits – Overall, the farmers interviewed were very much aware of health benefits in consuming cowpea leaves (data not shown). Especially the important supply of vitamins, which strengthens their immunity, and the improvement of their vision and blood were notably

important. These results indicate an existing awareness from the farmers' side. Nevertheless, further promotion activities are needed to broaden the knowledge of health benefits by consuming cowpea leaves.

Diversity of varieties – 70% of the farmers in Dodoma and approximately 35% each in Arumeru and Mwanga districts cultivated more then one variety. They mentioned the different use of the varieties as the most important reason. Hence the multi-purpose use considering leaves and seeds, in different times of the cultivation period, is considerably important. This confirms the view of CHWEYA AND EYZAGUIRRE (1999) who stated the multi-purpose use of cowpea as a unique advantage within the African farming systems. However, it demonstrates that there is a potential in developing multi-purpose varieties with good performance, which are well-yielding in both leaves and seeds. It can be assumed and suggested to breed varieties which are high-yielding and can be cultivated throughout the year, thus, small-scale farmers would benefit the most. Moreover, farmers were interested in early-maturing varieties that allow for multiple harvesting over a long production cycle.

Consumption, growth and sale patterns – Regarding their cultivation and sale patterns, Tab. 2 clearly demonstrates a high and common demand for cowpea leaves. For consumption, only farmers in Dodoma mentioned notably that they wanted to consume more (86%), whereas farmers in Mwanga (67%) and Arumeru (48%) districts slightly tended to consume more. This was, most likely, due to the lack of alternatives in Dodoma district.

Tab. 2: Consumption, growth and sale patterns of farmers as stated by 138 participants in the household survey, carried out in three cowpea-growing districts of Tanzania in 2008

District		Would you like to **consume** more, less or the same amount of cowpea?		Would you like to **grow** more, less or the same amount of cowpea?		Would you like to **sell** more, less or the same amount of cowpea?	
		Frequency (no.)	%	Frequency (no.)	%	Frequency (no.)	%
Mwanga	Same	20	33	3	5	2	3
	More	41	**67**	57	**94**	59	**97**
	Total	61	100	61	100	61	100
Arumeru	Same	14	52	0	0	1	4
	More	13	**48**	27	**100**	26	**96**
	Total	27	100	27	100	27	100
Dodoma	Same	3	6	1	2	3	6
	More	43	**86**	49	**98**	43	**86**
	Total	50	100	50	100	50	10

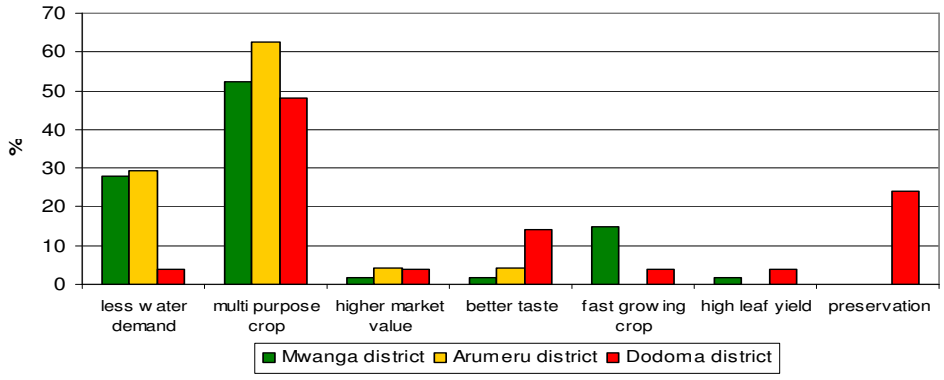

Fig. 1: Main advantages for farmers of cowpea compared to other leafy vegetables as stated by 138 participants in the household survey, carried out in three cowpea growing districts of Tanzania in 2008

Main advantages of cowpea vs. other leafy vegetables – In order to demonstrate the position of cowpea leaves vs. other leafy vegetables, farmers were asked to mention the main advantages of cowpea (Fig. 1). The results support earlier research by CHWEYA AND EYZAGUIRRE (1999) who pointed out the importance of the multi-purpose use of cowpea. Also WHITBREAD AND LAWRENCE (2006) described cowpea as one of the most important tropical dual-purpose legumes, being used as leafy vegetables, grain, as fresh cut-and-carry forage, and for hay and silage, which BARRETT (1990) similarly highlighted, especially for eastern and southern Africa. Only a few farmers mentioned the high leaf yield, better taste, or higher market value as main advantages. It shows the high potential of cowpea leaves for these purposes and, thus, more research, breeding and promotion activities are necessary.

Most important characteristics – Farmers mentioned overall 31 characteristics, which have major importance to them, e.g., resistances, leaf colour, tenderness, and fodder use. The research also showed strong differences among the three sites. Therefore, the results clearly indicate the need for site-specific research and breeding approaches.

Conclusion and Outlook

This study demonstrates the importance of cowpea in resource-poor communities. Thus, preserving indigenous knowledge on production and consumption, while improving varieties and cultivation practices of cowpea in Tanzania, will contribute to the well-being of thousands of poor farmers. Hence, it will enable them to improve their cultivation as well as to participate in markets. The research strongly indicates the potential of cowpea used as leafy vegetable.

In order to realize this potential of cowpea's use as leafy vegetable, infrastructure and accessibility to markets have to be improved. The multi-purpose character of cowpea should be further enhanced by considering traits of local importance for its use as leafy vegetable. The low intra-specific diversity in cowpea and farmers' demands for improved varieties is an indicator that collaboration among the government, researchers and farmers needs to be strengthened by site-specific selection approaches. The success of promoting cowpea used as leafy vegetable for nutritional health in Tanzania will also depend on good promotional activities. Production-related information, such as variety information, yields and cultivation practices, should be packaged and made available to extension personnel and governmental agricultural research institutes that often have a good outreach to farmers. Consumption-related information such as medicinal and nutritional properties should also be packaged and intensively promoted. Furthermore, it is important to spread the information by applying a promising approach, namely via schools, supermarkets, local markets and, especially, the radio should be used.

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