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Indigenous Knowledge Influences Cowpea (*Vigna Unguiculata*) Production among Smallholder Farmers in Northern Uganda

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Abstract:

This study documented the available indigenous knowledge (IK) on cowpea production in northern Uganda. The study focused on smallholder farmers along the River Nile belt in Nebbi, Arua, and Moyo districts in Uganda where cowpea is still grown widely. Data was collected from 300 randomly selected smallholder farmers in the study area, using a semi-structured survey questionnaire. Our findings show that only 17% of farmers cultivated cowpea on more than 1 acre. The majority cultivated cowpea on 1 acre (31%) and half an acre (30%). We found that 5 cowpea varieties (small brown helium, medium black, pungent smell, small white red helium, and large white red helium) are grown. The varieties that are commonly grown are small white red helium (34.7%) and large white red helium (48.3%). However, the findings reveal that the small brown, medium black and pungent smell varieties are becoming extinct. The major source of seeds for farmers was found to be local markets (36.3%), farmers' own preserved seeds from previous seasons (28.3%), purchasing and using own preserved seeds (23.0%), urban markets (2%), purchased from both local and urban markets (6%), and borrowed from other farmers (1%). The major field pests that affect cowpea production were found to be aphids, glow worms, and beetles. Farmers control them using IK methods, including homemade remedies (69.3%) and handpicking (36.1%). Farmers control storage pests using storage, farmer use neem leaves or wood ash spread in granaries (25.8%), "osikusi" (3.9%), "dula" (1.9%), underground tunnels (4.7%), pots (0.3%), and empty drums (0.3%). These results suggest that IK plays a significant role in cowpea production, and is critical to enhancing socio-economic growth, increasing income, and ensuring food security among smallholder farmers.

Key Words: *Cowpea production; Indigenous knowledge; Smallholder farmers; Food security*

Introduction:

Cowpea is an important food and cash crop that is grown throughout the northern and eastern regions of Uganda for its leaves and grain. The crop is an excellent source of protein, vitamins, and essential minerals (Adipala*et al.,* 2000). Thus, it has the potential to become a high income-generating crop capable of contributing to poverty reduction, as well as improving food security and nutrition. Despite its importance, the crop has been classified as a *neglected and underutilized* species in eastern and southern Africa due to commercialization of other more economically important crops. As such, little research has been done in Uganda in recent times on the different production methods, processing and post-harvest handling. As a result, the cowpea crop is now considered a 'backyard' crop mainly cultivated by women. Although potential yields of the crop (3000 kg/ha) have been reported (Rusoke and Rubaihayo 1994), cowpea grain yields in Uganda average only 200–400 kg/ha (Nabirye*et al.,* 2003).

The phenology of cowpea comprises four short main stages: pre-flowering, flowering, pod formation and pod maturation (Ishiyaku and Singh 2003). A complex of key insect pests including aphids (*Aphis craccivora* Koch), flower thrips (*Megalurothripssjostedi*Trybom), pod borers (*Marucavitrata*Fab.), and pod sucking bugs (e.g. *Nezeraviridula* Linnaeus, *Clavigrallatomentosicollis*Stal.)cause significant damage to the crop during the growing season. Natural enemies play an important role in limiting potential pest population surges. However, the natural enemy populations are often insufficient to suppress high pest infestation levels. Because of high costs of brand name pesticides, farmers often rely on indigenous knowledge (IK) for management of field and storage pests. Unfortunately, the available IK and its associated technologies used in cowpea production have not been documented. As a result, IK use

in cowpea production is rapidly being lost.Therefore, the objective of this study was to document and conserve IK used in cowpea production in northern Uganda.

Approach and Methodology:

This was a purposive study that focused on smallholder farmers along the River Nile belt in Nebbi, Arua, and Moyo districts where cowpea is widely grown. Within the selected districts, ten (10) sub-counties were randomly selected – Rhino Camp, Rigbo, Paworu, and Ogokosubcounties in Aruadistric; Wadelai, Panyimur, and Panyango sub-counties in Nebbi district; Lefori, Aliba, and Gimara sub-counties in Moyo district. Thirty (30) households were randomly selected from each sub-county using a simple random sampling method, totaling to three hundred (300) smallholder farmer households for the study. Data were collected using a semi-structured survey questionnaire, which was pretested prior to data collection. The questionnaire sought to explore the acreage under cowpea production, varieties grown, sources of seed for farmers, IK use in cowpea production and storage, and production constraints faced by farmers. Data were analyzed using Statistical Package for the Social Sciences (SPSS)Statistical Software (SPSS version 22, IBM Analytics).

Results:

Regarding acreage of cowpea production by farmers in the West Nile region, our findings show that only 17% of farmers grow cowpea on more than 1 acre. The majority of farmers grow cowpea on 1 acre (31%) and half an acre (30%) (Figure1).

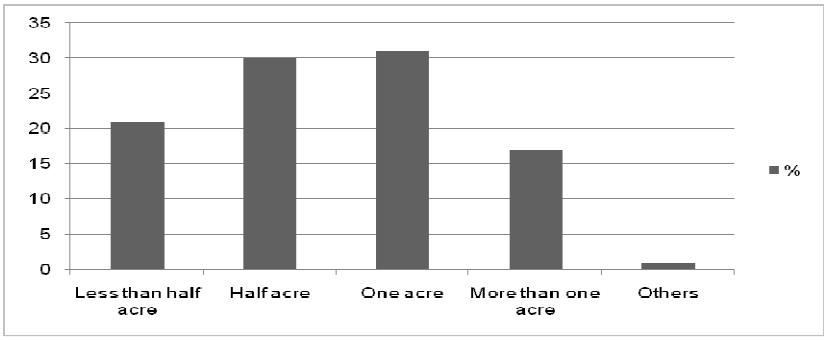

Figure 1 Cowpea production by smallholder farmers in West Nile

We found that five cowpea varieties – small brown, medium black, pungent smell, small white, red helium, and large white red helium – are commonly grown. The varieties that are mostly grown are small white red helium (34.7%) and large white red helium (48.3%) (Figure 2). Farmers described the varieties of cowpea by grain size and grain color, giving local names as well. However, our findings show that the small brown, medium black, and pungent smell varieties are becoming extinct.

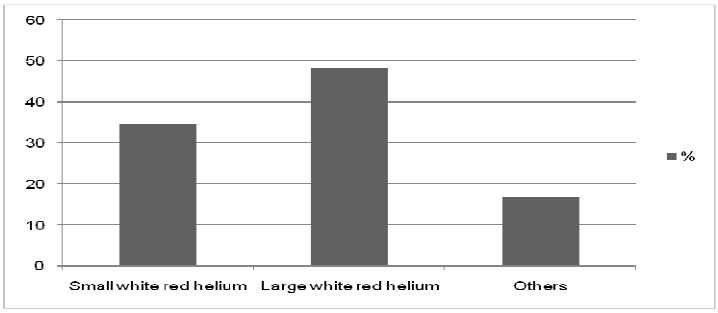

Figure 2 Major cowpea varieties grown by smallholder farmers in West Nile

Regarding the sources of cowpea seed, the major sources of seed for farmers was found to be local markets (36.3%), farmers' own preserved seeds from previous seasons (28.3%), purchasing and using own preserved seeds (23.0%), urban markets (2%), purchased from both local and urban markets (6%), and borrowed from other farmers (1%) (Figure 3).

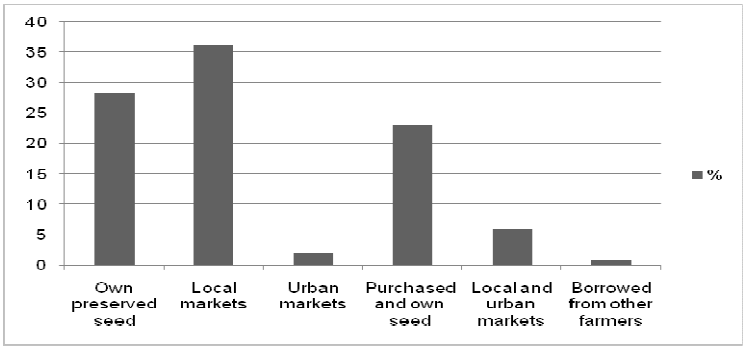

Figure 3 Sources of cowpea seed for smallholder farmers in West Nile

Regarding pests and their management, the major pests that attack cowpea were found to be aphids, glow worms, beetles, and weevils. The IK methods that farmers use to control these pests were found to be use of homemade remedies (69.3%), crop rotation (61.9%), growing resistant varieties (55.1%), handpicking pests (36.1%), and intercropping (45.9%) (Figure 4).

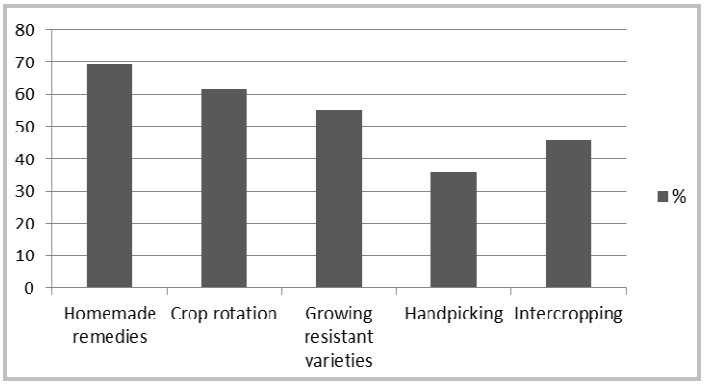

Figure 4 IK methods used in pest management

With regards to use of IK for cowpea storage, farmer use neem leaves or wood ash spread in granaries (25.8%), "*osikusi*" (3.9%), "*dula*" (1.9%), underground tunnels (4.7%), pots (0.3%), and empty drums (0.3%)(Figure 5).

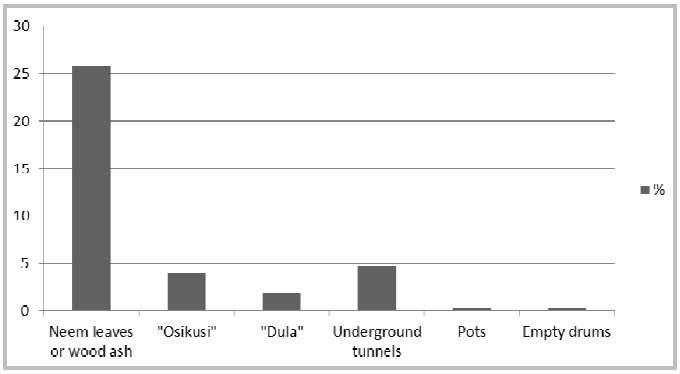

Figure 5 IK methods used in post-harvest storage

Regarding constraints to cowpea production, farmers ranked erratic rainfall (32.3%), high costs of production (21.8%), inadequate knowledge on production (19.5%), and pests and diseases (16.8%) prominently. Other constraints included fire outbreaks and theft of produce by other community members (4.5%), poor transportation to markets (3.6%), lack of adequate storage facilities for the cowpea produce (0.9%), and perishability of produce/cowpea leaves (0.5%) (Figure 6).

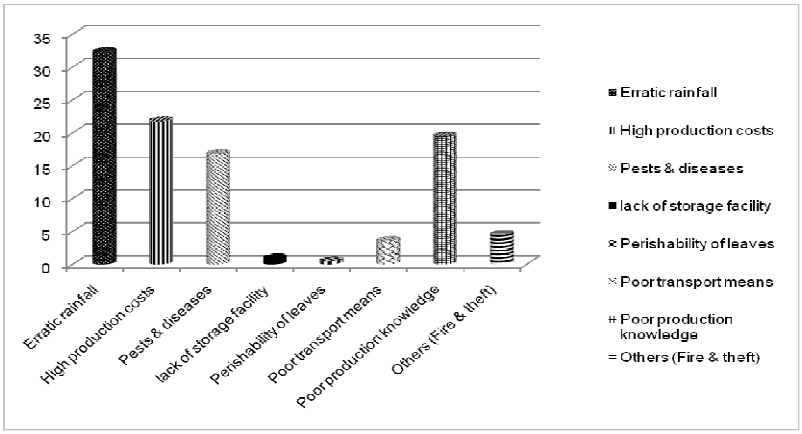

Figure 6 Major constraints of cowpea production in West Nile region

Discussion

Our study found five (5) commonly grown cowpea varieties in the West Nile region. All five varieties grown are local varieties. The reasons for growing only local varieties, according to the farmers, include adaptability to local conditions, taste, ease of availability of seed, and cost of seed. The survey did not find evidence of improved varieties grown by the farmers. The Small brown, medium black, pungent smell variety are becoming extinct partly because of poor harvesting methods (pulling of whole crop as vegetable before reaching maturity) and lack of interest in preserving dull colored cowpea varieties. These three varieties are dull-colored, so farmers often sort the seed out, which are then discarded.

The major source of cowpea seed for farmers are rural markets because prices in the rural markets are considered cheap (1 kg of seed in rural markets is priced at 2,250 Uganda shillings on average). Farmers often opt for cheaper prices as long as the seeds are not attacked by pests. Also, transportation costs are considered important in selecting sources of seed. Urban markets are seldom preferred because costs associated with transportation, as wells as costs of seed, are perceived to be high (1 kg of seed in urban markets is priced at 6,000 Uganda shillings). Farmers believe their own preserved seed (28.3%) are safer and more viable than other farmers' seed. This is attributed to the preference for their own preserved seed. Secondly, the farmers looked at the quality of seed in terms of seed size. The larger the seed, especially for the large white variety, the better the quality associated with it. In cases where the seed are smaller in size, it is often considered of low quality. Hence, a farmer would rather sow their own preserved seed because they trust the seed source and quality.

Furthermore, these findings show that farmers prefer to use indigenous knowledge in management of pests of field crops and stored cowpea produce. This is attributed to the perceived high cost of brand name pesticides. Homemade remedies are preferred because farmers consider them cheaper options to brand name pesticides, the raw materials for making them (animal manure, animal urine, wood ash, etc.) are readily available and knowledge on making a potent mixture is readily available and freely passed from one farmer to another through peer education. These findings are similar to those of other studies on indigenous knowledge (e.g. Rubaihayo*et al*., 2003; Musinguzi*et al*., 2006; Directorate of Plant Production, 2011). However, storage technologies based on indigenous knowledge such as "*osikusi*", "*dula*" and underground tunnels, are unique approaches only used by farmers in West Nile. Farmers consider them safe and insect pest proof.

Conclusions:

Indigenous knowledge plays a vital role in cowpea production; therefore it is critical in enhancing socio-economic growth, increasing income, and ensuring food security among smallholder farmers. Farmers need to be supported through provision of extension and other support services such as education and creation of direct links to commodity and input markets so as to curb challenges of inadequate knowledge on cowpea production. Preservation of IK especially on pest management, storage, and preparation

methods needs to be encouraged among the communities and the public, because they have critical implications for climate adaptability, food security, increase in income, and poverty alleviation.

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