Utilization, propagation and genetics of the wild edible yam lusala in Zambia

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Introduction

Wild edible plants foraged from forests are used by many rural households in Africa to supplement family food supply from backyard gardens and smallholdings. Foraging provides an important, but sometimes overlooked, source of vegetables and fruits in diets. Lusala, a wild edible yam (*Dioscorea hirtiflora* Benth. subsp. *pedicellata* Milne-Redh), in Southern Zambia is a good example of a hitherto poorly-recognized vegetable in diets.

Aims

To determine utilization among rural households; explore potential domestication and genetic variation of lusala in Zambia.

Methods

Survey – 278 rural households in four districts were interviewed to assess foraging, consumption and trade. **Potential domestication** – conventional cultivated yam propagation methods involving tubers, minisetts and single node vine cuttings were tested on lusala in a glasshouse. **Genetic variation** – 13 published microsatellite markers were used to survey genetic variation across 185 lusala samples collected across Zambia.

Results

Household survey

About 83, 96 and 59% of interviewed households collected, consumed and sold lusala, respectively, during the dry season from March to September 2017. In the peak month for foraging (April), each rural household within the respective groups collected 27.9kg, consumed 12.0kg, and sold 35.7kg of tubers on average. Lusala also supported market traders' businesses, each purchasing an average of 899kg valued at USD383 during one month (August) for resale.

Potential domestication

Lusala was propagated successfully from tubers, tuber pieces called minisetts and single node vine cuttings, but high dormancy often delayed stem emergence.

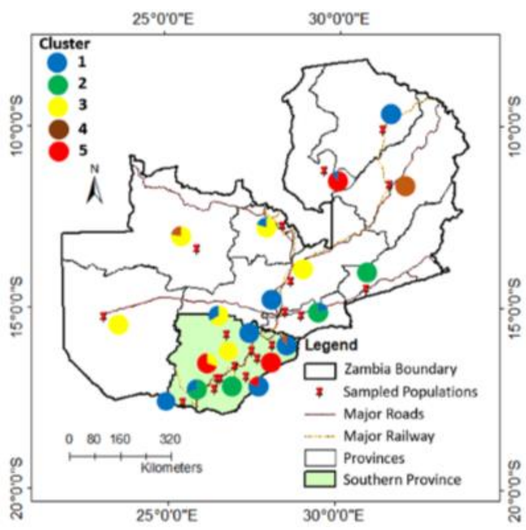
Fig 1: A: Lusala in the forest;
B: Lusala tubers at a local market in Chongwe, Zambia;
C: A woman trading in lusala tubers;
D: Lusala propagation trial in a glasshouse at the University of Reading, UK.

Potential domestication (continuation)

Tubers and minisetts that had visible shoot buds (lost dormancy) performed better than those without, i.e., sprouted earlier, had greatest growth and yield. Planted vine cuttings established easily and formed minitubers, without needing rooting hormone, 150 days from planting.

Genetic variation

Considerable genetic diversity was detected amongst 185 lusala samples collected across Zambia. Analysis of molecular variance showed 65% of the variation between populations and only 35% within populations. Five genetic clusters of samples were identified.



Map shows geographical distribution of five identified genetic clusters of lusala in Zambia. Similar colours indicate genetically similar lusala plants. There was no association between genetic and geographical distance suggesting unrestricted flow of germplasm

Conclusion

The study revealed high lusala utilization in southern Zambia. A semi-domestication approach involving introduction of lusala tubers or minisetts from the proximal end (planting material with visible shoot buds) into natural forests near homestead would contribute to the sustenance of livelihoods and would reduce the decline of lusala in the wild. Lusala improvement research is needed to ensure early and even sprouting as a prelude to domestication. Sampling for future research on conservation, domestication or breeding should be guided by the identified genetic clusters.

Reference

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Acknowledgement

- Donald Zulu is a PhD Commonwealth Scholar (ZMCS-2016-850), funded by the UK government.

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