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Spotlight on Agriculture

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THE POTENTIAL OF TRADITIONAL GREEN LEAFY VEGETABLES – PROCESSING POTENTIAL

INTRODUCTION

Glossary of abbreviations: EU: European Union, IGLV: Indigenous Green Leafy Vegetables, IPTT: Indigenous Plant Task Team, NASSP: National Agricultural Support Services Programme, NBRI: National Botanical Research Institute, SME: Small and Medium Enterprise, TGLV: Traditional Green Leafy Vegetables, UPDP: Useful Plant Development Programme, VIVA: Vigorous Indigenous Vegetables from Africa.

Having viewed the results and potential of cultivating indigenous green leafy vegetables in the previous *Spotlight on Agriculture*, we will have a closer look at the nutrients and the potential for processing and marketing. As mentioned in the previous article, traditional vegetables are a valuable source of nutrition in rural areas where exotic species are not available, and contribute substantially to protein, mineral and vitamin intake. They are known under different local names, such as *ekwaka* (Oshiwambo), *mboga* (Rukwangali), *tepe* (Silozi) for ***Amaranthus thunbergii***; *ombidi* (Oshikwanyama), *mpungu* (Rukwangali), *shishungwa* (Silozi) for ***Cleome gynandra***; and *omutete* (Oshiwambo), *mutete* (Rukwangali), *mundambi* (Silozi) for ***Hibiscus sabdariffa***.

RESEARCH FINDINGS AND RECOMMENDATIONS

The main conclusion of the processing trials is that for a small-scale traditional leaf-processing unit (or processing at household level), the two preservation methods (after proper sorting, washing and blanching of leaves) to be recommended are:

- Deep-freezing, which appears to be the easiest and safest preservation method, provided there is deep-freezing facility available;
- Drying, which appears to be the second best preservation method, provided it is carried out hygienically and in the shade.

Sterilization is not recommended for a small-scale processing unit, because of the technical difficulty in obtaining a properly preserved product, and the risk associated with the potential development of pathogens. Unsuitable containers and failed sterilization (with microbiological development in the products) and inappropriate pH (acidity) present potential hazards. To ensure an acceptable product with a sufficiently long shelf-life, preservation by sterilization must be conducted skilfully with appropriate equipment and quality control. Although this method of preservation is not recommended for a small-scale and artisanal processing unit, because of the aforementioned risk of pathogen development in the products, canning on a larger scale (and less artisanal level) could still be considered.

Sorting and cleaning of the leaves prior to the processing

Amaranthus thunbergii leaves ready to be processed

RESULTS AND RECOMMENDED PRACTICES

PANEL TESTING AND QUALITATIVE MARKETING RESEARCH

The ratings provided by the consumer panel test showed a strong preference for *Amaranthus thunbergii* (*ekwaka/mboga/tepe*) as against *Cleome gynandra* (*ombidi/mpungu/shishungwa*) and *Hibiscus sabdariffa* (*omutete/mutete/mundambi*).

Cooking time, too, increases from *Amaranthus thunbergii* (20 minutes) to *Cleome gynandra* (35 minutes), and yet again to *Hibiscus sabdariffa* (50-60 minutes), thus reducing nutrient content.

NUTRITIONAL ANALYSES

Comparative vitamin A contents of processed *Cleome and Amaranthus* samples

	Vit. A (mg/100 g) dry weight
1. Cleome frozen	15
2. Cleome sterilized	15
3. Cleome dried	4.3
4. Amaranthus frozen	10
5. Amaranthus sterilised	19
6. Amaranthus dried	5.2

- For each processing method (freezing, sterilizing and drying), *Cleome* and *Amaranthus* show a similar vitamin A content of 10-15 mg/100 g.
- For both species, drying reduces most of the vitamin A content (by a factor 2 to 3,5).
- Freezing and sterilizing seem to maintain a similar level of vitamin A, although the results for *Amaranthus* show freezing to be more damaging to vitamin A.

Results for Protein and Vitamin C content

Analysis done by S. Rügheimer, Section Head: Microbiology & Food Chemistry

Test / Identification	Moisture Weight %	Protein Weight % (wet)	Ash Weight % (wet)	Vitamin C mg/100 g (wet)
1. *Cleome gynandra*	79	7.1	4.2	2.9
2. *Amaranthus thunbergii*	85	3.4	2.4	60

Test / Identification	Calcium mg/100 g (wet)	Iron mg/100 g (wet)	Phosphorus as P mg/100 g (wet)
1. *Cleome gynandra*	361	6.3	182
2. *Amaranthus thunbergii*	500	7.8	75

Results for processed leafs

Test / Identification	Moisture Weight %	Protein Weight % (wet)	Ash Weight % (wet)	Vitamin C mg/100 g (wet)	Vitamin C mg/100 g (dry)
1. *Cleome*, frozen, 16/03, 200 g	88	3.8	2.3	1.1	9.1
2. *Cleome*, sterilized, 16/03	88	4.3	2.6	2.6	21.6
3. *Cleome*, dried, 16/03	7.4	31	18	7.7	8.31
4. *Amaranthus*, frozen, 200 g	86	3.2	2.2	4.3	20.71
5. *Amaranthus,* sterilized, 330 g	88	3.0	1.9	3.4	28.33
6. *Amaranthus*, dried, 200 g	3.0	23	16	9.7	10

Test / Identification	Calcium mg/100 g (wet)	Iron mg/100 g (wet)	Phosphorus as P mg/100 g (wet)
1. *Cleome*, frozen, 16/03, 200 g	161	4.0	90
2. *Cleome*, sterilized, 16/03	219	4.7	102
3. *Cleome*, dried, 16/03	1127	39	767
4. *Amaranthus*, frozen, 200 g	444	6.2	70
5. *Amaranthus,* sterilized, 330 g	390	4.9	62
6. *Amaranthus*, dried, 200 g	2826	49	506

- No significant difference (within the error margins) in the protein and ash content (at 3 % of wet weight);
- An expected decrease in the vitamin C content, this decrease being larger in the dried samples than in the sterilized and frozen samples;
- Relatively low decrease or insignificant variation in the calcium, iron and phosphorus contents.

The economic options on and evaluation of these traditional green leafy vegetables will follow in the next *Spotlight on Agriculture* issue.

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