

The Way Forward with Indigenous Vegetables: A Proposal to the IPTT

**Pierre du Plessis
CRIA SA-DC
31 October 2008**

1) Background

Indigenous vegetables (IVs) and especially indigenous green leafy vegetables (IGLVs) play an important role in the nutritional security of Namibians, particularly the poorest segments of society. This was recognized and described (Kolberg 1999; Ombidi Working Group) even before the formation of the Indigenous Fruit Task Team (IFTT) and eventually played a crucial role in the decision to expand the IFTT's mandate beyond fruit, which resulted in it becoming the Indigenous Plant Task Team (IPTT) in 2003.

In 2004 the *Indigenous Vegetables Development Proposal* was compiled for the IPTT under the EU EDF-funded National Agricultural Support Service Programme (NASSP). The proposal outlined a comprehensive programmatic approach under the title "Vigorous Indigenous Vegetables from Africa (VIVA)". The IPTT endorsed the proposal but decided to initially implement only those parts dealing with IGLVs. A project coordinator (Patrick Hilger) was recruited for this work, hereinafter referred to as VIVA-IGLV.

From 2004 to 2006 IGLV seeds were collected and distributed, and various cultivation trials were done with three priority species (*Cleome gynandra*, *Amaranthus thunbergii* and *Hibiscus sabdariffa*). In addition CRIA SA-DC was contracted to do two sets of processing trials, panel tastings by "traditional" and "new" consumers, and some preliminary investigations into the perceptions and preferences of formal markets.

In December 2006 a final report on all this work was submitted to the IPTT by the Project Coordinator. Although the report contained much useful information and some very detailed recommendations, the IPTT felt that it did not spell out a clear way forward with IGLVs.

In February 2008 the IPTT therefore contracted the current consultancy and instructed the consultant "to propose to the IPTT a comprehensive way forward for the development of production and/or harvesting, processing and marketing of green leafy and other indigenous vegetables" (see Terms of Reference attached as Appendix 1).

2) Methodology

The consultant was tasked with reviewing five VIVA documents (detailed in Annex 1), consulting relevant persons/stakeholders as necessary for clarifications, and proposing a comprehensive way forward that includes:

- Outline of a set (sets) of activities that would achieve the way forward

- Estimated budgeted amounts for the activities
- Prioritised activities for funding under remaining UPDP funds

3) **Review of key issues**

The reports reviewed for this assignment contain a wealth of detailed information, which the consultant will not summarise in totality. Below are the main points considered relevant to planning the way forward.

3.1) *Institutional issues*

The *Indigenous Plant Development Strategy Review*, endorsed by the IFTT at the 2nd National Workshop, recommended “the establishment of an indigenous vegetables programme at NBRI, focusing initially on leafy vegetables and adding other types later”. When the *Indigenous Vegetables Development Proposal* was subsequently compiled, NBRI management and staff felt that the institute was constrained by a shortage of human resources and growing facilities. This was the main reasons for outsourcing the VIVA-IGLV work. Now that the Plant Products Development post at NBRI has been filled and the incumbent has taken over responsibility for coordinating the IPTT’s “pipeline” of products, VIVA can be provided with on-going coordination support.

A related issue flagged several times in VIVA-IGLV reports (and in verbal report-backs by the Project Coordinator) is the lack of support from most field-based MAWF research staff, who apparently (and with some notable exceptions) saw the work as “imposed from Windhoek”. In the next phase, which involves more implementation than research, this lack of support will not be mission-critical. However, it is important to raise awareness among agricultural extension staff – especially those involved in promoting horticulture – of the options and opportunities offered by IGLVs. Since NBRI is part of MAWF its coordinating role in VIVA may also result in enhanced “ownership” by the Ministry.

Another institutional issue that emerges from the reports is that trying to work with too narrow a group of participants or beneficiaries almost certainly invites sub-optimal results. During the trial phases this “narrow focus” was necessitated by limited resources and the need to generate basic knowledge, but now that the programme is moving on to wider implementation it should adopt an approach of reaching out to as many people or groups as possible. Institutions or individuals that have already been involved should be re-contacted and their interest in continuing the work ascertained. Potential “new” audiences for extension messages include gardening projects, HIV/AIDS support groups, any organized and willing community group, and the NGOs that support them.

3.2) *Species selection issues*

Three priority species (*Cleome gynandra*, *Amaranthus thunbergii* and *Hibiscus sabdariffa*) were targeted by VIVA-IGLV. In a nutshell, all research results obtained (on seed collection and supply, cultivation, processing, consumer preferences) suggest that further IGLV commercialization efforts focus on *Amaranthus*, because it is most

productive and also preferred by most consumers. There are clearly also niche markets for *Hibiscus* (in Kavango and among Kavango-speakers) and for *Cleome* (for particular tastes).¹ A differentiated approach to the three species would therefore be appropriate.

The *Indigenous Vegetables Development Proposal* also suggested that VIVA targets – in addition to IGLVs – other “wild” (i.e. undomesticated) food and useful plants, especially roots, tubers and bulbs, but also fruits and perennial spinaches, which could have domestication and cultivation potential. The proposal suggested that a more systematic effort to collect these “wild” species and bring them into local and *ex situ* cultivation could have major long-term potential to contribute to farming systems diversification. To this end it envisaged a system of local and/or eco-regional “field gene banks” (recognizing that maintaining such field collections will pose significant management challenges). The logic remains valid, the urgency is much clearer (given mounting evidence of climate change impacts) and this work should form part of the way forward.

In some places there could be considerable added value in also working with less conventional indigenous vegetables, like baobab (*Adansonia digitata*) leaves, and/or less familiar exotic vegetables, like young cladodes of prickly pear (*Opuntia ficus-indica*) or leaves of *Moringa* spp.

3.3) Seed supply issues

Limited availability of seed and planting material is one of the three main constraints facing farmers who want to grow indigenous vegetables (the other two are lack of extension advice and inappropriate use of pesticides or polluted water).

The *Indigenous Vegetables Development Proposal* identified three distinct phases to seed supply: first to have more seed available cheaply so that more farmers can respond to increased demand and/or better prices, then – if there really is a demand – to choose seed that better meets the specific demand, and finally to produce more of the better seed. To make seed of these semi-domesticated crops easily available in sufficient quantities to small commercial growers, three parallel approaches were suggested:

- active on-farm seed production by growers, in fenced plots to prevent animals from eating the seeds before they can be harvested
- cultivation specifically for seed production, preferably in isolated plots
- on-station comparisons of sub-populations or provenances; if significant differences between populations are detected the trials can then be extended.

However, the work done under VIVA-IGLV showed no significant differences between provenances, except for taste in *Hibiscus*, so while breeding work remains a distinct possibility for anyone interested in doing it, it is obviously not an immediate priority for the IPTT on the way forward, whereas seed supply clearly is. Being able to provide seed to interested groups is fundamental to making progress with IGLVs.

¹ The very strong consumer preference for *Amaranthus* over *Cleome* that emerged during the tasting trials is inconsistent with previous observations and some of the literature; it may have been influenced by the quality of the particular batches used. *Cleome* is less productive and more susceptible to pests, but should not be abandoned completely at this stage.

3.4) *Agronomic issues*

In traditional Namibian farming systems IGLVs are weedy, semi-domesticated catch crops harvested opportunistically after favourable rains. In some other countries (e.g. Kenya) they have become important crops for peri-urban market gardeners. VIVA-IGLV extensively tested some basic agronomic parameters that need to be known to turn IGLVs into domesticated, cultivated crops.

The main finding of the cultivation trials done under VIVA-IGLV were:

- It is more cost-effective to use medium concentrations of fertilizers, since higher concentrations do not increase yield very much.
- *Amaranthus thunbergii* had 75 % seed emergence while *Cleome gynandra* had only 50%; *Cleome* yields were also lower.
- The type of fertilizer used had little effect on vegetative growth, (but might on nutrient content, which was not part of the trials)
- “Bow benches” (growing trenches lined with buried plastic sheets) saved irrigation water and increased yields, probably because they stopped nutrients from leaching out of the root zone.
- In crops irrigated with floppy overhead sprinklers it made no difference whether water was applied four times a week or twice a week (but this irrigation system is not recommended for *Amaranthus thunbergii* on a loamy soil).
- Transplanting seedlings reduced yields and the long, fast-growing roots of *Cleome gynandra* were especially vulnerable to transplantation if not carefully handled.
- Seeding method had the most significant effect on yields, followed by spacing and only last by the variety.
- Calyx yields of *Hibiscus sabdariffa* do not increase significantly in response to higher water applications and the crop should be irrigated at low water applications.
- At N\$7/kg (clean leaves) a farmer can just about break even growing *Amaranthus* under drip irrigation on 0.25ha; at N\$8/kg the gross margin rises to N\$ 1862 per 0.25ha (N\$ 7448 per ha) per two-month crop cycle, which compares well with most horticultural crops; if leaves are washed, deep frozen and sold for N\$ 12/kg on-farm it could be an even more profitable venture.

3.5) *Processing issues*

Delays in transporting harvested IGLVs from the North to Windhoek for processing trials caused quality problems, which could be addressed through local processing (this implies no more processing trials in Windhoek unless raw material is sourced nearby). The main harvest is during the rainy season, so IGLV are often wet when harvested, which further compromises quality if there is any delay.

The *Indigenous Vegetables Development Proposal* recommended that GLV product development for formal and urban markets concentrates at first on investigating the financial feasibility of preserving wild spinach by pressure-sterilising it in plastic pouches (“retort pouching”), which also suits out-of-season marketing.

Washing fresh leaves to remove sand is difficult and uses a large quantity of water. Two special “washing baskets” were manufactured for this purpose and proved appropriate.

After boiling leaves in airtight plastic bags proved ineffective, blanching of fresh leaves (first processing) was done in a stainless steel pot with little water added (to minimise loss of nutrients).

Secondary processing (for preservation) of the blanched leaves led to the following conclusions:

- Deep-freezing is an easy and quick method
- Drying was more difficult (longer with *Amaranthus* than with *Cleome*) but seems to be an easy method provided some precautions are taken, and the weather is not too humid
- Sterilisation in glass jars proved more difficult and a number jars failed due to lids not airtight. Lowering the pH of the product by adding acid (to prevent the development of *Clostridium botulinum*) was discontinued as it gave a very bad taste to the product.
- To be technically and financially viable, retort pouching would require economies of scale that are not achievable at the moment.

For small-scale IGLV processing the two recommended preservation methods (after proper sorting, washing and blanching of leaves) are:

- Deep-freezing - the easiest and safest preservation method if available
- Drying - provided it is carried out hygienically and in the shade.

Microbiological tests of the deep-frozen and sterilized samples showed:

- No contamination by Coliforms or *Escherichia coli*
- No or very low counts of moulds and yeasts
- Presence of Gram positive micro-organism spores (and Gram negative in one instance).

Most importantly, the initial processing trials conducted for VIVA-IGLV showed that the logistics of centralized processing – and especially controlling the flow of raw material along the supply chain – will be a nightmare. When this is viewed against the reality that IGLVs are already substantially commercialized in the informal SME sector, are consequently available cheaply in dried form at most open markets in Namibia, and are eaten up to four times a week by many households, it would seem more sensible to go forward with a strategy designed to encourage and upgrade localized entrepreneurship by the informal SME sector. This implies promoting IGLV cultivation primarily for household food security and self-sufficiency, while raising awareness of potential markets for processed products, and the quality requirements of these markets.

3.6 Market development and promotion issues

Dried cakes of IGLVs are widely sold in Namibia. Adding more value to the product can potentially enhance household income, but it is uncertain that farmers will prioritise more active commercial cultivation of IGLVs unless they have access to improved markets.

Unfortunately the existing markets for IGLVs are still badly understood in Namibia. Price gradients are known to exist between informal markets in the NCAs and those in the main urban areas, but these have not been quantified. In general there is a lack of

data on the quantities of IGLVs traded in informal markets, on mechanisms used to access these markets, and on prices in various markets in different seasons.

Until the informal trade is better understood, it is recommended that no actions be taken that could negatively affect the current system, either by reducing the access poorer people now enjoy to “wild” spinach harvested from the fields of their neighbours (which is possible because the major constraint on production is labour availability during the rainy season), or by increasing prices in informal markets (which could result from stimulating demand without increasing production).

The nutritional superiority of IGVLs is well documented and can be used in public awareness campaigns, to educate consumers and facilitate other marketing efforts. Potential linkages with the National Horticulture Initiative and other ways to move the produce to urban markets rapidly should be pursued more actively.

The VIVA-IGLV marketing studies found that urban consumers and restaurants/caterers serving indigenous foods would be willing to buy more IGLV products provided they felt sure that processing was done hygienically. These clients could initially accommodate fairly small quantities and may offer direct routes to market for SME processors willing to take on the extra effort involved in hygienic food processing practices.

4) Ways forward: next steps

It is the consultant’s considered view that under current conditions in Namibia a “comprehensive way forward” with indigenous vegetables must necessarily involve taking a variety of parallel, complementary approaches. In principle this accords with the view of the VIVA-IGLV project coordinator, who in his final report identified the following as possible viable options:

- Seeing IGLV as a catch-crop only
- Seeing IGLV as a crop to cultivate under rain-fed conditions
- Seeing IGLV as a crop to cultivate under drip irrigation

The sets of activities outlined below should therefore NOT be seen as leading sequentially down only one path; instead they are first steps that potentially lead on to many ways forward.

4.1) Promote the concept

The VIVA-IGLV Inception Report envisaged producing a “diet and planting” extension booklet after the end of the programme, if additional funding is available. The project coordinator wrote three articles (on IGLV cultivation, processing and economic options) for MAWF’s *Spotlight on Agriculture (No.94-96)* but these largely reproduced the findings contained in the final report and were not simple or practical enough to use as extension materials. It remains a very good idea to raise more public awareness, though.

It is recommended that the IPTT budgets N\$60’000 for the production, translation and printing of an extension booklet or pamphlet that contains four simple messages:

- ***Indigenous vegetables are more nutritious and therefore healthier than most exotic vegetables***

- *Indigenous vegetables – especially Amaranthus – are easy to grow and can be a catch-crop in vegetable gardens or crop fields (including advice on how to collect seed)*
- *Surplus harvests can be dried (or frozen) for off-season use or selling*
- *Dried or frozen products can be marketed for an extra cash income, and can earn a premium price if hygienic processing techniques are used*

A “shotgun approach” that presents different types of potential IGLV users with different options and allows them to choose activities according to their capacities and needs is more likely to stimulate increased activity around IGLVs than trying to find a single “magic bullet”. Prime target audiences would include community gardening projects, HIV/AIDS groups involved in gardening and/or nutritional education, extension officers focusing on horticulture, school gardens, and NGOs supporting gardening projects.

4.2) *Ensure seed is available*

On the assumption that the extension booklet will not be ready in time for the 2008/09 growing season, it is crucially important that this season be used to increase the available seed supply, so that “starter packs” of seed can be made available along with the booklets in time for the 2009/10 season (i.e. no later than August 2009). *Amaranthus* and *Hibiscus* seeds are easier to collect than *Cleome* seeds and in line with the findings of VIVA-IGLV it is probably best to concentrate on *Amaranthus*.

It is recommended that the IPTT mandates the PPD Officer at NBRI to negotiate with the seed growers’ cooperative at Mahenene (or other suitable groups) to bulk up the seeds that are currently available and/or harvest seeds from wild plants, and that a budget of up to N\$20’000 be set aside for compensating the contracted seed producers/harvesters.

Additional ways to ensure better seed availability would be to request the IPTT Eco-Regional Satellite Centres to spread the word among people in their areas, asking them to collect seeds this year for use next year.

4.3) *Mandate someone to be the “champion” for IVs inside MAWF*

For the long-term sustainability of IV interventions it is crucially important that they become a core part of the MAWF strategy and work plan, so that they receive at least as much attention from extension services as livestock, field crops and horticulture. Achieving this would require that someone at a fairly senior level within MAWF “pushes” for IVs to be included.

It is recommended that the IPTT mandates its Chairman and/or the NBRI PPD Officer to actively pursue inclusion of IVs in MAWF’s long-term work programme.

Another way of generating more interest in and action on IGLVs is to encourage community groups to pro-actively seek support from their MAWF extension officer, which should (at least in theory) lead to extension workers in turn seeking more information and support from MAWF, NBRI or the IPTT.

4.4) Organise training for (prospective) SME processors

From the information available to date it seems unlikely that centralised processing of IGLVs will work, even at sub-regional or district level. Even if it does work such an approach would not necessarily be profitable, due to high transport costs, a short growing/processing season, and high losses of raw material that will probably occur due to almost unavoidable gluts and/or delays.

At farm or household level, however, the traditional practice of making dried “spinach cakes” out of boiled IGLVs is very well known, and practiced very successfully by some (e.g. recorded income of N\$14’000 per season in one case). If this scale of processing can be upgraded to meet the expectations of formal markets (urban consumers, restaurateurs, caterers) regarding hygienic food processing practices, significant additional value can be added to the products.

It is recommended that:

a) An assessment of training needs be compiled through participatory documenting of current home processing practices (who currently processes IGLVs, how, when, at which scale, why do they process while others don’t, what are their perceived training needs, where/how do they sell now?); this may require a consultancy budget of about N\$30’0000 and should be done in early 2009, after the rains have started and people are actually processing IGLVs;

b) The results of the needs assessment be used to design and deliver a training programme for prospective SMEs; the IPTT should try to raise additional funds and/or resources for this (e.g. through the “SMEs Compete” programme); if the training takes place in 2010 it could probably be supported by the MCA intervention

It would be ideal if training could be combined with market match-making and a small loans facility to provide essential equipment.

4.5) Start bringing other IVs into field genebanks and ex-situ collections

The rationale for this activity is explained above. While there will definitely be management challenges the only way to overcome them is to make a start.

It is recommended that the IPTT encourages gardening projects working with people who still gather wild foods to start bringing local vegetables and other useful plants into cultivation. The initial participants would ideally include at least the Kalahari Gardens project being implemented at Corridor by the Global Diversity Foundation and Komeho, the community gardens in Na#Jaqna and Nyae Nyae, the IRDNC RPRP project in West Caprivi, and the ICEMA succulent cultivation initiative in southern Kunene conservancies.

Initially this work can probably be done without spending much; additional funding should be sought from donors supporting biodiversity and/or plant genetic resources and/or farming systems innovation work (e.g. the recent FARPAN call for proposals).

Appendix 1

Terms of Reference for Consultancy

1 OBJECTIVE

To propose to the IPTT a comprehensive way forward for the development of production and/or harvesting, processing and marketing of green leafy and other indigenous vegetables

2 SPECIFIC TASKS OF THE CONSULTANT

The consultant is expected to:

- 3.1 Review the following ‘Vigorous Indigenous Vegetables from Africa’ (VIVA) documents, consulting relevant persons/stakeholders as necessary for clarifications:
 - *Indigenous Vegetables Development Proposal* (NASSP Report No. 005/2004)
 - *Indigenous Green Leafy Vegetables (IGLV) Processing and Marketing Trials* (NASSP Report No. 026/2005)
 - *Promoting Indigenous Plants in Namibia: Indigenous Green Leafy Vegetables – Processing and Marketing Trials Phase 2 (2006) Final Report*
 - *VIVA Inception Report* (NASSP Report No. 016/2004)
 - *Evaluation of the Cultivation Trials of Indigenous/Traditional Green Leafy Vegetables under the IGLV-VIVA 2005-2006 Program* (Patrick Hilger)
- 3.2 From the review in 3.1 propose to the IPTT a comprehensive way forward for the development of production and/or harvesting, processing and marketing of green leafy and other indigenous vegetables that includes:
 - Outline of a set (sets) of activities that would achieve the way forward
 - Estimated budgeted amounts for the activities
 - Prioritised activities for funding under remaining UPDP funds