

# Moringa and other highly nutritious plant resources: Strategies, standards and markets for a better impact on nutrition in Africa



Accra, November, 16-18, 2006

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## Daily digest Thursday, November 16<sup>th</sup>

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Today around 100 participants attended the workshop.

The opening of the workshop took place at 9:30. The organisers of the workshop: Armelle de Saint Sauveur (Moringanews Network), John Woodend (CTA) and Jordi Rotllan (CDE) introduced their respective organisations and the objectives of the workshop: to gather and share experience amongst scientists, producers, private entrepreneurs and NGOs involved in research, production, trade or promotion of Moringa leaves.

In total, 10 plenary presentations took place, and 8 posters were displayed, on different topics:

### **New scientific studies and literature reviews on Moringa leaves nutritional properties** (nutritional value, antioxidants properties, bioavailability of nutrients, anti-nutrient factors):

- The presentation of Armelle de St Sauveur, and the poster of Mélanie Broin, from MORINGANEWS, presented a review of literature published on *Moringa oleifera* nutrient content; and the presentation of Dechasa Jiru, from the Forestry Research Center, Ethiopia, gave new data about the nutritional value of *Moringa oleifera* and *stenopetala* leaves.
- Virginie Levasseur, from the World Vegetable Centre, presented original data about the effect of harvesting season, leaf maturity and processing on the nutrient content and the of Moringa leaves; as well as research results about the bioavailability of nutrients; and so did Vanisha Nambiar, from University of Baroda, India, in a presentation, and Dr Guiro, from Institut des Technologies Alimentaires, Senegal, in a her poster. Amaglo Newton, from University of Sciences and Technology, Ghana, talked about the influence of tree spacing and harvest frequency on the nutrient content of *Moringa oleifera* leaves.
- Jed W. Fahey, from Johns Hopkins School of Medicine, USA, presented a review of nutritional studies on the consumption of Moringa leaves, as well as new results about the content of anticancer phytochemicals in Moringa leaves.

### **New scientific studies or economic data on Moringa leaves production:**

- Amaglo Newton presented the effect of spacing and harvest frequency on the growth and leaf yield of Moringa;
- Armelle de Saint Sauveur, M. Sogbo, from ONG APPEF, Togo, and M. Ougoudadja, from ONG GARPE, Benin, presented economic data on the conditions of profitability and sustainability of Moringa leaf production in Togo, Benin and Niger.

### **Examples of programmes using Moringa leaves and other leafy vegetables to prevent malnutrition or to improve the nutritional status of malnourished people:**



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- Vanisha Nambiar showed the results of a programme in India aiming at improving the consumption of Moringa leaves in the daily diet, its acceptability and its effect on health of the targeted people (children under 5, pregnant and lactating women).
- Beth Doerr, from ECHO, USA/World Vision, Mauritania, presented the World Vision programme in Mauritania that promoted Moringa leaves consumption to prevent or cure vitamin A deficiency;
- Paul Bordoni, from GFU for underutilized species, Italy, highlighted the potential of underutilised species to improve livelihood for poor people in Africa.

### **Examples of initiatives to introduce Moringa leaf powder or leaf juice in processed food products:**

- Leonard Rweyemamu, from the company StayFit Nutrisupplies, Tanzania, presented original data about the processing of nutrient rich-food in order to offer a nutritionally rich, standardised, attractive and marketable products;
- Armelle de Saint Sauveur showed how we can improve the nutritional quality of traditional baby foods by adding Moringa leaf powder in order to obtain formulas that are balanced in macro-nutrients and rich in micro-nutrients.

### **Market opportunities and regulations for Moringa products**

- Armelle de Saint Sauveur presented the market of dietary supplements and Moringa products in Africa ;
- Stéphane Durand, from the company Teralis S.A., France, presented the different aspects of fair trade and organic markets for export (principles, TOR, organizations, future regulations).



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## Daily digest Friday, November 17<sup>th</sup>

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Today 80 participants attended the workshop.

Participants were divided into smaller groups to exchange information, discuss and make recommendations on 4 main topics:

**Workshop 1.** How to use Moringa leaves and other highly nutritious plants in a medical or nutritional context

**Workshop 2.** How to produce Moringa leaves efficiently

**Workshop 3.** How to use Moringa leaves and other leafy vegetables to prevent malnutrition

**Workshop 4.** How to develop the market of dietary supplements and processed food products made of Moringa and other leafy vegetables in ACP countries

In each workshop, the following discussions took place:

### **Workshop 1. How to use Moringa leaves and other highly nutritious plants in a medical or nutritional context**

#### Objectives:

How to take into account:

- The variability of nutrients content in Moringa leaf powder
- The bioavailability of nutrients
- The profile of the people treated
- Potential antinutrient factors

#### Activities:

- Establish mean values for the main nutrients in Moringa leaf powder
- Define the factors of variability of these values (ecotypes, harvesting time, processing...)
- Establish the status of knowledge on these nutrients' bioavailability
- Establish the status of knowledge about antinutrient factors and how to minimize their impact
- Establish the various patients' profiles and correspondent needs
- Discuss the best ways to incorporate Moringa leaf powder in patient's diet

#### Results:

- Product standards with acceptable range of variation
- Best practices to reach these standards
- Guidelines for measuring out Moringa leaf powder according to patient's profile
- Patients to exclude from Moringa leaf powder intake for medical / ethical? reasons
- Best eating practices/associations to maximize nutrients intake

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Further information and research projects needed

## Workshop 2. How to produce Moringa leaves efficiently

Before the discussion starts, three presentations were given on various examples of cultivation and profitability of Moringa leaves:

M. Sogbo, from NGO APPEF, Togo, presented a small farmers initiative to cultivate and trade Moringa leaves and leaf powder

Mrs Gamatié, agronomist from Niger, presented the cultivation system in Niger and its economic importance

M. Chadokar, UN volunteer in Ethiopia presented the traditional cultivation system of *Moringa stenopetala* by the Konso people

Discussions then concentrated on the following tasks:

### Objectives:

To have reliable data on the cultivation of Moringa and its profitability

### Activities:

Panorama of the different cultivation systems

List pros and cons of each system

Gather and confront data from participants and previously published data on each system

Gather and confront the existing economic data (investment, production costs, selling prices, revenues)

### Results:

Guidelines for fieldworkers to define which system is best suited according to objectives/constraints

Define the main characteristics of each system (density, inputs, yield, frequency of harvests, cost of production, manpower, profitability, etc.)

## Workshop 3. How to use Moringa leaves and other leafy vegetables to prevent malnutrition

### Objectives:

Define the best strategies for using leafy vegetables to prevent malnutrition

### Activities:

Assessing malnutrition: when and why choose leafy vegetables?

Ways to increase leafy vegetables' consumption: individual production and consumption vs marketing leafy vegetables. Whose diet is improved?

Production vs consumption: groups concerned and their incentives

Assessing diet changes in projects aiming at increasing leafy vegetables' consumption: examples, methods, results, constraints

Assessing the change in nutritional status of the target groups: examples, methods, results, constraints

### Results:

Guidelines for project development: diagnostic, implementation, assessment

Description of the best practical tools already tested

List of contacts able to provide materials and methods for projects

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## **Workshop 4. How to develop the market of dietary supplements and processed food products made of Moringa and other leafy vegetables in ACP countries.**

In this workshop, two presentations took place:

Jordi Tio Rotllan presented the facilities offered by the CDE (Centre for the Development of Enterprise), an organ of the European Commission, to support the private sector, and particularly SME in Africa

Paul Bordoni presented the European Novel Food Regulation, and in what way it constitutes a barrier to the European markets for non-traditional foods

Discussions then focused on the following topics:

### Objectives:

Define the conditions for market development of processed food products and dietary supplements made of leafy vegetables in ACP countries

### Activities:

Panorama of available Moringa derived products already on the market

Describing the African markets for dietary supplements: companies involved, products available, buyers' profiles

Describing present use of leafy vegetables in processed food products in ACP countries

Identifying the main constraints faced by companies and elaborating ways to face them (product supply, product quality, sanitary requirements, possible side effects, processing, packaging, administrative clearance needed, marketing)

Export markets: two presentations

### Results:

Action plan for product and market development

Action plan to set up a quality label

Contacts for technical, financial and marketing assistance

For each working group, a small group of people who attended the workshop (the facilitator, the secretary and 1 or 2 resource persons) sat together to make a summary of the discussions that took place, and to draw the main conclusions on each topic, that will be presented on Saturday 18<sup>th</sup>.

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## Daily digest Saturday, November 18<sup>th</sup>

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This morning, the main conclusions of yesterday's group sessions were presented in a plenary session.

Below are presented the main outputs of the working groups:

### **Workshop 1. How to use Moringa leaves and other highly nutritious plants in a medical or nutritional context**

#### ***Nutritional value of Moringa leaves***

An important work of data compilation has been done during the preparation of the workshop, and additional analyses have been obtained from the participants. Product standards with acceptable range of variation will be published in the proceedings of the workshop according to current knowledge. These values will evolve and become more and more accurate and reliable as new data are taken into consideration (contributions from the network members and from the available literature). These values will be useful for fieldworkers and for communication on Moringa, but any nutritional study should include a proper analysis of the particular samples used.

#### ***Best practices to reach these standards***

Many factors can influence the nutrient content of the leaves, during the production, processing and storage steps. The main conclusions of the working group were:

Cultivar seems to have a limited effect on the nutritional content

Preferably choose mature leaves (more rich in nutrients) for leaf powder and young leaves (more tender) for fresh consumption

Harvesting season can have an effect but this depends on the local climate and anyway long conservation also affects nutrient content

Processing can greatly alter nutrient content (especially vitamins): drying T°, grinding T°, drying length, exposure to UV...

Processing can also have an effect on the bioavailability of nutrients (the use of leaf powder is recommended in a medical context since bioavailability of nutrients is enhanced)

Storage can influence the nutrient content (length, T°, oxidation...)

To avoid microbial contaminations during storage and utilisation, an appropriate packaging has to be designed

#### ***Patient profiles***

Two different patients' profiles have been identified for Moringa leaves consumption:

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Vulnerable groups exposed to malnutrition (as a preventive or a cure): weaning children (6 months – 3 years), pregnant and lactating women: these three target groups constitute a complementary approach to eradicate child malnutrition

To complement a medical treatment for people suffering from chronic diseases (HIV, diabetes, high blood pressure, drepanocytose) or particular affections like microbial affections and physiological disorders.

### ***Recommended amounts***

Quantities generally used are the following:

To prevent or cure malnutrition: 10 to 30g leaf powder (eq. To 50 to 150g fresh leaves)

For medicinal uses, 1 to 4 tablespoons a day

But these quantities are empiric and need to be adjusted.

It has been emphasised that Moringa leaves should not substitute a medical treatment in case of illness (HIV, malaria, etc.) and that a medical follow-up is always necessary in this or in case of malnutrition.

It has also been emphasised that Moringa leaves should be presented as a dietary supplement that promotes health rather than as a medicine, this to encourage healthy people to consume it too and to avoid that people suffering from diseases be tempted to give up their medicine for Moringa if cheaper.

### ***Best eating practices***

Moringa leaves or leaf powder should be associated to other foods in order to increase the bioavailability of nutrients:

As flours associated with cereals, legumes and oil for specific targets (children, women, etc.)

As beverage: tea, powder in water (for medicinal use mainly)

Fresh or dry added to traditional dishes

These eating practices contribute to promote the idea that Moringa leaves are a «health promoting food» rather than a medicine, which strengthen the sustainability of consumption.

### ***Further information and research projects needed***

Priority research areas identified are:

To study the effects on malnourished children, pregnant and lactating women (figures and statistics)

To study the effect on HIV+ patients, and patients suffering from cardio-vascular pathologies

It has been proposed to create a working group dedicated to nutrition in the Moringanews Network, which priority actions would be:

To define a simple protocol for clinical follow-up that can be easily used by fieldworkers in order to gather as much data as possible that are comparable

To establish technical notes on production, processing, storage, packaging, nutritional values, recommended intake and food associations for optimal efficiency

To set up common research programmes

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### Workshop 2. How To Produce Moringa Leaves Efficiently

In this group, two production systems have been compared: intensive production versus familial exploitation.

Their main results are presented in the following table:

	Intensive	Extensive
<b>Spacing</b>	5x5, 20x20cm, 1x1m(ITC for seed production)	2x2m (Gh, Zb); 3x3m
<b>Cutting ht</b>	20cm	1.5m-2m
<b>Depth of Sowing</b>	2cm	2cm
<b>Seed Storage</b>	Dry, cool conditions.	
<b>Seed Treatment</b>	Soak In Water overnight Dehull Direct	same
<b>Seed rate</b>	Depends on Spacing and walkway $\text{Spacing(m)}/10000\text{m}^2$	same
<b>Sowing</b>	Direct	Nurse and transplant
<b>Germination</b>	9-10 days 14 days without Dehulling	
<b>% Germ.</b>	80-90 %	
<b>Transplanting</b>	Not Recommended	Recommended
<b>Soil type</b>	Sandy Loam; avoid clay	
<b>Irrigation</b>	Only in Dry season; avoid waterlogging	
<b>Fertilization</b>	NPK, Manures, Compost, manure teas, mycorrhizae	
<b>Frequency of Harvest</b>	35-40	60 days
<b>Pest</b>	Termites, Rats, Mole rats, Baboons, Antelopes,	
<b>Crop Protection</b>	Leaf blight; Neem Seed oil	
<b>Processing</b>	Fresh Leaves Cooked, Drying of leaves Powdering of Leaves	

### Workshop 3: How to Use Moringa Leaves and Other Leafy Vegetables to Prevent Malnutrition

In the third working group, the following questions methodology has been propose for project implementation:

#### **Assessing Malnutrition: When and why do we choose Moringa?**

Determine type of malnutrition among target group

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Availability of local foods and nutrient content  
Cultural dietary practices (acceptability of Moringa in local diets)

## ***Why do we choose Moringa?***

Good for health  
More sustainable, acceptable, and nutrient-rich than vitamin pill supplements  
Affordable, accessible, locally-produced, and self-renewable food source  
Easy to produce and process

## ***Ways to Increase Leafy Vegetable Consumption***

Advocacy with government structures, NGOs, religious organizations, agencies  
Awareness-raising among consumers (families, schools, women's groups, etc.)  
Training of producers and processors

### **TOOLS:**

Scientific documentation  
Mass media (radio, TV, posters, recipe books)  
Interpersonal communication methods (cooking demonstrations, peer educators)  
Networking/Partnerships among target agencies

## ***Production vs. Consumption: Groups Concerned and Their Incentives***

### **PRODUCTION:**

Income for producers, reducing poverty  
Desire to consume healthy food  
Access to urban markets  
Low start-up costs, small # of external inputs

### **CONSUMPTION:**

Improve health and nutrition  
Increase food security (availability, accessibility, and utilization)

## ***Assessing Diet Changes in Projects for Increasing GLV Consumption***

Community baseline data and follow-up studies on dietary patterns:

- Checklist of Moringa consumption (self-reporting)
- Survey
- Observational study

Market monitoring:

- Price monitoring
- Supply and demand of Moringa products

## ***Assessing Change in Nutritional Status of Target Groups***

Community baseline data and follow-up studies on nutritional status:

- Anthropometric measures
- Clinical assessment
- Checklist of disease frequency (self-reporting)

### **CONSTRAINTS:**

- Obtaining accurate data (including causal connection)
- Cultural sensitivities
- Current dietary and food preparation practices

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## Workshop 4. How to develop the market of dietary supplements and processed food products made of Moringa and other leafy vegetables in ACP countries

### Objectives:

Define the conditions for market development of processed food products and dietary supplements made of leafy vegetables in ACP countries

This workshop was attended by a majority of Ghanaians, and two persons coming respectively from Uganda and Benin. The results below are thus mainly reflecting the Ghanaian situation.

### Presentations:

Paul Bordoni, GFU : The European Novel Food Regulation: a barrier to the European markets for non-traditional foods

Jordi Tio Rotllan: CDE assistance to enterprises

Armelle de Saint Sauveur: Panorama of available Moringa derived products already on the international and African markets

### Activities:

#### *Describing present use of leafy vegetables in processed food products in ACP countries*

Several participants who were attending this workshop sell Moringa leaf powder as a food supplement or as a tea. It is the same product in both cases, only the consuming habit is different.

The product can be packaged in (from less to more elaborate):

- ♦ Sealed plastic sachet
- ♦ Recycled plastic bottle
- ♦ Zip locked plastic sachet
- ♦ Zip locked plastic sachet in a paper bag
- ♦ Zip locked plastic sachet in a box

#### **Identifying the main constraints faced by companies**

- ♦ Packaging  
Because of low investment capacity, packaging is often poor.  
Because of the small number of units produced (1000 or 2000 for instance), the packaging cost is high (10% of production costs).  
Packaging and labelling are sometimes of medium quality because they are done in small units that don't have the best equipment.
- ♦ Processing  
The promoters often don't have their own equipment and have to go to processing units where their product often waits for too long before being processed.
- ♦ Certification of the product  
In Ghana, a product needs to be certified by the Food and Drug Board to be authorised on the formal market.  
Certification costs around 1.3 million Cedis and it takes about 3 months to get the certification.  
At the moment, promoters in Ghana are not certified and cannot sell in shops. One of the promoters has applied for certification.

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Products are sold through networks of relations, churches and associations, but not over the counter.

- ♦ Profile of the promoters  
Most promoters in Ghana are not companies but associations or churches (Presbyterian, Methodist). They have a good supply network and a good clientele network, but they often don't have the financial and technical capacities to step to a business activity. They need some assistance to move from individual production and distribution to a formal processing and trading activity.
- ♦ Secrecy  
As Moringa leaf powder is new product on the market, promoters sometimes tend to keep some kind of confidentiality around what they are doing, and react like competitors. This is not helping the progress of technical knowledge and the overcoming of common problems such as certification.

### **Ways to overcome the constraints**

- ♦ Certification  
Promoters are all conscious that the need to get certified. Once the first one will have his certification, it will probably be easier for the others to apply if the products are similar. Certification involves:
  - Chemical analysis of active ingredients
  - Toxicology tests
  - Inspection of processing and packaging premises
- ♦ Forming an association of producers and manufacturers  
There was a large consensus during the workshop on the need to unite the small promoters in a larger organisation.
- ♦ Marketing  
The market is demand driven as there have been a lot of NGO activities on Moringa and people are ready to buy. It has been stressed that before getting into the formal market, the promoters need to secure supply. The promoters are very conscious of the risk of developing the market too quickly.

### **Results**

Action plan for product and market development

Forming an association of producers and manufacturers of Moringa products

Applying for certification as a group

Centralizing processing in one processing plant or auditing the processing plants of each member.

Action plan to set up a quality label

The following factors need to be standardized, and guide of good practices established:

- Time of harvest
- Harvest to drying: post harvest handling
- Washing the leaves or not
- Drying technology
- % of humidity after drying
- storage method

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- shelf life

It has been noted that good practices in tea production and post harvest can be a good indication of how to handle Moringa leaves.

The promoters suggested to have common standards and to hire the service of a auditing unit to control the quality and to give the association's label to the products.

Contacts for technical, financial and marketing assistance

The association would need assistance on:

Business plan

Technical assistance on quality standards

Training of the staff to meet these standards.

In the afternoon, after a presentation by Jeffrey Faus, Trees for Life, USA: "Presenting Moringa's potential to decision makers", a discussion took place on how to communicate about Moringa and other leafy vegetables.

Participants emphasised the need for a book with practical information intended to farmers and fieldworkers, for people having basic education. In particular, it has been noted that the information produced by scientists is not made available for producers.

It has been noticed that more funds should be made available to promote already existing information.

Some participants also stated that existing NGOs already working with Moringa need to be strengthened so that they can offer higher quantities and more diversified Moringa products to the communities.

It has also been proposed that the Moringanews network set up regional focal contacts in various countries, working with a multidisciplinary team representing the different stakeholders concerned with Moringa, and involving the Ministry of Health of each country.

It has also been proposed that thematic sub-groups be formed in the network to discuss specific topics.

The question of the funding of the network has also been raised: though it is not possible to have people pay any membership by now, it would be possible to propose paying services to enterprises.

The workshop finally ended with the closing session.

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