

# Moringa

Health and Economic Benefits

# Moringa Introduction

Moringaceae is a family of trees native to India, the Red Sea area, and parts of Africa.

*Moringa oleifera* is the most popular of the 13 known species.



The less famous relatives of *Moringa oleifera*:

*M. arborea*

*M. ovalifolia*

*M. borziana*

*M. peregrina*

*M. concanensis*

*M. pygmaea*

*M. drouhardii*

*M. rivaie*

*M. hildebrandtii*

*M. ruspoliana*

*M. longituba*

*M. stenopetala*

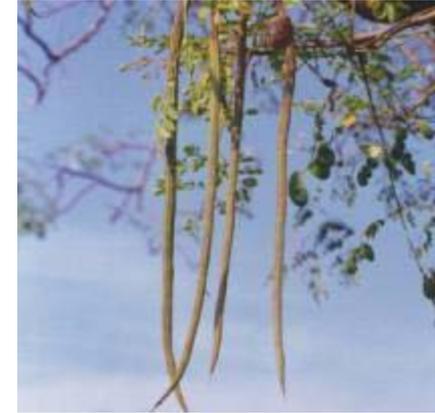
**Leaves:**  
Nutrition  
Medicine



**Flowers:**  
Medicine



**Pods:**  
Nutrition  
Medicine



# Uses of Moringa

**Roots:**  
Medicine



**Seeds:**  
Water Purification  
Medicine and Oil



**Bark:**  
Medicine



# Uses of Moringa

- Leaves can be eaten fresh, cooked or dried
- Pods can be eaten when young
- Mature seeds used to purify water
- Mature seeds contain high quality oil
- Seed extract used as antibiotic
- Bark used to make fiber & blue dye
- Roots used in various traditional remedies
- Flowers used to make a tea good for sinuses

# Moringa and Health

Moringa has been used for many things including:

Bacterial Infections

Toothaches

Common Cold

Warts

HIV/AIDS

Intestinal Parasites

Earache

Fever

Throat Infection

Asthma

Tumors

Cancer

Anemia

Hypertension

Diabetes

Thyroid

Snakebite

Diarrhea

Dysentery

Ulcers

Arthritis

Gout

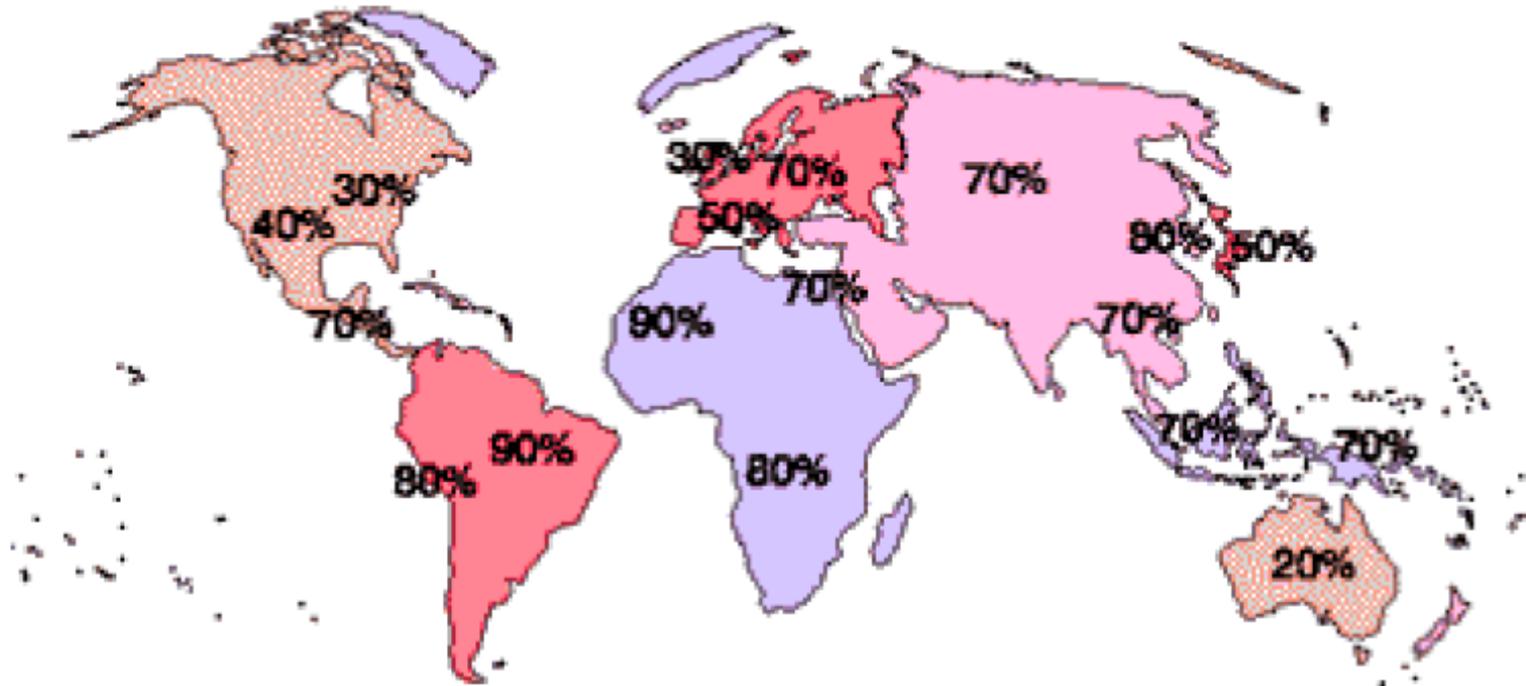


Moringa research in the  
late 1940's identified  
phytochemicals including  
glucosinolates and  
isothiocyanates

=

Anticancer  
Antibacterial  
Hypotensive

*Helicobacter pylori* is a human pathogen that is a major cause of gastritis, stomach ulcers, and stomach cancer. Compounds in Moringa are very effective at controlling this pathogen.

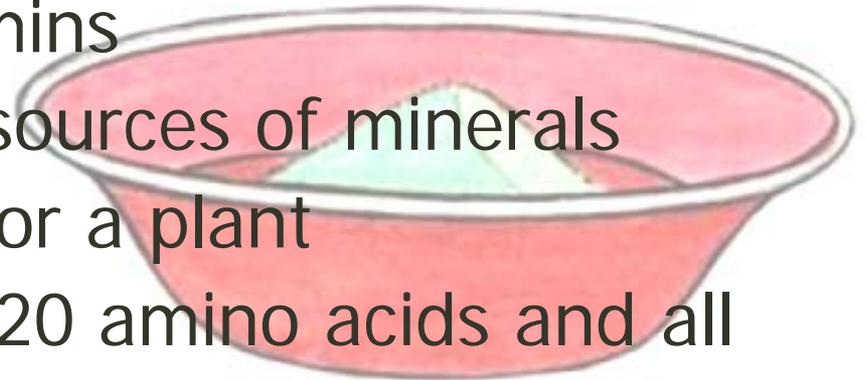
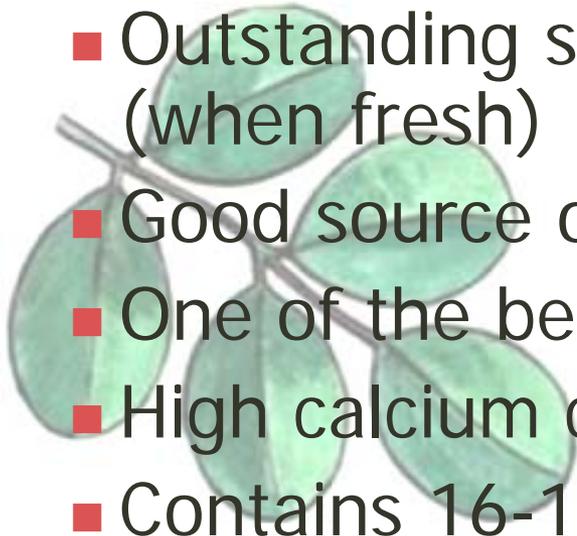


*Percentages of population infected with H. pylori as determined by epidemiological studies. Within national populations, rates of infection vary across subsets and may be attributed to socioeconomic conditions in childhood.*

Image courtesy of The Helicobacter Foundation.

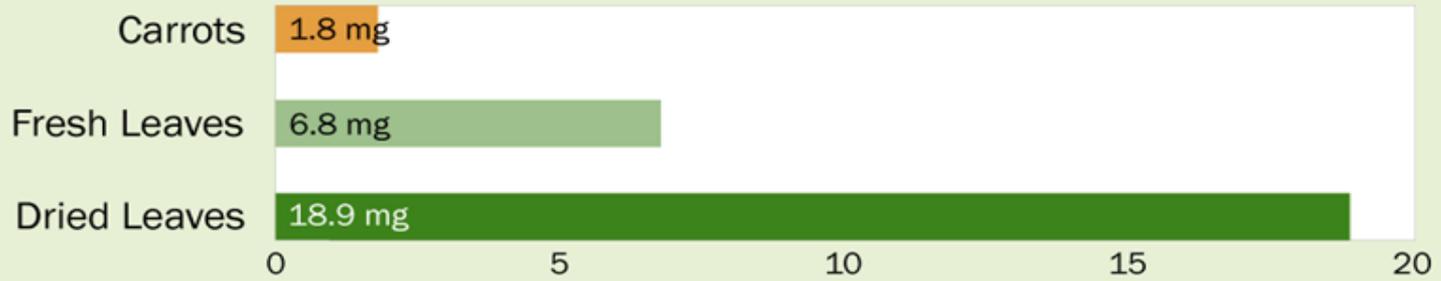
# Moringa for Good Nutrition

- Moringa leaves can be eaten fresh, cooked or dried and crushed into a powder
- Outstanding source of vitamin A and vitamin C (when fresh)
- Good source of B vitamins
- One of the best plant sources of minerals
- High calcium content for a plant
- Contains 16-19 of the 20 amino acids and all essential amino acids\*
- Excellent source of protein

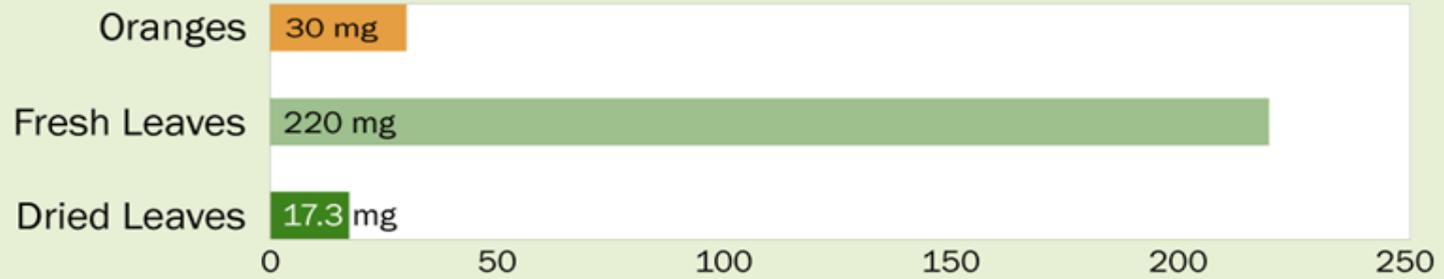


\*Methionine+Cystine level is 21 and should be at 25 to be considered a "complete" protein

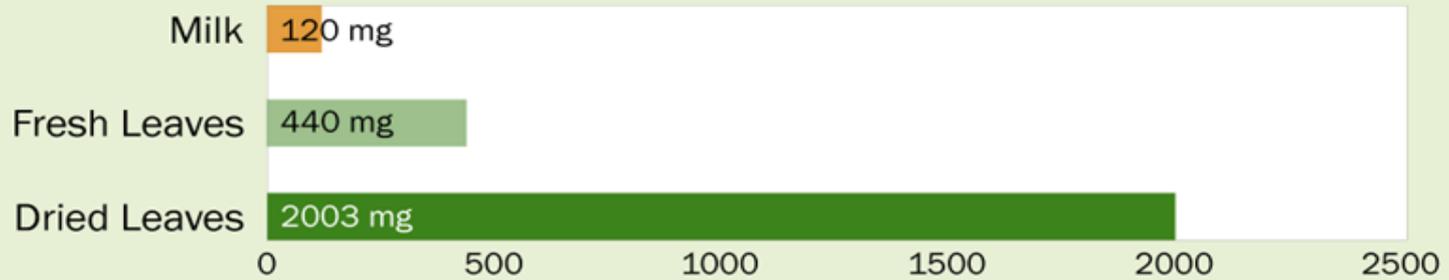
### Vitamin A



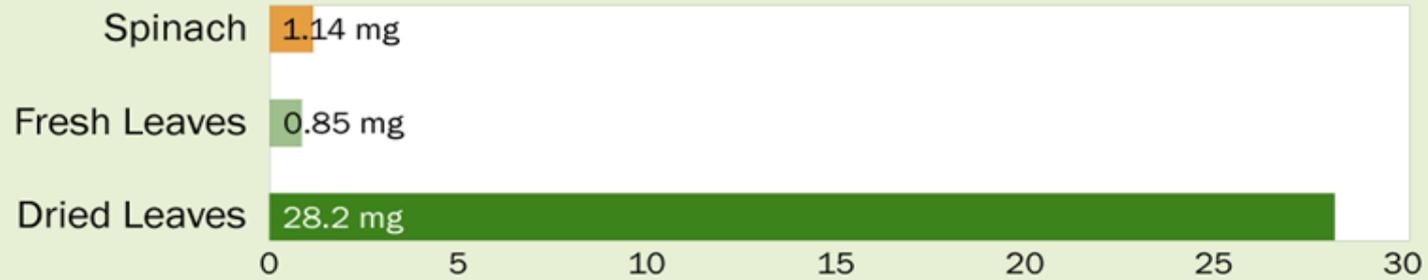
### Vitamin C



### Calcium

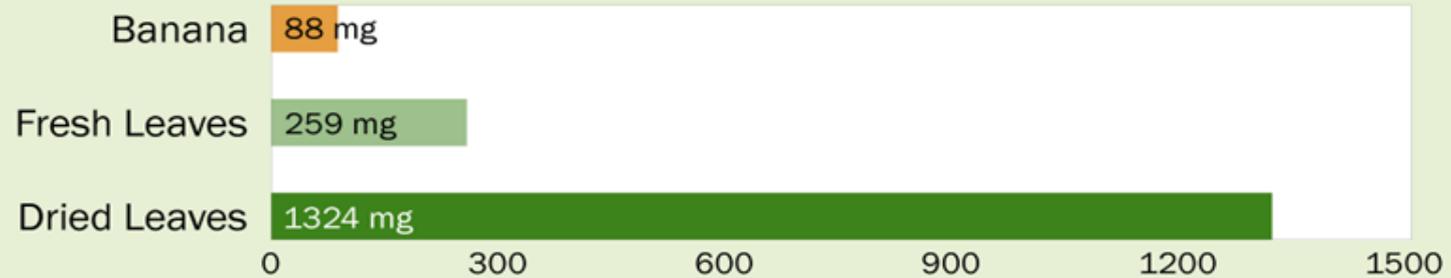


## Iron

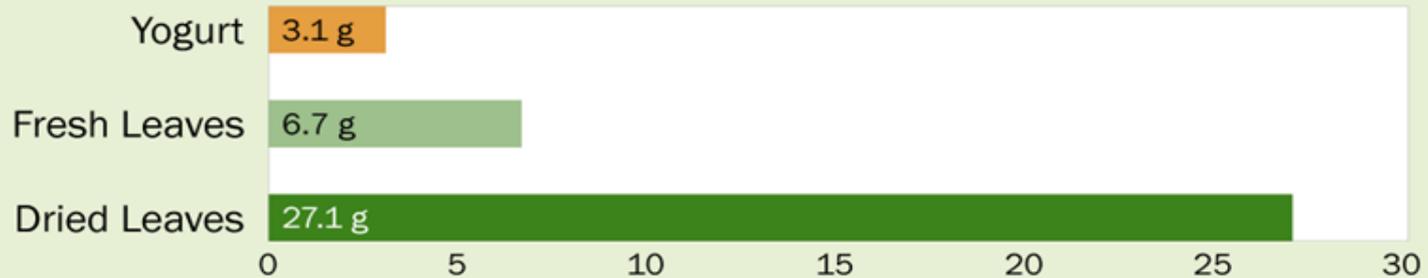


**Note:** Iron from plants, including spinach and Moringa, is generally difficult for the body to absorb.

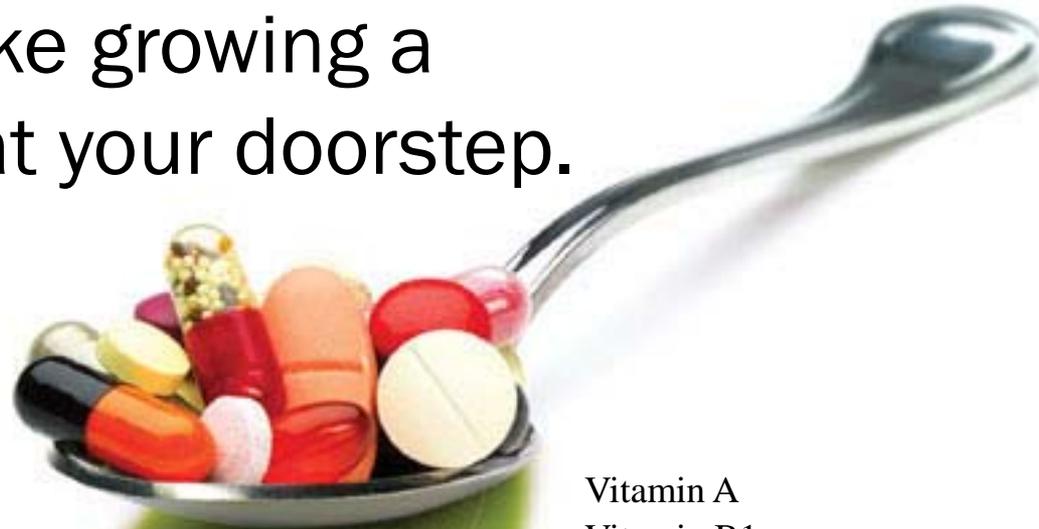
## Potassium



## Protein



# Moringa- It's like growing a multi-vitamin at your doorstep.



Vitamin A  
Vitamin B1

Vitamin B2

Vitamin B3

Vitamin C

Calcium

Chromium

Copper

Iron

Magnesium

Manganese

Phosphorus

Potassium

Protein

Zinc

# Moringa Leaves

A person is seen from behind, carrying a large, heavy bundle of fresh moringa leaves on their back. They are walking through a field of moringa trees. The background shows a clear blue sky and some distant structures.

- Harvest in hot-wet season for higher protein, vitamin A, glucosinolates and antioxidant activity.
- Harvest in cool-dry season for higher iron, vitamin C and phenolic content
- Mature leaves are more nutritious and dry quickly with minimal nutrient loss.
- Young shoots exhibit better eating quality and are better accepted.

The Maternity Clinic in Kiffa, Mauritania decided to do three different tests using Moringa.





## 25 women on Iron & 25 on Moringa Powder for 5 months

### Moringa:

- avg weight gain of 5.388kg
- no anemia, no dizziness, no fatigue, no loss of appetite
- felt good
- best health during a pregnancy
- can be grown by anyone

### Iron:

- avg weight gain of 3.3kg
- nausea and dizziness (2 women stopped taking it)
- expensive

## 25 infants on Moringa for months 4-9

-avg weight gain on moringa  
2.468kg

-avg weight gain on control  
2.162kg

-infants on moringa had fewer episodes of diarrhea (typically the biggest cause of malnutrition in this age group)





## 10 Malnourished Children

4 years  
12kg/26.46lb

3 years  
11kg/24.25lb

2 years  
10kg/22.05lb

17 months  
6kg/13.23lb

# 10 Children in the Red Zone

- within 2 months all but one were out of the red zone
  - within 4 months all 10 were in the green zone
- 2 children were over 2 years old and could not walk at the beginning; they were walking at the end
  - fewer cases of diarrhea
- average gain of 2kg per child over the 4 month period



# Nutrition impacts the future

87% of metabolic energy of children under 5 is used by brain

Malnutrition makes the body unable to utilize available nutrients

**Permanent damage to cognitive ability occurs from poor nutrition**



## Moringa can contribute to good nutrition

- fresh leaves in salads or on sandwiches
- cooked leaves in sauces or soups
- dried leaf powder added to weaning food
- dried leaf powder added to meals

# There are many ways to consume Moringa



Crushed leaves  
mixed with hot  
tea in Asia



# Moringa Leaf Processing

- Cooking Moringa leaves with oil helps retain beta carotene and oil helps with conversion of beta carotene to vitamin A in the body.
- Cooking Moringa leaves with tomato products reduces beta carotene because vitamin A is unstable in acidic conditions.
- Cooking Moringa leaves increases availability of iron and enhanced aqueous antioxidant activity; cooking with mungbean greatly increases iron bioavailability.

A photograph of a Moringa tree branch against a light brown wall. The branch is covered in green, pinnate leaves and several long, slender, green pods hanging vertically. Small white flowers are visible at the tips of some branches.

# Moringa Farming Systems

Moringa can be grown as a household tree



Moringa can be grown in unused space



Moringa can be grown in large production plots



This is our  
Moringa plot  
at ECHO



# Moringa plot in South Africa





Moringa in South Africa re-sprouting after winter



Intensive Plot  
spacing ranges  
from 10cmx10cm  
to 25cmx25cm.

Intensive Moringa Plot in Northern Senegal  
(Photo by: Caroline Olivier, CWS)

Intensive Moringa plot in Nicaragua



Intensive Moringa plot in Nicaragua





Moringa in containers



A photograph of a Moringa tree branch with several long, green, curved pods hanging down. The leaves are small and green, and there are some white flowers visible. The background is a textured, brown wall.

# Moringa Products

# Moringa Leaf Powder

Leaves are 75% moisture  
and need to be dried to  
10% moisture  
so these leaves.....



...reduced to this powder

# Moringa Leaf Powder

Leaves are 75% moisture  
and need to be dried to  
10% moisture

For rough calculations:

Fresh weight x .35 = dry weight  
Dry weight x 2.86 = fresh weight

If you want 10kg powder:  
 $10 \times 2.86 = 28.6\text{kg}$  fresh leaves

If you have 10kg fresh leaves:  
 $10 \times .35 = 3.5\text{kg}$  leaf powder



# Moringa Leaf Powder

Moringa Leaf Powder that is properly cleaned and dried can be stored up to **three months**:

[3 months storage → 50% beta carotene; 6 months storage → no beta carotene]

- store in air-tight containers
- protect from light
- keep below 24°C (75 °F)
- protect from humidity





# Moringa Oil

Moringa seeds are 35-40%  
oil by weight

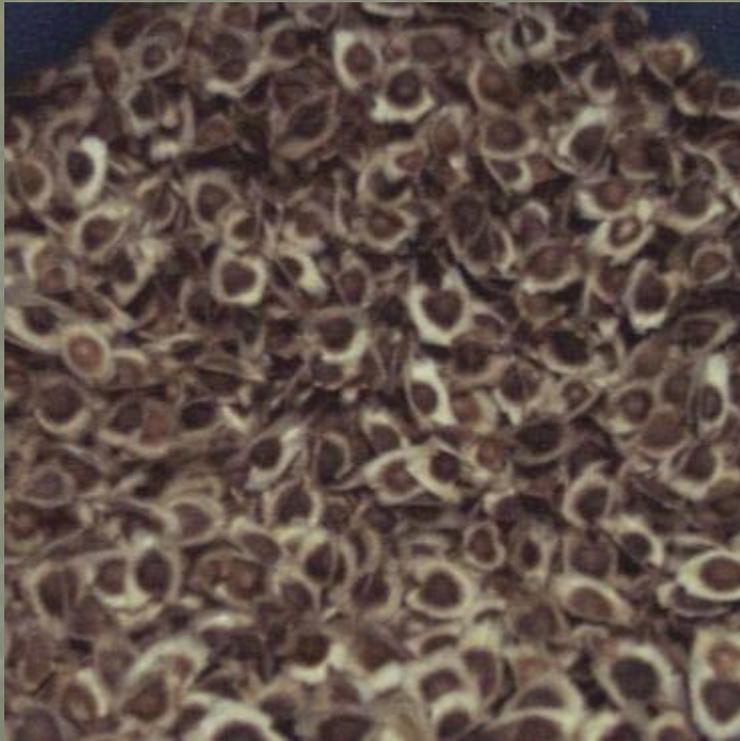
Oil is high quality

Similar to olive oil

Stores well

Cooking, soaps, lubricants,  
etc

Leftover presscake can be  
used for water purification



# Moringa Oil



Tim Tanner, Tanzania

People harvest leaves  
from lower branches  
and trees produce a lot  
of seeds...

...is there an easy way  
to press moringa oil?

Piteba Expeller, \$150





### Oil Expeller

An Oil Expeller is a machine that uses friction to compress pressed to remove the raw material and thereby get the oil. Typical raw materials are nuts, oil seeds, and even algae. This model comes from Thailand.

Tim Tanner's Homemade Expeller





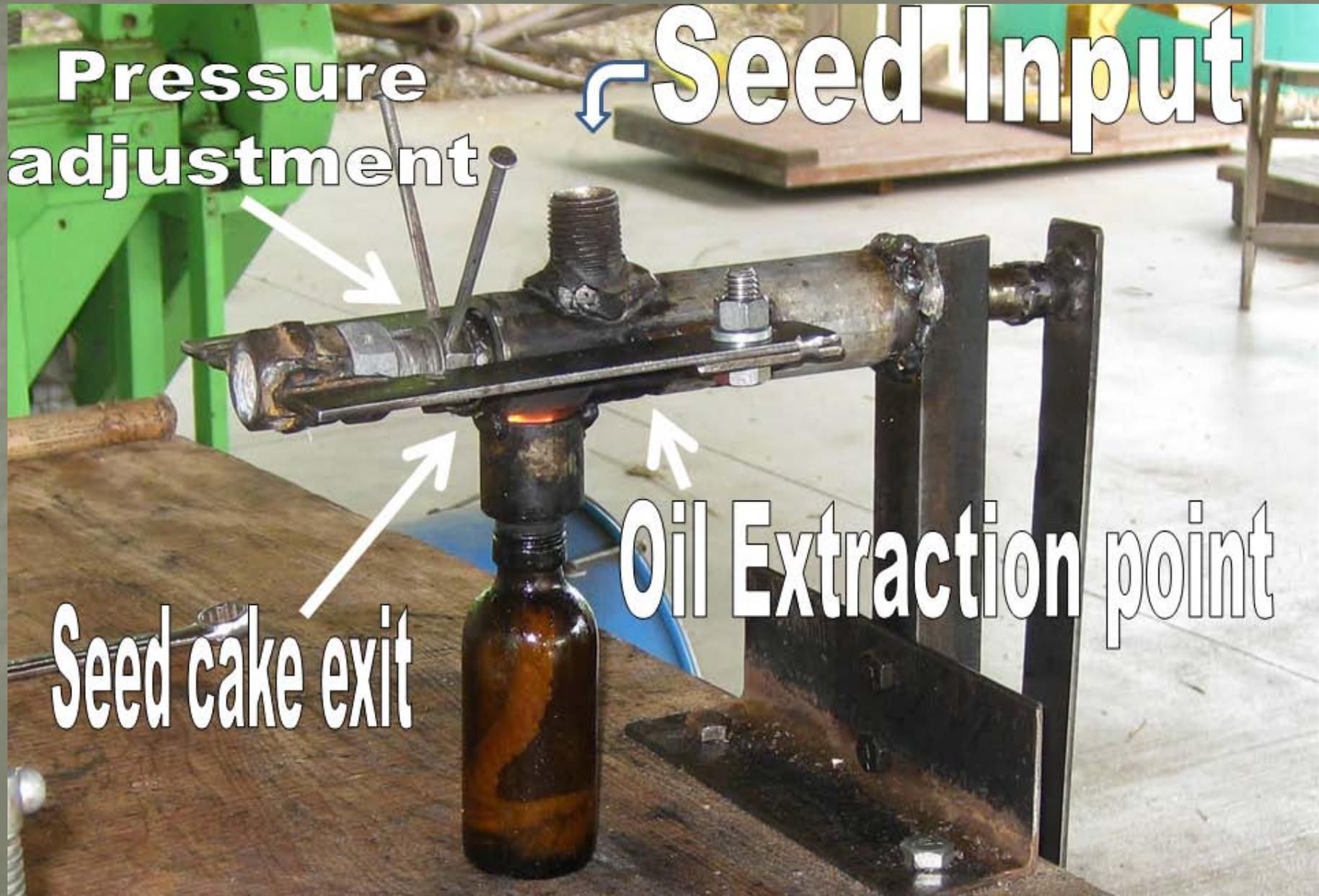
Tim Tanner's Homemade Expeller

# Moringa Oil

For best results when pressing the oil,  
dehull 50% of the seeds



This expeller can extract 15% of the oil  
(by weight)



**Pressure adjustment**

**Seed Input**

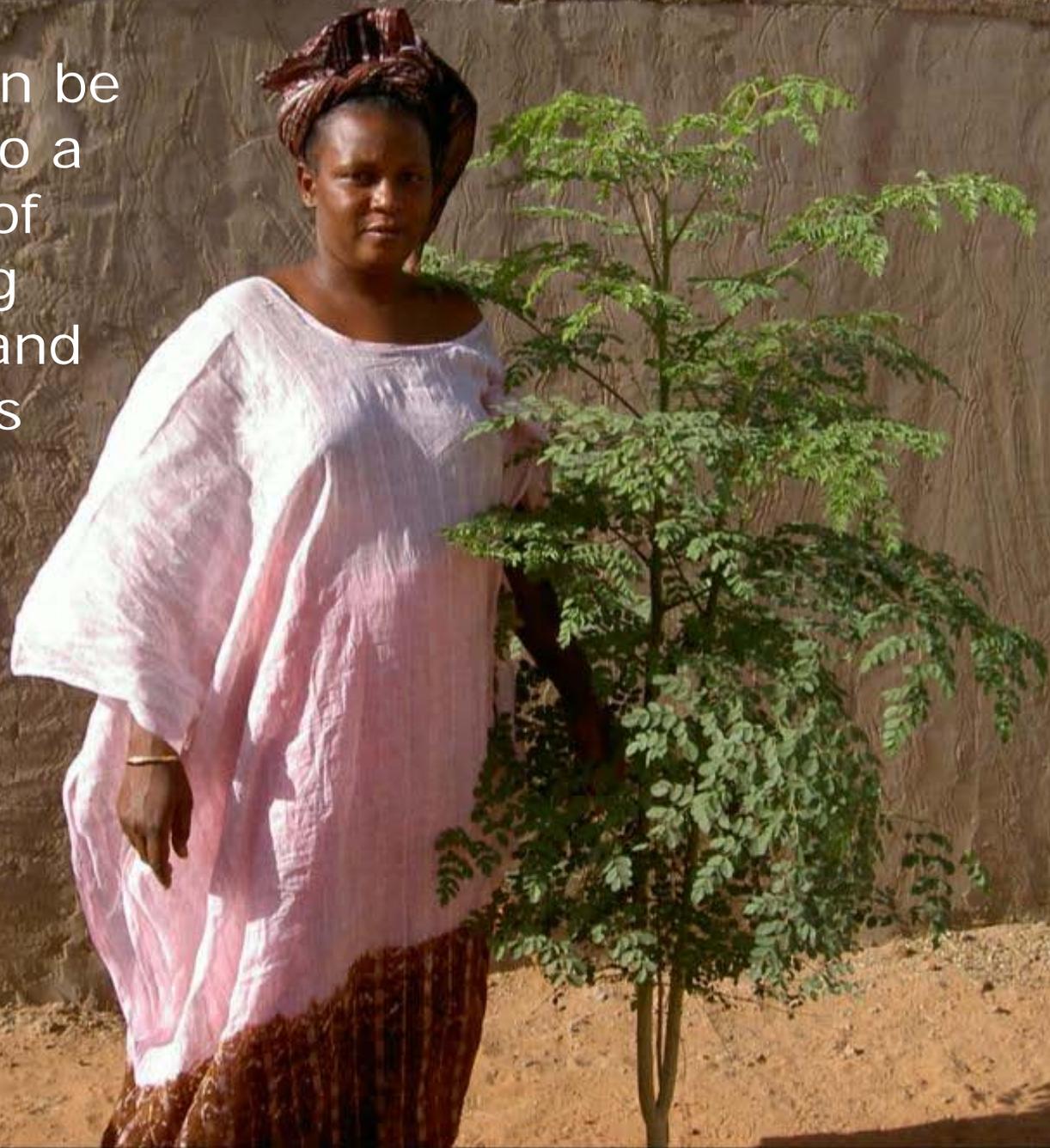
**Oil Extraction point**

**Seed cake exit**

There are lots of products that can be made from Moringa



Moringa can be adapted to a variety of growing systems and climates



Moringa can contribute to  
healthy families



# Moringa Web-Resources

- ECHO: [www.echocommunity.org](http://www.echocommunity.org)
- Moringa News: [www.moringanews.org](http://www.moringanews.org)
- Trees for Life: [www.treesforlife.org](http://www.treesforlife.org)
- AVRDC: [www.avrdc.org/LC/indigenous/moringa.pdf](http://www.avrdc.org/LC/indigenous/moringa.pdf)
- email: [echo@echonet.org](mailto:echo@echonet.org)