



Becoming a Crop Champion!

Penny Rambacher, R.D.



A photograph of the Jefferson Memorial in Washington, D.C., featuring its iconic white dome and classical columns. The image is framed with a thin gold border and set against a dark green background with a faint grid pattern.

The greatest service
that can be rendered
to any country is to add
a useful plant to its culture

Thomas Jefferson

US President 1801-09

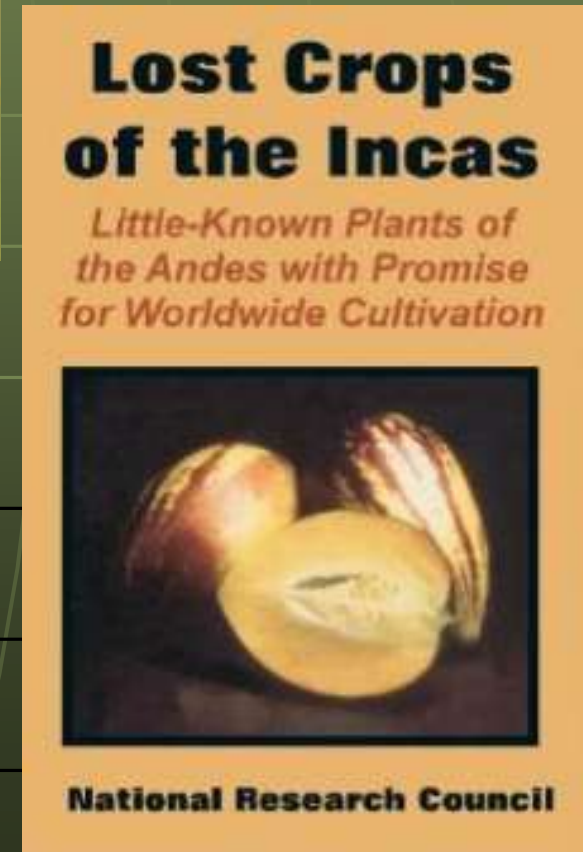
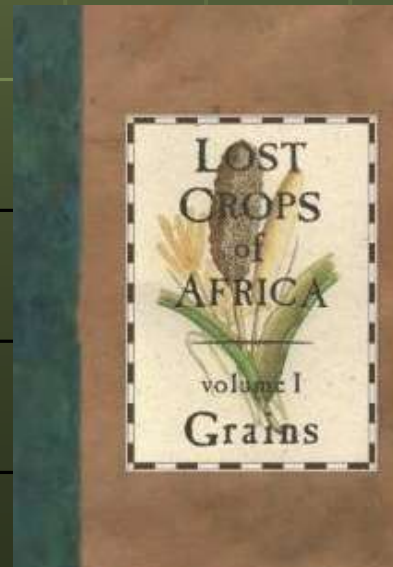
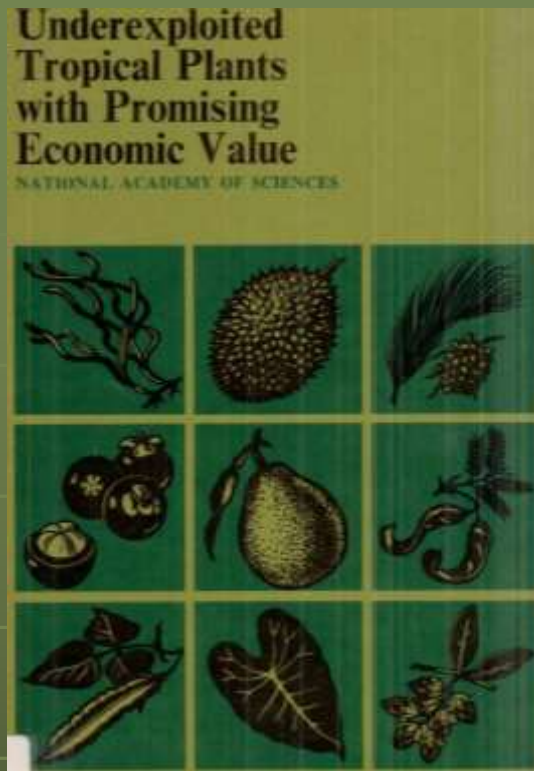


In 1970

Dr. Noel Vietmeyer
began his research career
with National Academy
of Science.

He lives his life as a
“Crop Champion” with his
goal to inspire others to do
the same, and promote
under-utilized plants for
the betterment of humanity.

“The plant kingdom has
many jewels and most have
yet to be polished and put
to proper use.”





Mesoamerica Civilization
(indigenous Aztec, Maya,...)

Mexico
Yucatan
Belize
Guatemala

(Central America)

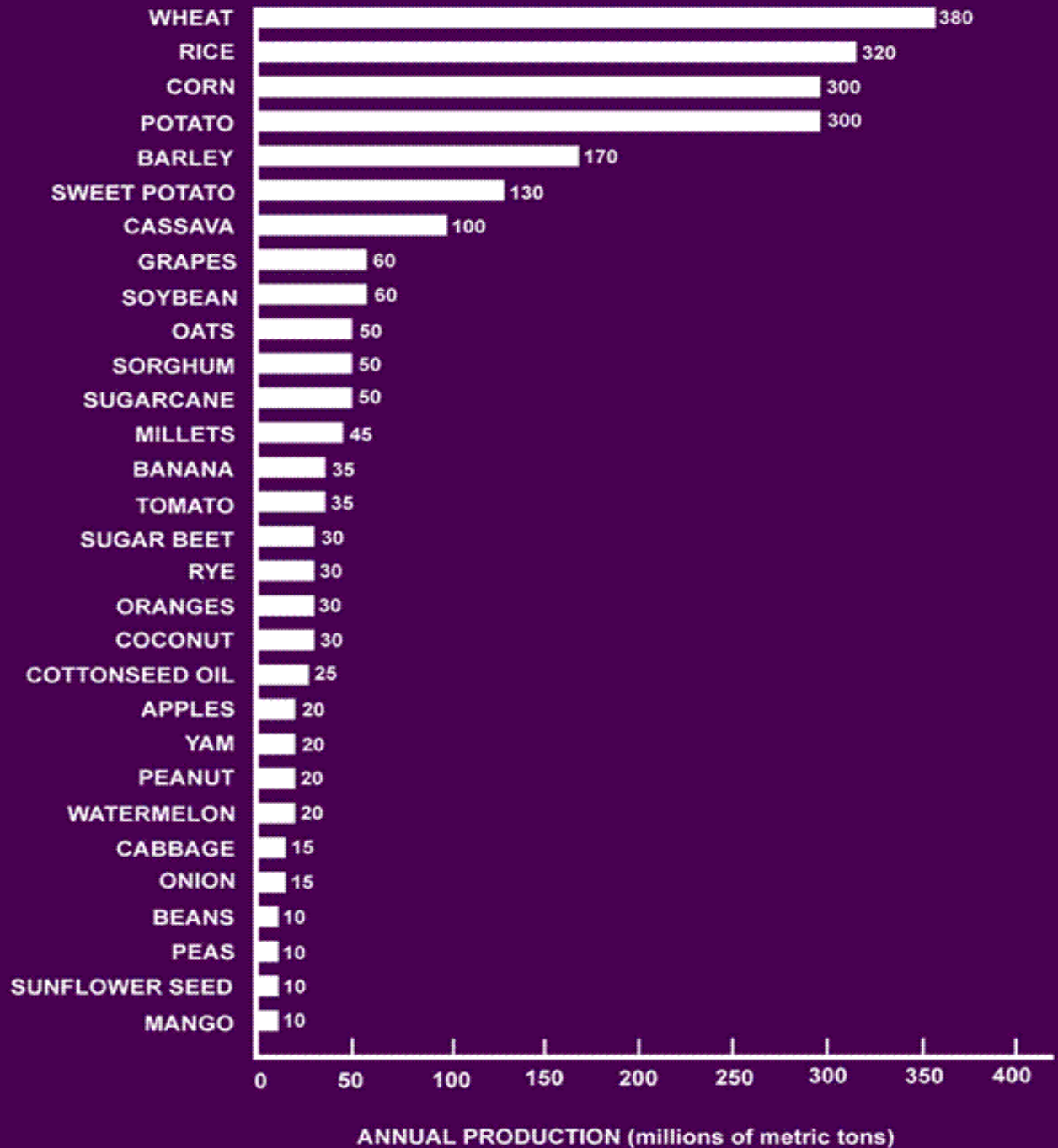
Ecuador,
Peru, Bolivia
(Andes Mountains)



- 3/5 of the modern world's agriculture comes from plants first domesticated by Native Americans.
- Native Americans were the first to cultivate:
corn, Irish potato, sweet potatoes, cassava/yucca/manioc, some beans, squash, pumpkins, peanuts, tomatoes, chocolate, and more.
Many traditional foods were not adopted by Europeans.



The top 30 plant foods that currently feed humanity



Source:
Trees for Life Journal
www.TFLJournal.org

CORN: 852 million metric tons produced per year 2012
40% of corn in the US is used for fuel.

Corn is low in lysine and tryptophan amino acids, needed to make complete protein. Indigenous people would balance consumption with beans, chia, and amaranth. Soaking corn in ash and lime makes lysine more available. A better option is QPM (quality protein maize) that produces 2x more usable protein.

Corn

Domesticated in Mexico about 3500 B.C., corn is still king in Meso-america. Corn tortillas make up more than two-thirds of caloric intake in some rural areas. Europeans introduced corn to the Old World. Corn-meal has become an important staple in Africa.



WHEAT: 717 million metric tons produced per year (2012)

Grown on more land around the world than any other crop.



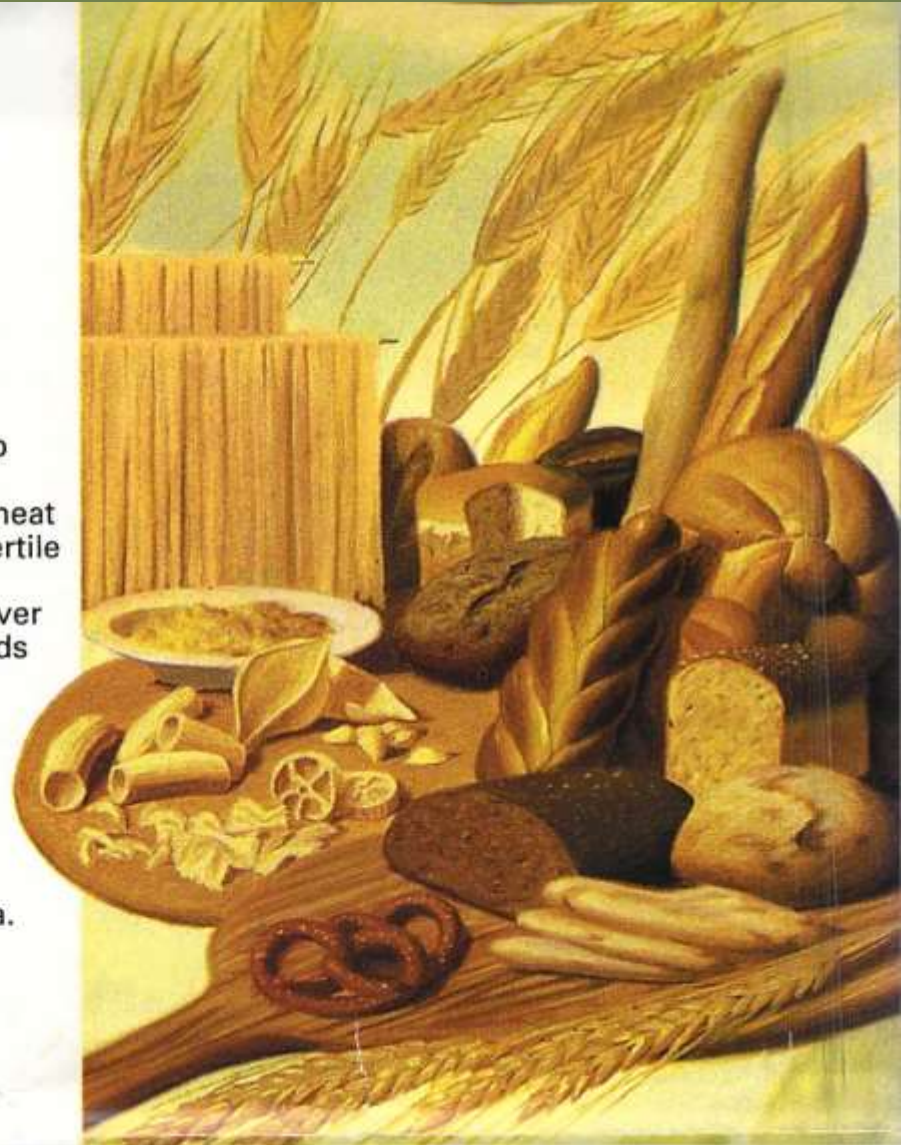
Leaf rust



Stem rust

Wheat

The world's top crop and one of the first cultivated plants, wheat was grown in the Fertile Crescent perhaps 10,000 years ago. Over a period of thousands of years it reached southern Europe, the Nile Valley, and the Indus Valley. European colonists bore it to the Americas, South Africa, and Australia.



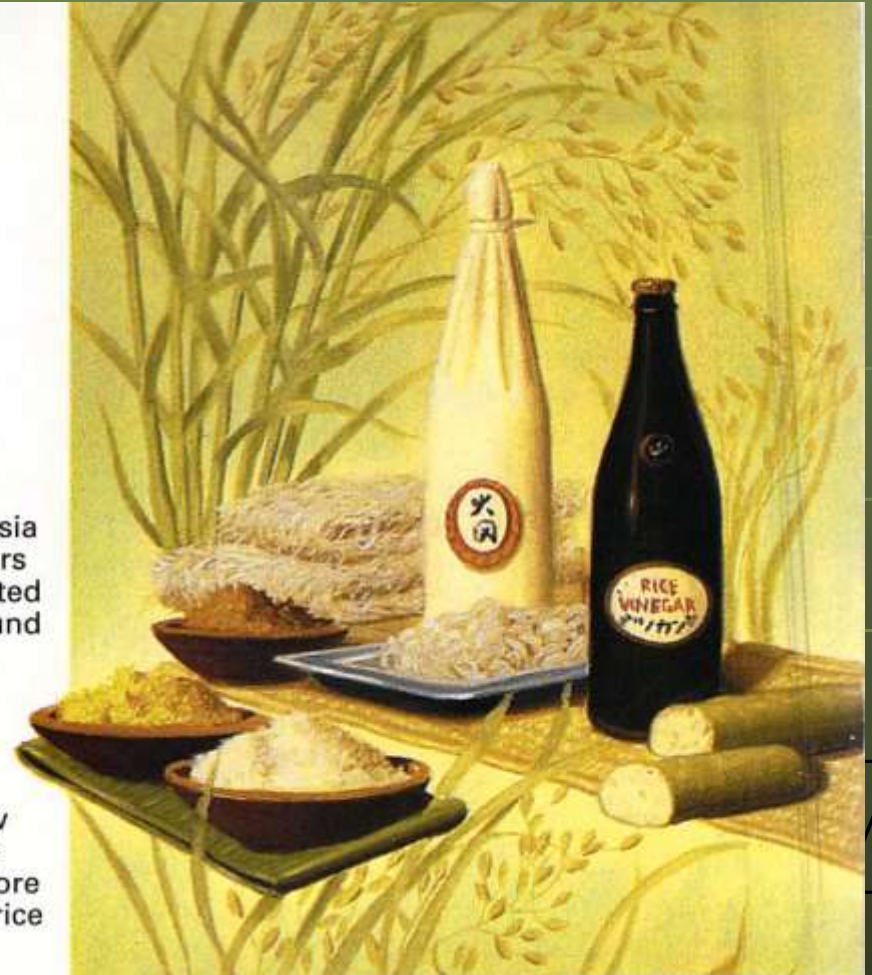
RICE: 498 million metric tons produced per year (2012)

Rice is increasing in popularity as more people are gluten sensitive or have celiac disease.

(gluten is the protein found in wheat).

Rice

Rice was grown in Asia as early as 5,500 years ago; Africans cultivated another species around 1500 B.C. Moors brought rice to Spain; Europeans took it to the Americas. Many Latin Americans now eat well over a cup a day. Germans eat more than twice as much rice as they did in 1970.

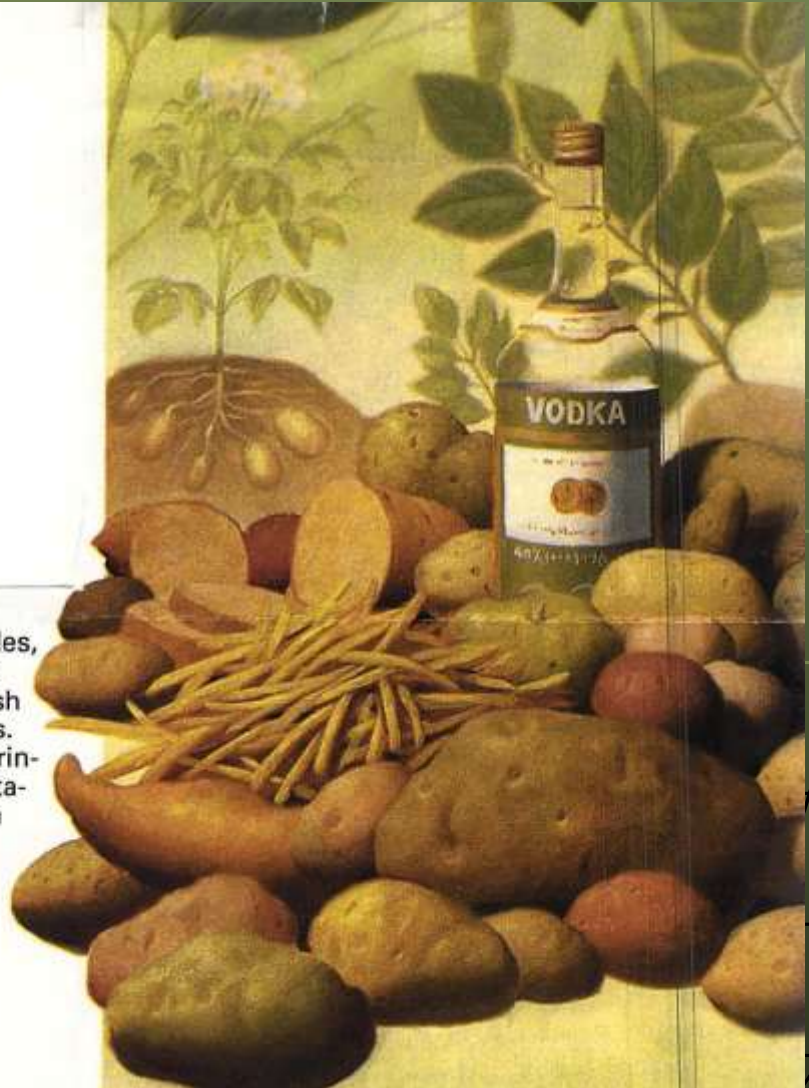


POTATOES: 365 million metric tons produced per year (2012)

Originating in the Peruvian Andes, potatoes became the staple food in Ireland, where the poor were solely reliant on one variety called Irish Lumper. In 1840's a potato blight led to 1 million people dying and 1 million emigrating from Ireland.

Potatoes

Native to the Andes, potatoes came to Europe on Spanish ships in the 1500s. They became a principal source of vitamin C in northern Europe. In the 1600s potatoes traveled to Asia and back across the Atlantic to North America.





WHIP MADE OF DRY ANIMAL SKIN

WOVEN VEST



YELLOW FLOWER

Over 1000 types
of potatoes.



Peru



MAKES THE DAUGHTER-IN-LAW CRY



FIG



PUMA'S PAW



BLUE

7,000 cultivated plant species are in use around the world today.

Wheat



Rice



Corn

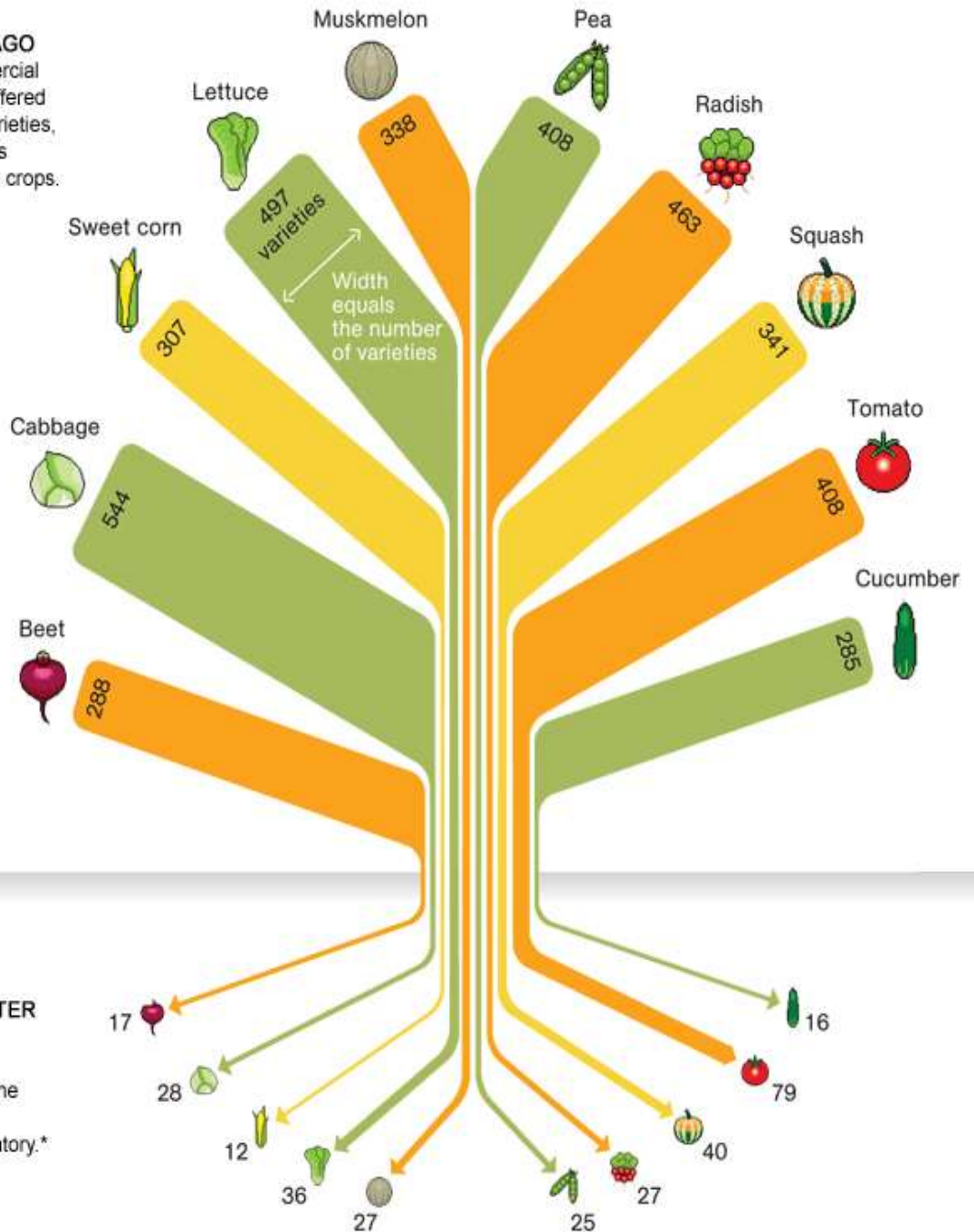


With 50% of humanity's caloric and protein needs being met by 3 crops, humankind faces a highly vulnerable situation and an urgent action to promote crop diversification is needed.

PLANT EXTINCTION

In 1983
66 crops were
studied.
Researchers
found that in
80 years, about
93% of the
plant varieties
had gone
extinct.

A CENTURY AGO
In 1903 commercial
seed houses offered
hundreds of varieties,
as shown in this
sampling of ten crops.



80 YEARS LATER
By 1983 few of
those varieties
were found in the
National Seed
Storage Laboratory.*

* CHANGED ITS NAME IN 2001 TO THE NATIONAL
CENTER FOR GENETIC RESOURCES PRESERVATION

JOHN TOMANIO, NGM STAFF. FOOD ICONS: QUICKHONEY
SOURCE: RURAL ADVANCEMENT FOUNDATION INTERNATIONAL

So how did I become a Crop Champion?



Penny Rambacher, R.D.





Miracles in Action
empowers Guatemalans
living in extreme poverty
to help themselves
through sustainable
projects that improve
Education,
Nutrition,
Vocational Skills,
and Create Jobs.



Naples, FL based
501©3 charity
Founded in 2005

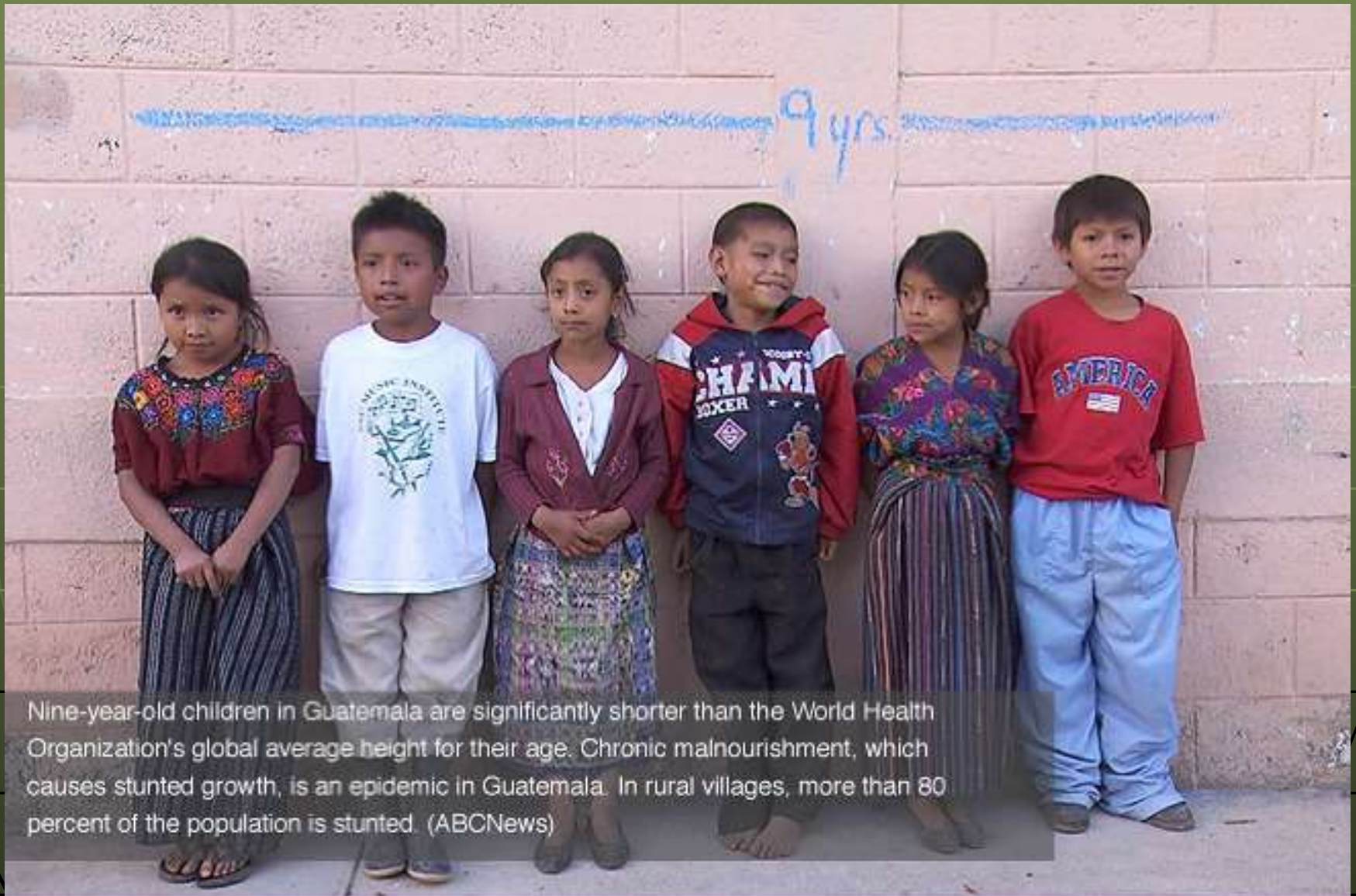


But, in 1999 we started
with delivering aid.



Shipping food Miami - Guatemala





Nine-year-old children in Guatemala are significantly shorter than the World Health Organization's global average height for their age. Chronic malnourishment, which causes stunted growth, is an epidemic in Guatemala. In rural villages, more than 80 percent of the population is stunted. (ABCNews)

Guatemala is 4th in the World in chronic malnutrition of children.

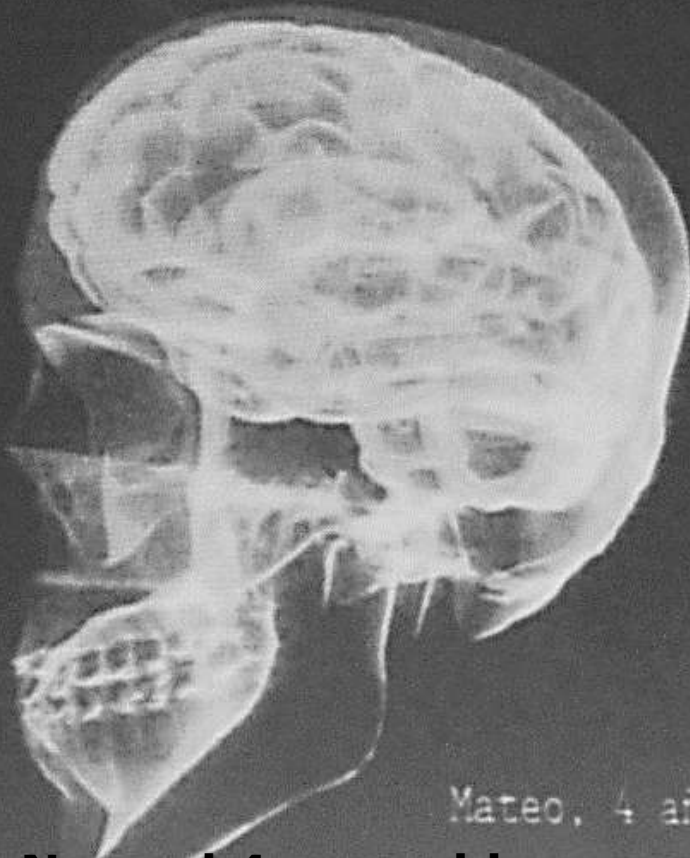
FIGURE 1 Guatemala has Higher Rates of Stunting than its Neighbors and Income Peers



Source: [The World Bank, "Guatemala: Nutrition at a Glance," 2010.](#)



Age 10 Age 7



Mateo, 4 años.

Normal 4 year old



Luis, 4 años.

Malnourished 4 year old

80% of rural, indigenous Guatemalans suffer from stunting, reduced development and IQ, and chronic malnutrition - created in the 1st 1000 days after conception. By age 3 it is too late, and can not be reversed.



What is the answer to malnutrition in Guatemala?





ECHO
makes learning
interesting
and fun!



Malnutrition Solution #1

Moringa

Indigenous to India

Grows best in hot
tropical coastal areas



Moringa

Loves Naples, Florida at sea level
grows 10-15' (3-5 mt) in a year.



Moringa

struggling to grow at 5,000-6,000'
(1500-1800 mt) elevation
in the highlands of Guatemala.



Moringa seeds are still in demand,
but only in the coastal tropical areas.

Malnutrition Solution #2 Chaya



Estrella or Star



Picuda Chaya

But which variety to re-introduce?



Chayamansa



Nutritional Composition Comparison

Chaya (*Cnidoscolus chayamansa*)

Katuk (*Sauropus androgynous*)

Spinach (*Spinacia oleraceae*)

Kale (*Brassica oleracea* v. *acaphala*)

	Protein	Calcium	Iron	Vitamin A	Vitamin C
Chaya ¹	7.4 mg.	330 mg.	9.3 mg.	(7.5 mg)	205 mg.
Katuk ²	4.9 mg	51 mg.	2.7 mg.	1122 IU.	83 mg.
Spinach ³	3.2 g.	100 mg.	3-5 mg.	8100 I.U.	28 +
Kale ⁴	3.2 g.	135 mg.	1.7 mg.	7400 mg.	100 mg.

Serving size- 100 g. fresh, leaves



Superior in
3 key nutrients

Protein
Calcium
Iron



Nutrient Analysis

Nutrients	Chaya	Spinach	Corn Tortilla	Black Beans
100gm Serv. =	5oz (fl)	5oz (fl)	4 tortillas	5oz (fl)
Protein gm	5.7	3.2	5.7	8.8
Iron (mg)	11.4	5.7	1.2	2.1
Calcium (mg)	199	101	81	27
Potassium (mg)	217	147	186	355
Vitamin A (mg)	0.085	0.014	0	0
Vitamin C (mg)	165	48	0	0

(25-30 fresh chaya leaves cook down to 5oz serving)



Develop a Plan to Spread this Amazing Plant

TED Talk –

Should be viewed by anyone in development field



and chaya

1. Real-time Data

2. Local Entrepreneurs

- locals know what motivates people to make change. Hire local extensionists.

3. Marketing

- Coke associates their product with the kind of life people want to live. "Open Happiness"
- Find out what makes local people happy.
- In Latin America: Family Life
- Don't assume that if people need something, you don't have to make them want it.

Chaya Chums



chaya growing at 5,000'



Chaya Chums



Transporting chaya cuttings,
whatever way it takes!



Chaya Chums at University del Valle



Dr. Ricardo Bressani,
Director Food Science
published over 500
scientific articles.

Worked w/ Dr. Price at Perdue



Dr. Rolando Cifuentes
Director of Agriculture
provides research papers



Lucia Castellano (Director Nutrition)
connected us w/ students working w/ chaya



Pensalibre newspaper
publishes several
articles on chaya.
Interest builds.



University del Valle (South) chaya forest

Growing Chaya – one of the fastest, easiest foods to grow!

Chaya grows easily from cuttings. Cut 8-12" sections of chaya branch (with or without the leaves). Cuttings can survive out of water, wrapped in newspaper for 4 weeks. Plant cutting in 4-5" of soil, either in pots, or directly in the ground. Be sure the area is open to plenty of sunlight and water often until roots form, but do not waterlog the plant. Chaya does well in drought conditions, even in sandy soil. Fertilizer is not necessary, however, if fertilized and watered, chaya will have more leaf growth. Ideal conditions are hot, humid coastal areas like Guatemala's tropical areas below 600 meters (2,000 ft.) elevation. Chaya grows slower in the highlands at 1500 meters (5,000 ft.). The planting area should be sheltered from frost and cold winds, with full sun. Chaya is resistant to insects and disease.



Important Facts to Remember

- Chaya contains an irritant or toxin in the leaf and stem.
- Always wash your hands after handling chaya. Do not get the sap in your eyes.
- Always cook chaya 15 minutes to remove the toxin.
- Always cook in steel, clay, or enamel pots. NEVER in aluminum. (Cooking chaya in aluminum pots can cause diarrhea).

Other Uses for Chaya

- Dried chaya leaves can be used as food for different farm animals such as pigs, chickens and turkeys.
- Shade trees for coffee or for fencing.
- High-nitrogen compost to fertilize gardens.
- Clinics can grow chaya bushes to give to malnourished patients as a food supplement, and to give them cuttings to grow at home.
- Chaya is helpful in controlling diabetes, arthritis, and other ailments.

Information made available by:

Penny Rambacher, R.D. (Registered Dietitian)
www.MiraclesInAction.org

Universidad del Valle de Guatemala
Center of Agricultural and Forestry Research
Center for Studies of Food Science and Technology
Educational Concerns for Hunger Organization
www.ECHO.net.org

Revision 2014



www.MiraclesInAction.org
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501 (c)(3) IRS approved charity



Nature's Solution to Malnutrition

One of the healthiest vegetables in the world.

Help us to re-introduce chaya to the people of Guatemala.

What is Chaya?

The chaya plant is native to the Yucatán Peninsula in Mexico, and to parts of Guatemala. It is similar to spinach and other greens, but grows on a bush that can get to 3 meters (10 ft.) tall and 2 meters (6.5 ft.) wide. The leaves are about the size of an adult hand. Chaya leaves are one of the most nutritious vegetables in the world. For centuries, chaya was a staple food of the Mayans, and was known as chae, chatate, or chaya mansa. There are many varieties of chaya, but Estrella (Star) chaya



is highest in nutrition and leaf mass. During dry or colder weather, chaya may lose leaves, but they will come back with the rains and sun.



Why Eat Chaya?

Chaya leaves are an excellent source for:

Protein – builds muscles. One serving of chaya has the same amount of protein as an egg.

Iron – for healthy blood and more energy. Chaya contains twice the iron of spinach.

Calcium – for strong bones. Chaya contains more calcium than any other vegetable.

Vitamin A – prevents blindness, reduces severity of infections & diarrhea diseases.

Vitamin C, folic acid, and B Vitamins – all essential to health.

For babies 6 months to 2 years, puréed chaya is a great way to provide protein and vitamins, especially when a toddler is weaned from breast milk. Chaya broth is excellent for children over 2 years old, and can be served as a staple with tortillas or mixed into the masa (tortilla dough). Mothers who eat chaya have a greater quality and quantity of breast milk for their babies.

Preparing Chaya

Chaya has a natural toxin (cyanide) in the leaf cells. (Other vegetables, such as cassava have toxins, but are safe to eat when cooked.) **To safely remove the toxin, boil chaya leaves for 15 minutes in a non-aluminum pot.** Boiling larger leaves for 25-30 minutes may be desirable to make them more tender. Chopping the cooked chaya will also make the leaves easier to chew and digest. The cooking water is high in vitamins and minerals and is safe to drink as hot tea or broth,



Recipe Ideas

Chaya leaves are easily added to foods such as soup or broth, beans, rice, scrambled eggs, or tamales. Chaya can be used as a main ingredient in soup (such as potato chaya soup) or chaya broth. Do you know how to make Tamalitos de Chipilín? Use the same recipe substituting chaya for Chipilín; the result will be a delicious and highly nutritious tamal. Finely ground or puréed cooked chaya can be added to masa to fortify tortillas. Any recipe with spinach can be substituted with cooked chaya. Add to stews, chili, vegetable soup, lasagna, black beans, or on pizza. Chop chaya leaves and sauté with oil, garlic, onion, cilantro and tomatoes.

Nutrient Analysis

Nutrients	Chaya	Spinach	Corn Tortilla	Black Beans
100 gram serving =	5 fl oz	5 fl oz	4 tortillas	5 fl oz
Protein (g)	5.7	3.2	5.7	8.8
Iron (mg)	11.4	5.7	1.2	2.1
Calcium (mg)	199	101	81	27
Potassium (mg)	217	147	186	355
Vitamin A (mg)	0.085	0.014	0	0
Vitamin C (mg)	165	48	0	0

(25-30 fresh chaya leaves cook down to 5 fl oz serving)

Developing rural recipes in kitchens
of the women we serve, using
ingredients they have and know.



pepita
(pumpkin seeds)



Chayote (guisquil)



chiltepe



hierba mora (macuy)



chipilin



watercress (berro)



Amaranth (bledo)

Market our chaya recipes



Chef Morales at University del Marroquin, Guatemala. She makes food look pretty, with many photos, in case you can not read.



Recetas
con
Chaya

Platillos





Pasta con Chaya

Ingredientes:

½ manojo de hojas de Chaya
 3 litros de agua pura
 1 libra de pasta
 1 cebolla grande
 1 chile pimiento
 Sal al gusto



Paso 1



1. En un recipiente que no sea de aluminio, deje hervir el agua.

2. Agregue las hojas limpias de Chaya cortada en trocitos y cocine por lo menos 15 minutos.

3. Poner agua a hervir en otra olla para la pasta de su preferencia y cocinar según tradición.



4. En una sartén poner a sofreír la cebolla picada, las hojas de Chaya picadas y el chile pimiento picado. Sazonar con sal al gusto.

5. Si cuenta con los ingredientes opcionales puede preparar una salsa de tomate cocinándolos en la misma agua de la pasta.



Cocido con Chaya



Ingredientes:

1 manojo de hojas de Chaya
Vegetales al gusto (elotes, güisquil, perulero, repollo, zanahoria, cebolla)
Agua hasta cubrir los vegetales en la olla
Sal al gusto

Paso
1 y 2



Esta receta es ampliamente conocida y puede tener diferencias dependiendo de la costumbre familiar o la región. El concepto básico es cocinar una mezcla variada de vegetales con carne de res; aunque en esta ocasión reemplazaremos la carne por hojas de Chaya por su contenido de proteínas.

1. En una olla que no sea de aluminio, deje hervir el agua.
2. Agregue las hojas limpias de Chaya cortadas en trocitos y cocine por lo menos 15 minutos.

3. Agregar sal al gusto, añada los vegetales cortados en trozos medianos y cúbralos completamente con agua pura.



4. Cocinar a fuego alto hasta que empieza a hervir el agua, y se cocinen los vegetales.



Cocido con Chaya



Frijoles con Chaya



Ingredientes:

- ½ manojo de hojas de Chaya
- 2 litros de agua pura
- 1 libra de frijol
- 2 cucharadas de aceite vegetal
- 1 cebolla grande
- 3 dientes de ajo
- ½ cucharadita de comino molido
- Sal al gusto
- Culantro picado al gusto

Paso
1 y 2



1. En un recipiente que no sea de aluminio, deje hervir el agua.

2. Agregue las hojas limpias de Chaya cortada en trocitos y cocine por lo menos 15 minutos.

3. En otra olla cocine los frijoles como de costumbre.



4. Aparte en un sartén poner el aceite a calentar y agregar la cebolla picada, las hojas cocidas de Chaya en trocitos, los dientes de ajo picados, el comino y sal al gusto.



5. Servir en un tazón una porción de los frijoles, colocar encima la Chaya sofrida y por último espolvorear un poco del culantro picado.



Papilla Fruta

Ingredientes:

3 vasos medianos de agua pura
 $\frac{1}{2}$ mano
 1 fruta



Paso
1 y 2



1. En un recipiente c...
deje hervir el agua.
2. Agregue las hojas
en trocitos y cocine

3. Cuando las hojas estén tiernas,
agregue la fruta en trozos y deje
hervir 8 minutos más.

4. Retire la fruta y las
hojas de Chaya del recipie
macháquelas con muy poc
para lograr un puré. (Pued
molerse en piedra o licuar:

Papilla de Vegetales

Ingredientes:

3 vasos de agua pura
 $\frac{1}{2}$ manojo de hojas de Chaya
 1 ve



Paso
1 y 2



3. Cuando las hojas estén tiernas,
agregue el vegetal en trozos y deje
hervir 8 minutos más.



1. E...
alun...
2. A...
Ch...
cine...

4. F...
Ch...
con...
pur...
licu...

Papilla de Cereales

Ingredientes:

$\frac{1}{2}$ manojo de hojas de Chaya.
 $\frac{1}{2}$ libra de arroz
 2 tazas
 1 pizca



Paso
1



2. Deje hervir a fuego lento,
coloque la tapadera y cúbralo casi
completamente, dejando un
espacio para que salga el vapor.
Cocinar hasta que se consuma el
agua.

1. En un
minio y
regue l...
y picad...
arroz, e



Papilla de Masa de Maíz

Ingredientes:

3 vasos de agua pura
 $\frac{1}{2}$ manojo de hojas de Chaya
 $\frac{1}{2}$ taza de masa de maíz para tortear
 1 pizca de sal



Paso
1 y 2



3. Retire las hojas de Chaya del
agua, agregue la masa y cocine.

1. En un recipiente que no sea
de aluminio, deje hervir el agua.

2. Agregue las hojas limpias de
Chaya cortadas en trocitos y
cocine por lo menos 15 minutos.



4. Muela las hojas en una piedra
de moler o en una licuadora.



5. Cuando la masa esté cocida
y forme un atol bastante espeso
o papilla agregue las hojas de
Chaya y una pizca de sal.



Helado de Limón con Chaya

Ingredientes:

20 hojas de Chaya
3 tazas de agua pura
1 taza de azúcar
1 taza de jugo de limón

Paso 1



3. En otra olla con agua caliente deshacer el azúcar a fuego lento hasta disolverla completamente durante 3 minutos aproximadamente.



4. Dejar enfriar y una vez que la mezcla esté fría, agregar el jugo de limón, colocar en los moldes y luego congelar.



Develop Healthy Happy Snacks



Batido de Mango con Chaya

Ingredientes:

20 hojas de Chaya
1/4 vaso de leche
1 mango cortado en trocitos
2 cucharadas de azúcar al gusto

Paso 1



1. En un recipiente que no sea de aluminio, dejar hervir el agua.
2. Agregue las hojas limpias de Chaya cortada en trocitos y cocine por lo menos 15 minutos.



4. Una vez hechas se pueden cortar en pequeños triángulos como rochos y tostar sobre un comal.



Chaya a La Pepita

Ingredientes:

25 hojas de Chaya
1 litro de agua pura
Semilla de ayote o pepita molida
Limón al gusto
Sal al gusto

Paso 1



1. En un recipiente que no sea de aluminio, dejar hervir el agua.
2. Agregue las hojas limpias de Chaya cortada en trocitos y cocine por lo menos 15 minutos.



3. Separar la Chaya del agua y colocar en un plato. Tostar las semillas de ayote en un comal y moler, o bien, espolvorear pepita molida al gusto sobre la Chaya y mezclar con unas gotas de limón.

Competing with snacks available everywhere at

\$.13/serv.



**Send a team to ECHO
so they can train extensionists**

Spread the website www.ECHOnet.org



TAD II August 2012



Taking knowledge
and seeds
back to the field



rice and beans
with chaya

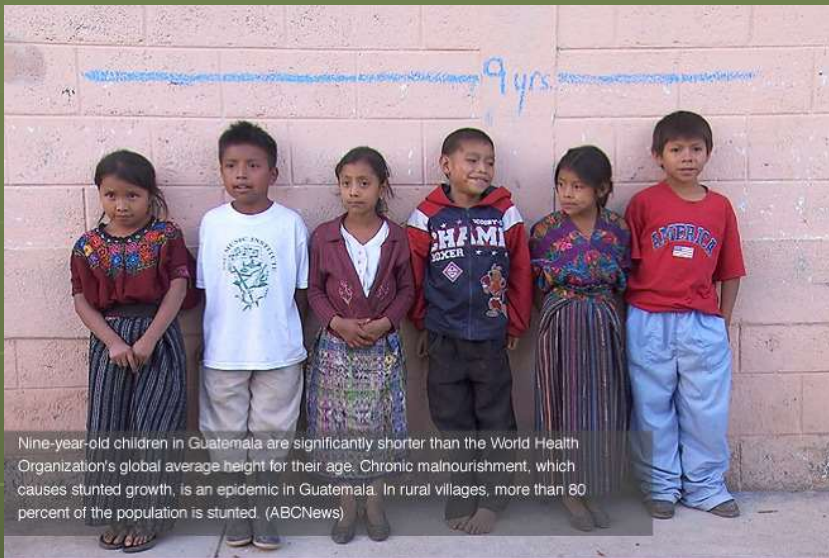
Community Gardens & Agriculture Training + Chaya



Nutrition & Chaya Education



Nutrition & Chaya Education



Your children don't care about these:



Because corporations are allowed to brainwash them on tv and the internet.



"I didn't know I was a bad mother. Had I known, I would not have bought the sodas and chips. My grandchildren will be better. Thank you for sharing this program." Grandmother attending our workshop.



LOS MAYAS: UN PUEBLO FUERTE





LOS MAYAS y su conexión con la TIERRA



FRIJOL



MAIZ



CHAN



AMARANTO



LOS ALIMENTOS DE LOS GUERREROS MAYAS



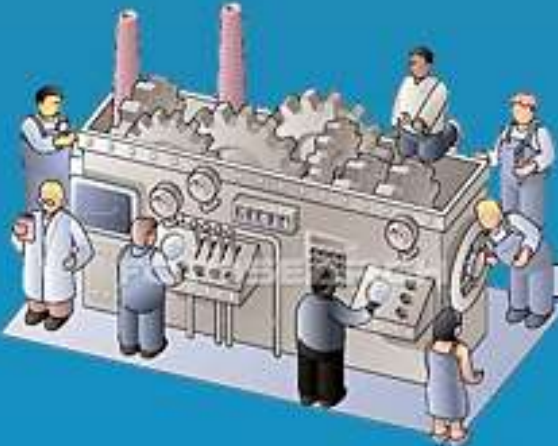
CHAN

AMARANTO

ALIMENTOS DE LA FABRICA







Alimentos de Fábrica





Maneras de decirle a tu hijo
“TE QUIERO MUCHO”
cuando está creciendo en tu vientre..



Me siento cansada,
me duele la cabeza
y los ricitos y la
gaseosa no me
llenaron.



Me siento cansada,
me duele la cabeza y los ricitos
y la gaseosa no me llenaron...



CHAYA EN NUESTRO PLATO



1

SOPAS Y CALDOS

La Chaya puede ser usada como ingrediente principal.

2

FRIJOLES Y HUEVOS

Las hojas se pueden añadir a las recetas como sustitución a la espinaca.

3

TAMALES

Reemplazar el chipilin por Chaya para tener un nutritivo tamal

4

TORTILLAS

Finamente molida, se puede añadir a masa para hacer tortillas mas nutritivas.

Nutrition Education Videos & sharing of data base



Get in the Kitchen and have "Fun with Food"



marketing
happiness
with
healthy
eating &
chaya





First ever Green Tortilla Cook-off Contest

Sponsored by





Judged on
taste, textile, nutrition, explanation of advantages
of fortifying tortillas, and plate presentation



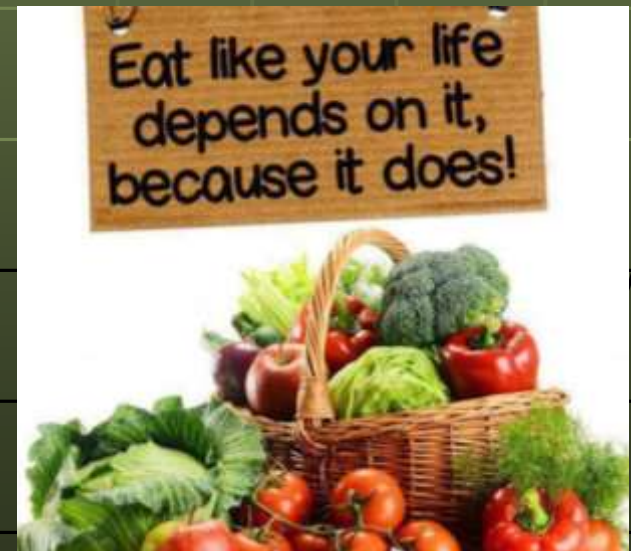
And the winner is... Three winners with prizes and all cooks received an apron and had a lot of fun. Let's do it again!



Marketing to girls - future cooks and mothers.

Super Hero becomes healthy and happy
after eating CHAYA

Character for future story
book and coloring book.



Every living cell in your body is made from food you eat.
If you consistently eat junk food then you'll have a junk body



Become a Crop Champion for one or more of the Under-utilized Nutritious Plants



Semilla Nueva

Trio



QUALITY PROTEIN MAIZE

Quality Protein Maize is a non-GMO corn variety that has been bred to be a complete protein with 90% of the protein of milk. Studies have proven that given average consumption of corn in tortillas by Guatemala's children, simply changing from normal corn to QPM can provide the protein necessary to grow¹.



PIGEONPEA

Pigeonpea is a highly nutritious traditional bean. It can be grown between the rows of other crops without decreasing their harvests. It provides more than enough beans than a family needs, and the excess can be sold locally.



CHAYA

Chaya, or tree spinach, is a native tree that can grow in difficult coastal conditions, without irrigation or fertilizer. Thirty chaya leaves have more protein than an egg and double the nutrients of spinach. Farmers can plant the tree as a food fence around their home or field, providing a sustainable and easy source of rich food.



QPM corn
tortillas



African
variety
pigeon
pea



chaya fence feeds families

Join us in fighting world hunger by becoming a "Crop Champion".
There are still many healthy, under-utilized plants to adopt.



Mangosteen



Questions?

For more information:
ECHO.net.org
MiraclesInAction.org