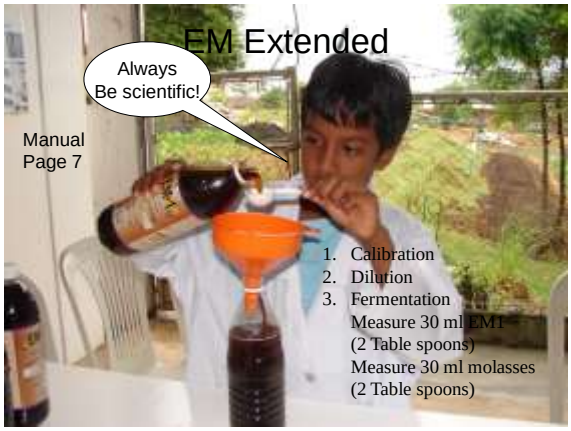
EM1 (original) is sleeping.

Microorganisms in EM1 are in a dormant stage.

To activate sleeping microorganisms, give them: **food** and a **house**.

(**livestock grade blackstrap molasses**)

(**water in an anaerobic condition**)



EME Inoculation

Dilution Rate 1:500

EME 30 ml

4 gallons X 3.8 L/g = 15 Liters

15 Liters = 15,000 ml /500= 30 ml

The Value of EM1 by volume

EM1	EM Extended	Back Pack Sprayer	Area	Cost
1 ml	30 ml	1	300 M^2	80 centavos
30 ml	1,000 ml (1 Liter)	33	10,000 M^2 (1 hectare)	26 peso
1,000 ml (1 Liter)	30 Liters	1,000	30 hectares	800 peso

Inoculation Comparison

- Takes advanced management and time
- No guarantee of results
- Cultures can have contamination
- P 20-60/ backpack sprayer
- P600-P3,600/hectare

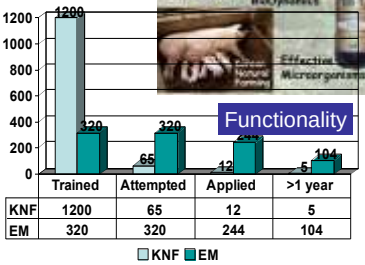
Good System if Sugar and rice are Free, Lots of time to manage, You are exacting and precise

- Simple managem
- Little time, easy
- Guaranteed resul
- Cultures will be pu
- P 1/ backpack sprayer
- P 30/hectare

Good System if Sugar is Expensive, Too busy for tedious propagation, Want to save money

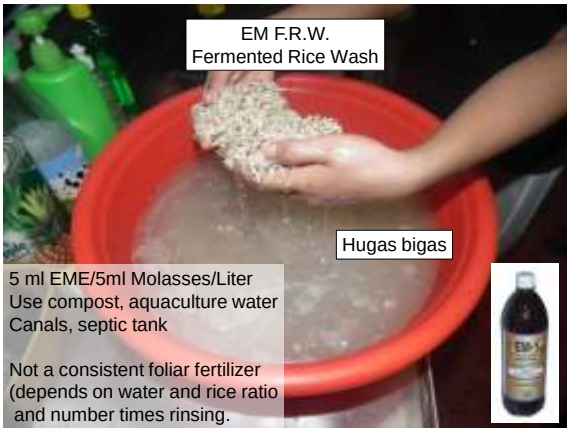
3 Fs to Sustainability

- Functionally Do-able
- Financially Viable
- Friendly on the Environment

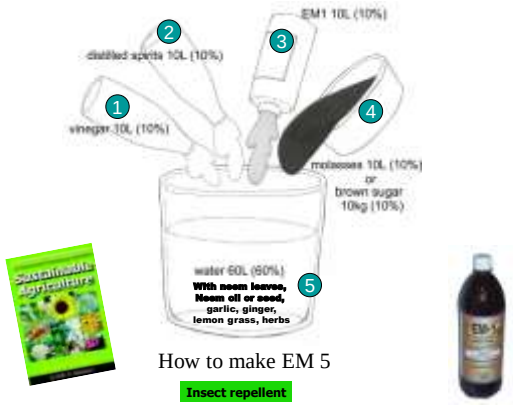


	Trained	Attempted	Applied	>1 year
KNF	1200	65	12	5
EM	320	320	244	104

KNF EM



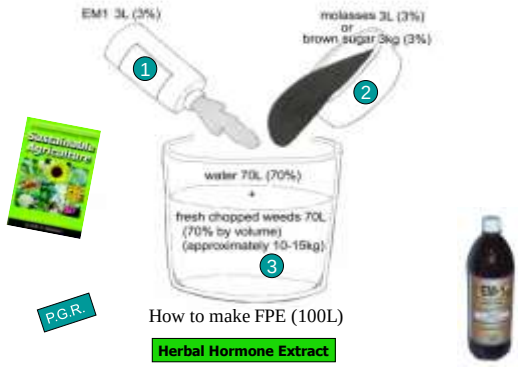
Stochu
(EM5)
keeps
pests away



How to make EM 5

Insect repellent

EM Fermented Plant Extract (FPE)

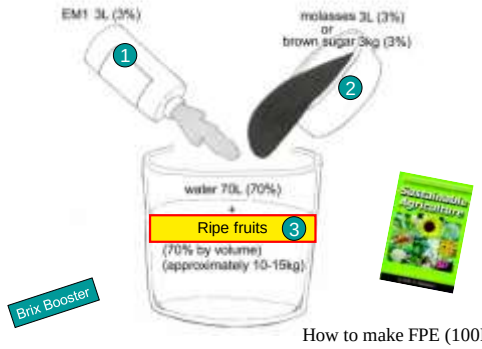


How to make FPE (100L)

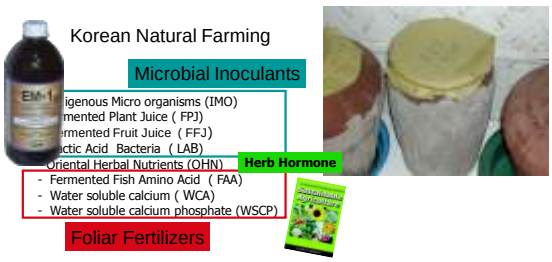
Herbal Hormone Extract

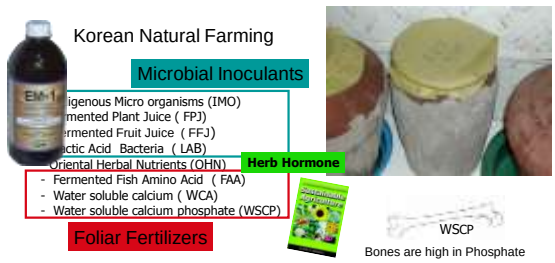
EM Fermented Fruit Extract (FFE)

Ripening Agent



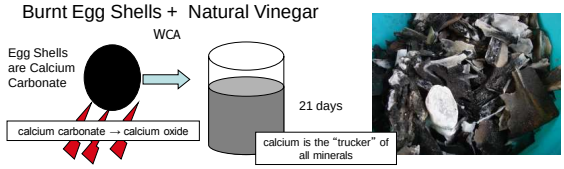
How to make FPE (100L)

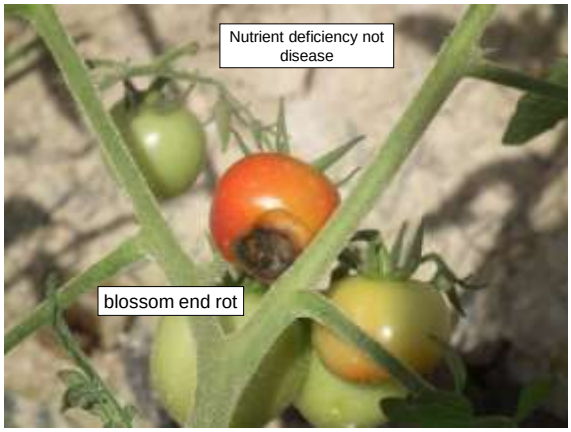




Bones are high in Phosphate

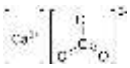
Burnt Egg Shells + Natural Vinegar





CH_3COOH

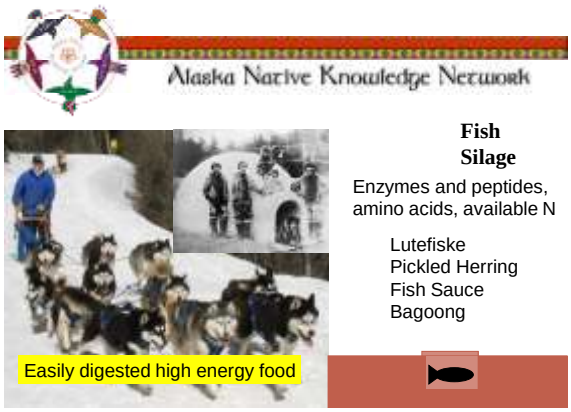
CaCO3



Eggshells are calcium carbonate (CaCO3) and vinegar has acetic acid (CH3COOH).

2CH3COOH + CaCO3 --> Ca(CH3COO)2 + H2O + CO2

WSC
Calcium Carbonate (CaCO3) and acetic acid (CH3COO) react in a double replacement reaction, giving you calcium acetate, water, and carbon dioxide. Since calcium acetate is soluble it'll dissolve. This leaves behind the egg's inner membrane, making it flexible and rubbery.



USA: Dr. Elaine Ingram

•Dr. Ingram developed a curriculum for the Aerated Tea Brewers Guide

•The SOIL FOOD WEB is a complex inter relationship of organisms and chemical reactions that all effect each other.

•We can create favorable microbial habitats and inoculants for the soil food web to prosper


1/2 Liter Molasses
1 L Vermicasts
20 L H2O
E.M.
Air
Water
Compost
Molasses
Aquarium Air Pump


Brew 24 hrs for annual vegetables
Brew 48-72 hrs for Perennials
Harvest time


This would never happen at Aloha House!
Some call this "Compost Tea"
ORGANIC


Organic?
Stagnent-Uncomposted-Raw-Manure
Illegal in the USA


E-coli
Giardia
Fecal coliforms
Enterohemorrhagic E. coli (EHEC): found in humans, cattle, and goats. Virotype is strain O157:H7, which causes bloody diarrhea without fever. EHEC can cause hemolytic-uremic syndrome and sudden kidney failure and possesses toxin that can elicit an intense inflammatory response.
The Giardia parasite lives in the intestine of infected humans or animals. Giardia is found in soil, food, water, or surfaces that have been contaminated with the feces from infected humans or animals. You can become infected after accidentally swallowing the parasite;
Bad Microbes


If this is Organic you should Panic
Always Aerate Compost Tea

Compost Teas, Compost Extracts & Liquid Organic Extracts

Compost leachate is the dark-colored solution that leaches out of the bottom of the compost pile—most likely will be rich in soluble nutrients; but, in the early stage of composting it may also contain pathogens. It would be viewed as a pollution source if allowed to run off-site. Compost leachate needs further bioremediation and is not suitable or recommended as a foliar spray.

Compost Extract is made from compost suspended in a barrel of water for 7 to 14 days, usually soaking in a burlap sack—a centuries-old technique. The primary benefit of the extract will be a supply of soluble nutrients, which can be used as a liquid fertilizer. Anaerobic problems diminish results.

Compost tea, A.C.T. in modern terminology, is a compost extract brewed with a microbial food source—molasses, kelp, rock dust, humic-fulvic acids. The compost-tea brewing technique, an aerobic process, extracts and grows populations of beneficial microorganisms.

Compost teas are distinguished from compost extracts both in method of production and in the way they are used. Teas are actively brewed with microbial food and catalyst sources added to the solution, and a sump pump bubbles and aerates the solution, supplying plenty of much-needed oxygen. The aim of the brewing process is to extract beneficial microbes from the compost itself, followed by growing these populations of microbes during the 24- to 36-hour brew period. The compost provides the source of microbes, and the microbial food and catalyst amendments promote the growth and multiplication of microbes in the tea. Some examples of microbial food sources: molasses, kelp powder, and fish powder. Some examples of microbial catalysts: humic acid, yucca extract, and rock dust.

Building on the concept of compost teas as a liquid organic extract, what are some other common organic extracts used as a liquid drench or foliar spray?

Manure Tea - Manure-based extracts are a soluble nutrient source made from raw animal manure soaked in water. For all practical purposes, manure tea is prepared in the same way as the compost extracts described in the preceding section. The manure is placed in a burlap sack and suspended in a barrel of water for 7 to 14 days. The primary benefit of the tea will be a supply of soluble nutrients, which can be used as a liquid fertilizer.

Herbal Tea - Plant-based extracts are from stinging nettle, horse tail, comfrey, clover. A common method is to stuff a barrel about three-quarters full of fresh green plant material, then top off the barrel with tepid water. The tea is allowed to ferment at ambient temperatures for 3 to 10 days. The finished product is strained, then diluted in portions of 1:10 or 1:5 and used as a foliar spray or soil drench. Herbal teas provide a supply of soluble nutrients as well as bioactive plant compounds.

Liquid Manures - Mixtures of plant and animal byproducts steeped as an extract—stinging nettle, comfrey, seaweed, fish wastes, fish meal. Liquid manures are a blend of marine products (local fish wastes, seaweed extract, kelp meal) and locally harvested herbs, soaked and fermented at ambient temperatures for 3 to 10 days. Liquid manures are prepared similarly to herbal tea—the material is fully immersed in the barrel during the fermenting period, then strained and diluted and used as a foliar spray or soil drench. Liquid manures supply soluble nutrients and bioactive compounds.

Summary - Compost teas and herbal teas are tools that can be made on the farm to enhance crop fertility and to inoculate the phyllosphere and rhizosphere with soluble nutrients, beneficial microbes, and the beneficial metabolites of microbes.

Caution - Whereas raw animal manures are used as a compost windrow feedstock, the composting process—thermophyllic heating to 135-160° F for 10-15 days—assures pathogen reduction. The raw organic matter initially present in the compost windrow undergoes a complete transformation, with humus as an end product. Any pathogens associated with raw manures will be gone. So caution is extended: Manure teas are NOT the same thing as compost teas or compost extracts. Because of concerns over new pathogenic strains of E. coli, the author advises growers to reconsider manure teas and/or to work with a microbial lab to ensure a safe, worthwhile product.
Steve Diver ATTRA

Methods of Compost Tea Production

Bucket-Fermentation Method

"Passive" compost tea is prepared by immersing a burlap sack filled with compost into a bucket or tank, stirring occasionally. Usually the brew time is longer, from 7 to 10 days. This is the method that dates back hundreds of years in Europe, and is more akin to a compost watery extract than a "brewed" and aerated compost tea.

Bucket-Bubbler Method

The equipment setup and scale of production are similar to the bucket method, except that an aquarium-size pump and air bubbler are used in association with microbial food and catalyst sources added to the solution as an amendment. Since aeration is critical, as many as three sump pumps may be used in a bucket simultaneously.

With homemade compost tea brewing, a compost "sock" is commonly used as a filter-strainer. Ideally, the mesh size will strain compost particulate matter but still allow beneficial microbes—including fungal hyphae and nematodes—to migrate into solution. Single-strand mesh materials such as nylon stockings, laundry bags, and paint bags are some of the materials being used; fungal hyphae tend to get caught in polywoven fabrics. If burlap is used, it should be "aged" burlap.

Trough Method

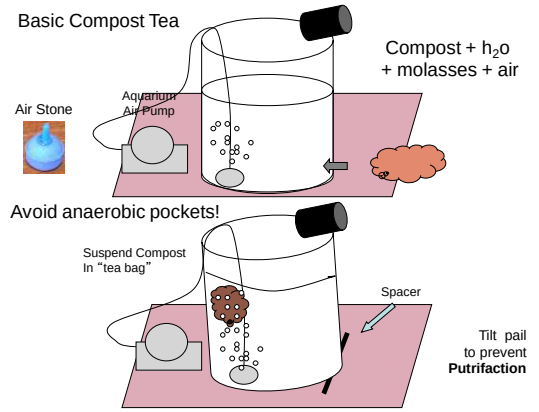
Large-scale production of compost teas employs homemade tanks and pumps. An 8- or 12-inch-diameter PVC pipe is cut in half, drilled full of holes, and lined with burlap. Compost is placed in this makeshift trough. The PVC trough is supported above the tank, several feet in the air. The tank is filled with water, and microbial food sources are added as an amendment. A sump pump sucks the solution from the bottom of the tank and distributes the solution to a trickle line running horizontally along the top of the PVC trough filled with compost. As the solution runs through the burlap bags containing the compost, a leachate is created which then drops several feet through the air back into the open tank below. A sump pump in the bottom of the tank collects this "tea" and distributes it back through the water line at the top of the trough, and so on. Through this process, which lasts about seven days, the compost tea is recirculated, bubbled, and aerated. The purpose of the microbial food source is to grow a large population of beneficial microorganisms.

Commercial Tea Brewers

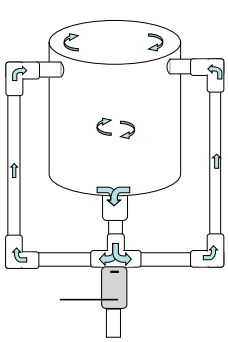
Commercial equipment is available for the production of brewed compost teas (see a list of suppliers below). Usually there is a compost sack or a compost leachate basket with drainage holes, either of which are used to hold a certain volume of compost. The compost-filled container is placed in a specially designed tank filled with chlorine-free water. Microbial food sources are added to the solution. A pump supplies oxygen to a specially-designed aeration device which bubbles and aerates the tea. **Steve Diver ATTRA**

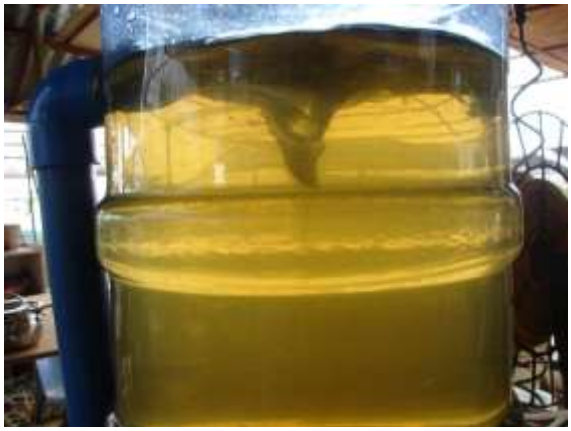
Vortex Method

The use of air to raise water and then draw down into a vortex the fluid tea. Highly aerobic and energized by the organized water flow, the fluid then passes through a chaos chamber before it once again is organized by the vortex. This method is popular among EM users as well a biodynamic systems.

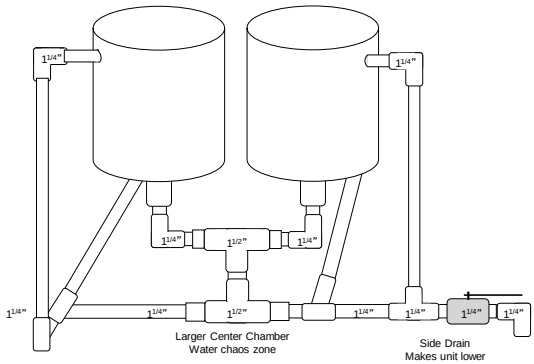


Single Vortex Brewer

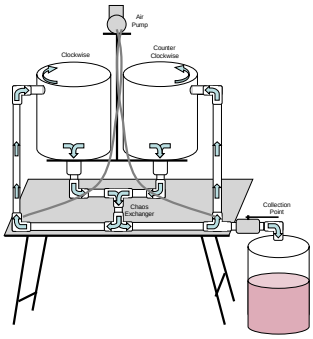




Double Vortex Compost Tea Brewer



Whizz-bang Double Vortex Compost Tea Brewer




Ingredients
Rock Powders


EM5
Epsom Salt
Rock Powder
Rock Powder
Sea Salt
Granite Dust
Bat Guano
Calcium Carbonate
Ingredients


Where rock powders come from


Where rock powders come from

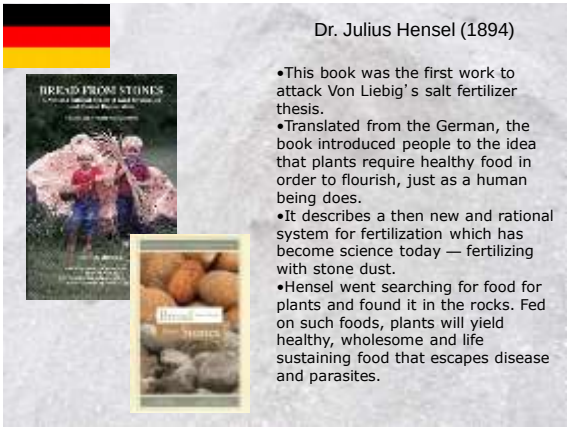

Where rock powders come from


Charcoal blends with rockdust

AVERAGE IGNEOUS ROCKS, AFRICA AND ASIA

	1	2	3	4	5	6	7	
SiO_2	58.21	54.67	50.59	50.02	61.92	61.81	59.72	SiO_2
Al_2O_3	15.28	16.21	15.81	15.68	15.69	15.73	16.51	Al_2O_3
Fe_2O_3	3.52	3.02	4.44	3.48	2.17	2.07	3.16	Fe_2O_3
FeO	3.73	4.93	5.79	4.41	2.75	4.41	2.95	FeO
MgO	3.51	4.21	5.79	4.04	2.62	2.47	3.03	MgO
CaO	5.09	6.51	7.93	5.87	4.50	5.16	5.76	CaO
Na_2O	4.83	4.36	4.27	4.80	4.10	3.11	3.78	Na_2O
K_2O	2.28	2.00	2.21	2.07	2.23	2.51	3.06	K_2O
H_2O^+	1.26	1.13	1.47	1.35	1.23	1.48	1.11	H_2O^+
TiO_2	0.84	1.44	1.53	1.14	0.68	0.76	0.80	TiO_2
P_2O_5	0.20	0.25	0.43	0.27	0.13	0.27	0.18	P_2O_5
MnO	0.07	0.01	0.04	0.05	0.10	0.17	0.14	MnO
BaO	....	....	....	....	....	....	....	BaO
Incl.	0.18	0.11	0.07	0.12	0.08	0.03	0.06	Incl.
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

1. Africa, continental. 223 analyses.
2. Madagascar, including Reunion. 140 analyses.
3. South Atlantic Islands (Azores, Canaries, Madeira, Cape Verde, Ascension, St. Helena). 96 analyses.
4. Africa and islands, including Madagascar and Atlantic Islands. 419 analyses.
5. Asia, continental. 116 analyses.
6. Japan. 60 analyses.
7. Malaysia, including Philippines. 120 analyses.
8. Asia, including continent, Malaysia and Japan. 313 analyses.



Dr. Julius Hensel (1894)

- This book was the first work to attack Von Liebig's salt fertilizer thesis.
- Translated from the German, the book introduced people to the idea that plants require healthy food in order to flourish, just as a human being does.
- It describes a then new and rational system for fertilization which has become science today — fertilizing with stone dust.
- Hensel went searching for food for plants and found it in the rocks. Fed on such foods, plants will yield healthy, wholesome and life sustaining food that escapes disease and parasites.

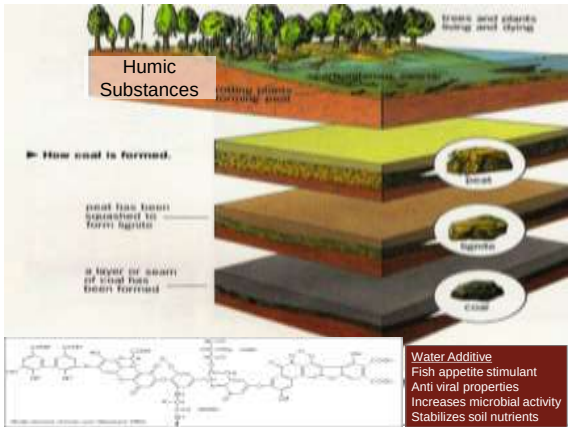
Where rock powders come from

Where rock powders come from

Where rock powders come from

Testing benefits

Plant Sap
Disease free at 12º+



Humic Substances

Terminology of Humus-related Materials

Humus--product resulting from decay of organic matter. Contains both humic and non-humic material.

Humin--the alkali-insoluble fraction of leonardite. (The usage of this term does not correspond exactly with the usage by other workers.) .

Humic substances--(plural) the collective name for the acid radicals found in humic matter. Typically separated from humic matter by alkaline extraction.

Humic acid--(singular) the acid radical found in humic matter which is soluble in alkali but insoluble in acid, methyl ethyl ketone, and methyl alcohol.

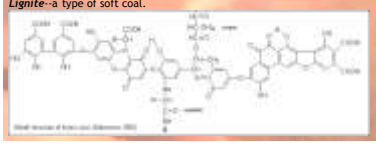
Humate--the salts of humic acids, collectively, or the salts of humic acid specifically. (The usage must be determined from the context.)

Fulvic acid--the acid radical found in humic matter which is soluble in alkali, acid, methyl ethyl ketone, and methyl alcohol.

Fulvates--the salts of fulvic acid.

Leonardite--a soft brown coal-like deposit usually found in conjunction with deposits of lignite.

Lignite--a type of soft coal.



Water Additive
Fish appetite stimulant
Anti viral properties
Increases microbial activity
Stabilizes soil nutrients

Takakura Composting

Heat costs fertilizer power

Takakura Composting

Heat costs fertilizer power

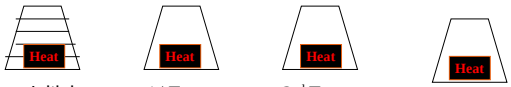
Takakura Composting

Heat costs fertilizer power

Transfer the seed compost from the box to the compost container. The compost container should be two-thirds full. During the transfer, you can see steam coming out of the seed compost.

Compost Piles

Thermophylic Bacteria → Mesophylic Bacteria → Actinomycetes → Fungi



Initial Layering

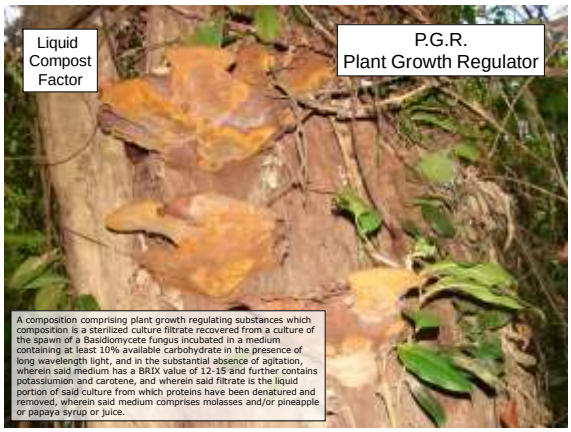
1st Turn Five to seven days

2nd Turn Five to seven days

3rd Turn Let mature for up to 6 months

Liquid Compost Factor

P.G.R. Plant Growth Regulator



A composition comprising plant growth regulating substances which composition is a sterilized culture filtrate recovered from a culture of the spawn of a Basidiomycete fungus incubated in a medium containing at least 10% available carbohydrate in the presence of long wavelength light, and in the substantial absence of agitation, wherein said medium has a BRIX value of 12-15 and further contains potassiumion and carotene, and wherein said filtrate is the liquid portion of said culture from which proteins have been denatured and removed, wherein said medium comprises molasses and/or pineapple or papaya syrup or juice.

Seaweed Extracts

Seaweed extracts contain natural plant growth regulators (PGR) which control the growth and structural development of plants. The major plant growth regulator are **auxins, cytokinins, indoles and hormones**. These PGRs seaweed are in very small quantities generally measured in parts per million. It only takes a very small amount of these to do the job. **Indole** compounds help the development of plant roots and buds. **Cytokinins** are hormones that promote growth via rapidly speeding up the process of cell division making seaweed extract of value in treating tissue cultures. When they are applied to foliage the leaves rejuvenate stimulating photosynthesis. Thus they stay green longer. The cytokinins in seaweed extract are a major factor when applied to apple and peach trees in promoting the growth of fruiting spurs and reduce premature dropping of fruit. Auxins, also hormones, occur in the roots and stems during cell division. They move to areas of cell elongation where they allow the walls of cells to stretch. Auxins actually give fruits and vegetables a naturally longer shelf life. This is known as delaying senescense: the deterioration of cells and tissues that results in rotting.

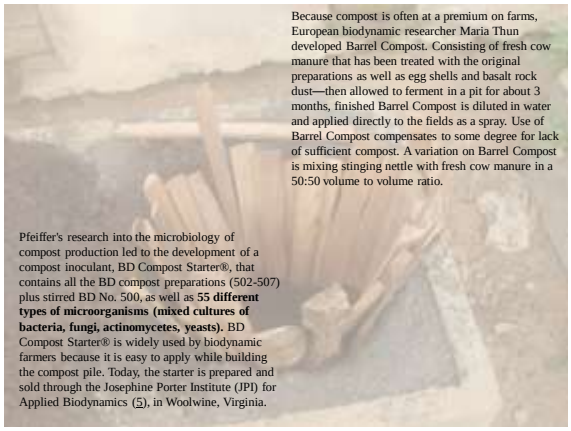
P.G.R. Plant Growth Regulator

1924 *Biodynamics*

•In Germany, Rudolf Steiner developed biodynamic agriculture, the first comprehensive organic farming system.

•This began with a lecture series Steiner presented at a farm in Koberwitz (now in Poland) in 1924.

•Steiner emphasized the farmer's role in guiding and balancing the interaction of the animals, plants and soil. Healthy animals depended upon healthy plants (for their food), healthy plants upon healthy soil, healthy soil upon healthy animals (for the manure).



Because compost is often at a premium on farms, European biodynamic researcher Maria Thun developed Barrel Compost. Consisting of fresh cow manure that has been treated with the original preparations as well as egg shells and basalt rock dust—then allowed to ferment in a pit for about 3 months, finished Barrel Compost is diluted in water and applied directly to the fields as a spray. Use of Barrel Compost compensates to some degree for lack of sufficient compost. A variation on Barrel Compost is mixing stinging nettle with fresh cow manure in a 50:50 volume to volume ratio.

Pfeiffer's research into the microbiology of compost production led to the development of a compost inoculant, BD Compost Starter®, that contains all the BD compost preparations (502-507) plus stirred BD No. 500, as well as **55 different types of microorganisms (mixed cultures of bacteria, fungi, actinomycetes, yeasts).** BD Compost Starter® is widely used by biodynamic farmers because it is easy to apply while building the compost pile. Today, the starter is prepared and sold through the Josephine Porter Institute (JPI) for Applied Biodynamics (5), in Woolwine, Virginia.

Aerobic Compost
Thermophilic / Mesophiles / Actinomycetes / Fungi

Simulate Nature

Ancient Forest Bokashi

KNF

EM1

ACT
Aerated Compost Teas

Biodynamic Preps

My order of experience

Simulate Nature

EM1

Ancient Forest Bokashi

Lower Tech

Aerobic Compost
Thermophilic / Mesophiles / Actinomycetes / Fungi

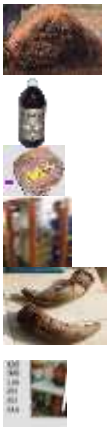
Complexity

KNF

ACT
Aerated Compost Teas

Higher Tech

Biodynamic Preps



Aerobic Compost
Thermophilic / Mesophiles / Actinomycetes / Fungi

Simulate Nature

EM1

Low

Ancient Forest Bokashi

Cost

ACT
Aerated Compost Teas

Biodynamic Preps

High

KNF

Ancient Forest Bokashi

Simulate Nature

Long time

EM1

ACT
Aerated Compost Teas

Adaption/longevity

Biodynamic Preps

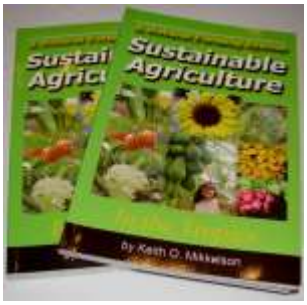
KNF

KNF Palawan Trained - 1,200
After 1 year - <10

Short time

Aerobic Compost
Thermophilic / Mesophiles / Actinomycetes / Fungi

RESOURCE RECOVERY FOR THE PRODUCTION OF HIGH QUALITY NUTRIENT DENSE FOOD FOR MAXIMUM HEALTH



A Natural Farming Method for
Sustainable Agriculture
in the Tropics

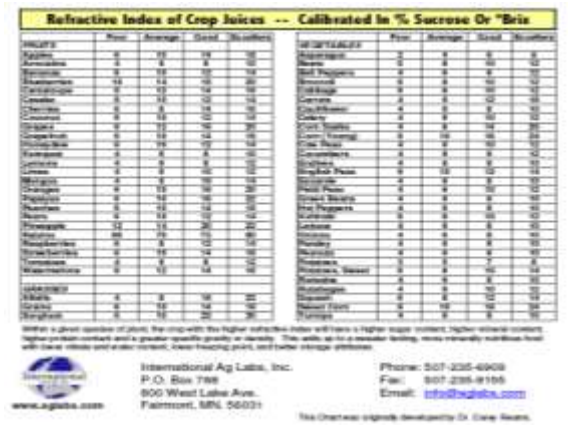
By Keith O. Mikkelson
mik@mozcom.com

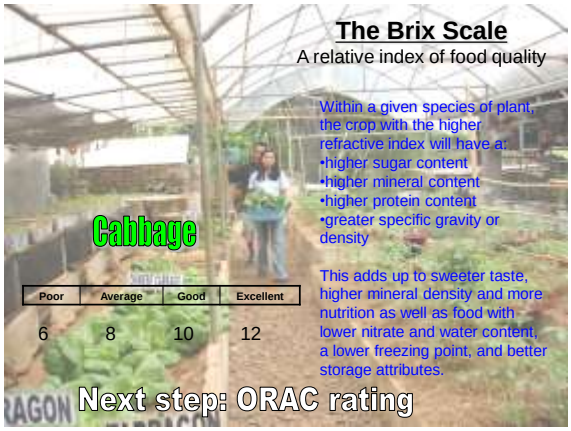

USDA
Agricultural Marketing Service
National Organic Program
USDA Accredited Certifying Agents
Domestic Accredited Certifying Agents:
Foreign Accredited Certifying Agents:
Media Help
To view PDF files you must have Adobe Acrobat Reader installed your computer.


OMRI
Organic Materials Review Institute
OMRI will change Review Program fees and update forms, effective July 1
Welcome to OMRI!
OMRI Publications
2008


OCCP
We build consumer trust
About Us
CERTIFICATION COMMITTEE
PRODUCERS AND PROCESSORS
APPLICATION
CERTIFIERS
INSPECTORS


Nutrient Dense Food
BEYOND Organic
There is a movement for high quality food
High vitamins, high minerals, high sugar
This food has healing powers
Brix° as an indicator
The refractometer


Refractive Index of Crop Juices -- Calibrated in % Sucrose Or °Brix
International Ag Labs, Inc.
P.O. Box 788
800 West Lake Ave.
Fairmont, MN 56031
Phone: 507-235-4909
Fax: 507-235-9155


The Brix Scale
A relative index of food quality
Within a given species of plant, the crop with the higher refractive index will have a:
•higher sugar content
•higher mineral content
•higher protein content
•greater specific gravity or density
This adds up to sweeter taste, higher mineral density and more nutrition as well as food with lower nitrate and water content, a lower freezing point, and better storage attributes.
Cabbage
Poor
Average
Good
Excellent
6
8
10
12
Next step: ORAC rating

BRUNSWICK LABORATORIES

Oxygen Radical Absorbance Capacity

ORAC rating is a laboratory analysis that provides an overall measure of a food's antioxidant activity. The higher the ORAC score, the greater is the food's antioxidant capacity. ORAC tests are often used to compare the antioxidant activities of different foods (fruits, vegetables, juices, wines, etc.).

Specific Minerals $$$

	Poor	Average	Good	Excellent		Poor	Average	Good	Excellent
Apples	6	10	14	18	Asparagus	2	4	6	8
Avocados	4	6	8	10	Beets	6	8	10	12
Bananas	8	10	12	14	Bell Peppers	4	6	8	12
Blueberries	10	14	16	20	Broccoli	6	8	10	12
Cantaloupe	8	12	14	16	Cabbage	6	8	10	12
Casaba	8	10	12	14	Carrots	4	6	12	18
Cherries	6	8	14	16	Cauliflower	4	6	8	10
Coconut	8	10	12	14	Celery	4	6	10	12
Grapes	8	12	16	20	Corn Stalks	4	8	14	20
Grapefruit	6	10	14	18	Corn(Young)	6	10	18	24
Honeydew	8	10	12	14	Cow Peas	4	6	10	12
Kumquat	4	6	8	10	Cucumbers	4	6	8	12
Lemons	4	6	8	12	Endives	4	6	8	10
Limes	4	6	10	12	English Peas	8	10	12	14
Mango	4	6	10	14	Escarole	4	6	8	10
Oranges	6	10	16	20	Field Peas	4	6	10	12
Papayas	6	10	18	22	Green Beans	4	6	8	10
Peaches	6	10	14	18	Peppers	4	6	8	10
Pears	6	10	12	14	Kohlrabi	6	8	10	12
Pineapple	12	14	20	22	Lettuce	4	6	8	10
Raisins	60	70	75	80	Onions	4	6	8	10
Raspberries	6	8	12	14	Parsley	4	6	8	10
Strawberries	6	10	14	16	Peanuts	4	6	8	10
Tomato	4	6	8	12	Potatoes	3	5	7	8
Watermelons	8	12	14	16	PotatoSweet	6	8	10	14
Romaine	4	6	8	10					
Alfalfa	4	8	16	22	Squash	6	8	12	14
Grains	6	10	14	18	Sweet Corn	6	10	18	24
Sorghum	6	10	22	30	Turnips	4	6	8	10

Got High Brix?