

So, You Want a Garden!

First Steps in Growing Your Own Food

MGACRA Spring Symposium

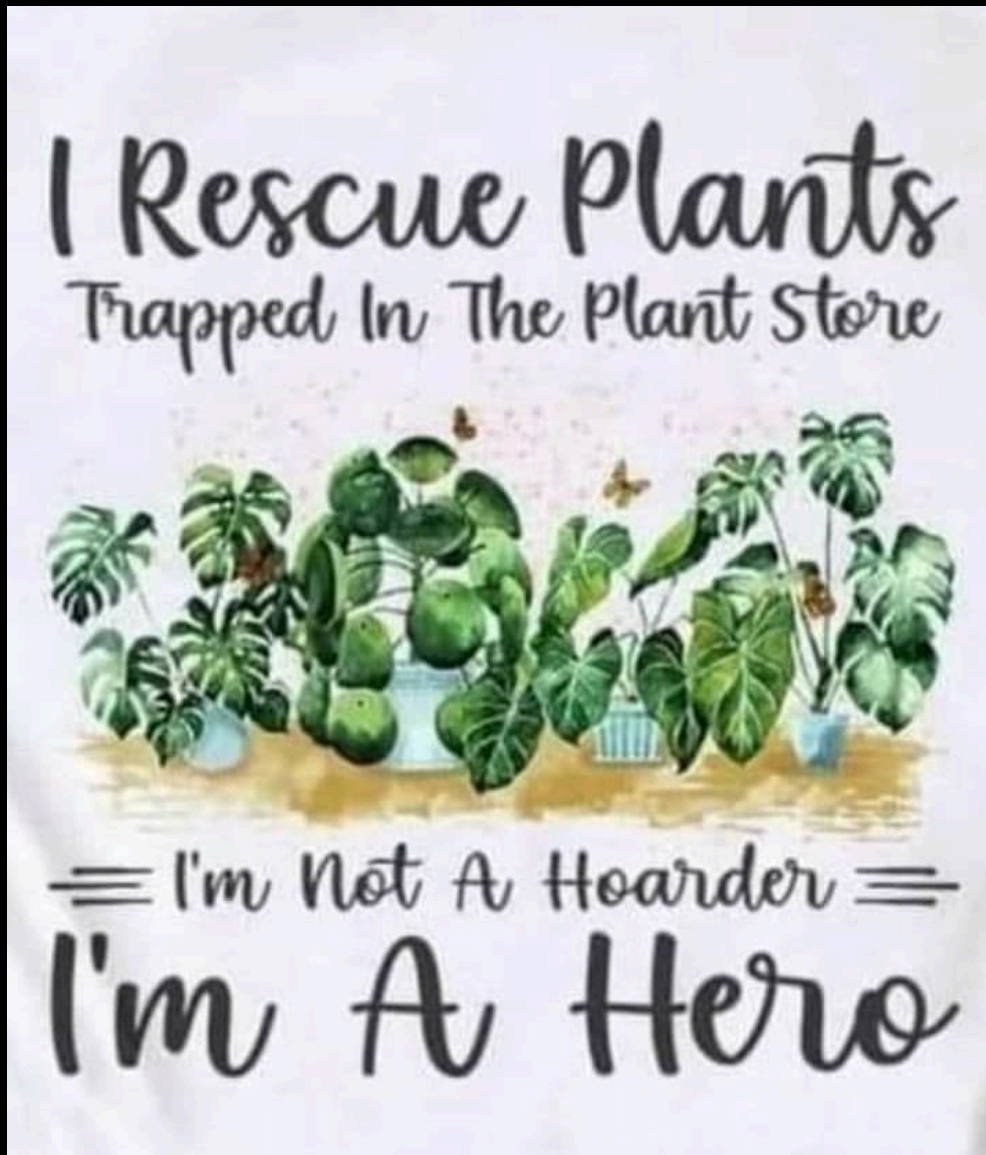
April 13, 2024

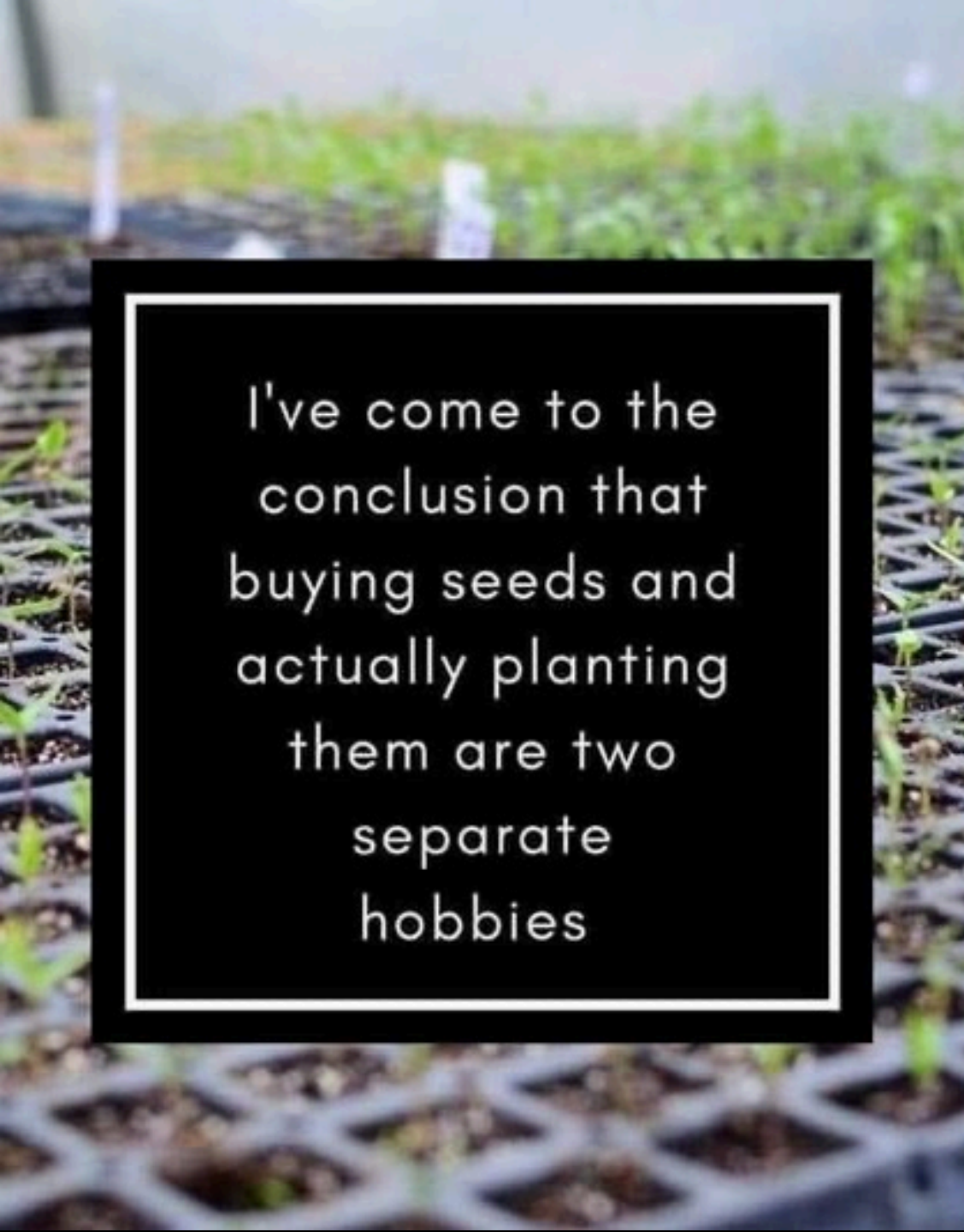
Bryce Lane, brycehortlane@me.com

YouTube: Power of Plants With Bryce Lane



I am so happy to be here!





I've come to the
conclusion that
buying seeds and
actually planting
them are two
separate
hobbies

For a seed to achieve its
greatest expression, it must
come completely undone. The
shell cracks, its insides
come out and everything
changes. To someone who
doesn't understand growth,
it would look like complete
destruction.

Gardening is big in the USA!

National Gardening Association

42 (up from 36) million American households grow food (35%)

Average food garden space: 600 sq. Ft.

Average garden yield: \$600 (@ a \$70 cost)

More millennials & families with children are growing food



The most popular vegetables...

Tomato:	86%
Cucumber:	47%
Sweet Pepper:	46%
Beans:	39%
Carrots:	34%
Onions:	29%
Squash:	28%
Hot Peppers:	27%
Lettuce:	26%
Peas:	24%



Where's Spinach???!?!?

Food Gardening Basics (Botany)

What do plants need?

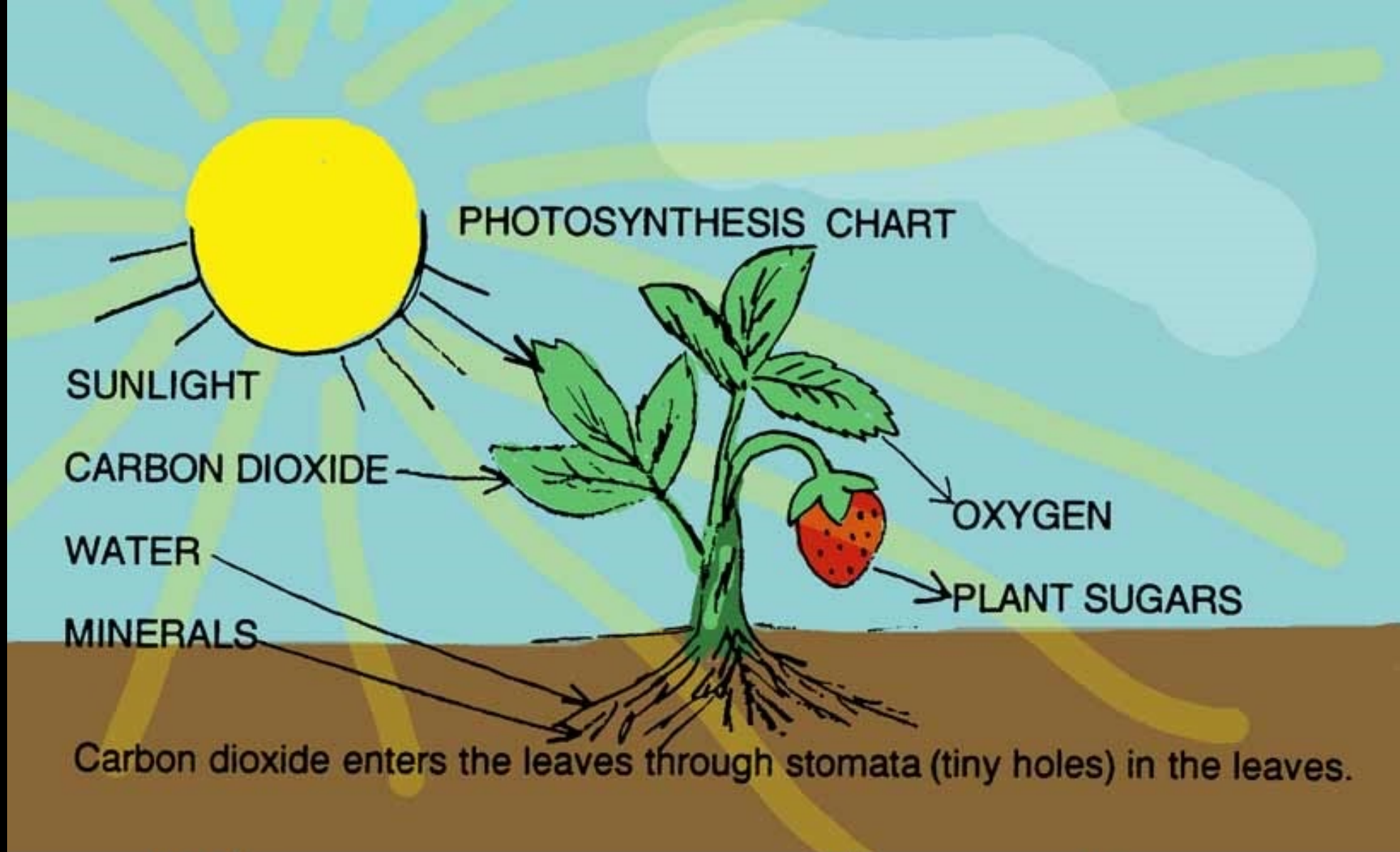
Light (sun, food) HONESTY

Water (soil, hydration and photosynthesis)

Nutrition (soil, health, chemical compounds)

Freedom from “bondage” (pests)





Photosynthesis

What is Plant Growth?

Increase in plant dry weight due to cell division and cell enlargement.

Compound creation (Cellulose, proteins, hormones, etc.)

% from photosynthesis?

% from nutrients in soil?

94% from Sun!

6% from soil!

Greatest gardening challenges

Good soil

Light (Full sun is 6+ hours of direct sunlight)

Climate... Drought, Deluge, Frost, Heat

Weeds (Competitors)

Insects and diseases

Large Animal pests: Deer, Rabbit, Voles



15 Shade Tolerant Plants

These root vegetables, herbs, and leafy greens all need 4 hours of sun a day, or less.



Kale



Parsley



Lettuce



Garlic



Scallions



Beets



Cilantro



Arugula



Mustard Greens



Turnips



Spinach



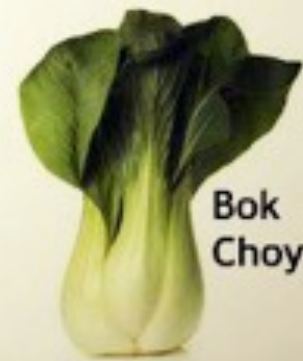
Carrots



Chard



Potatoes



Bok Choy

Where do plants come from?

Potato

Coffee

Cocoa

Cranberries

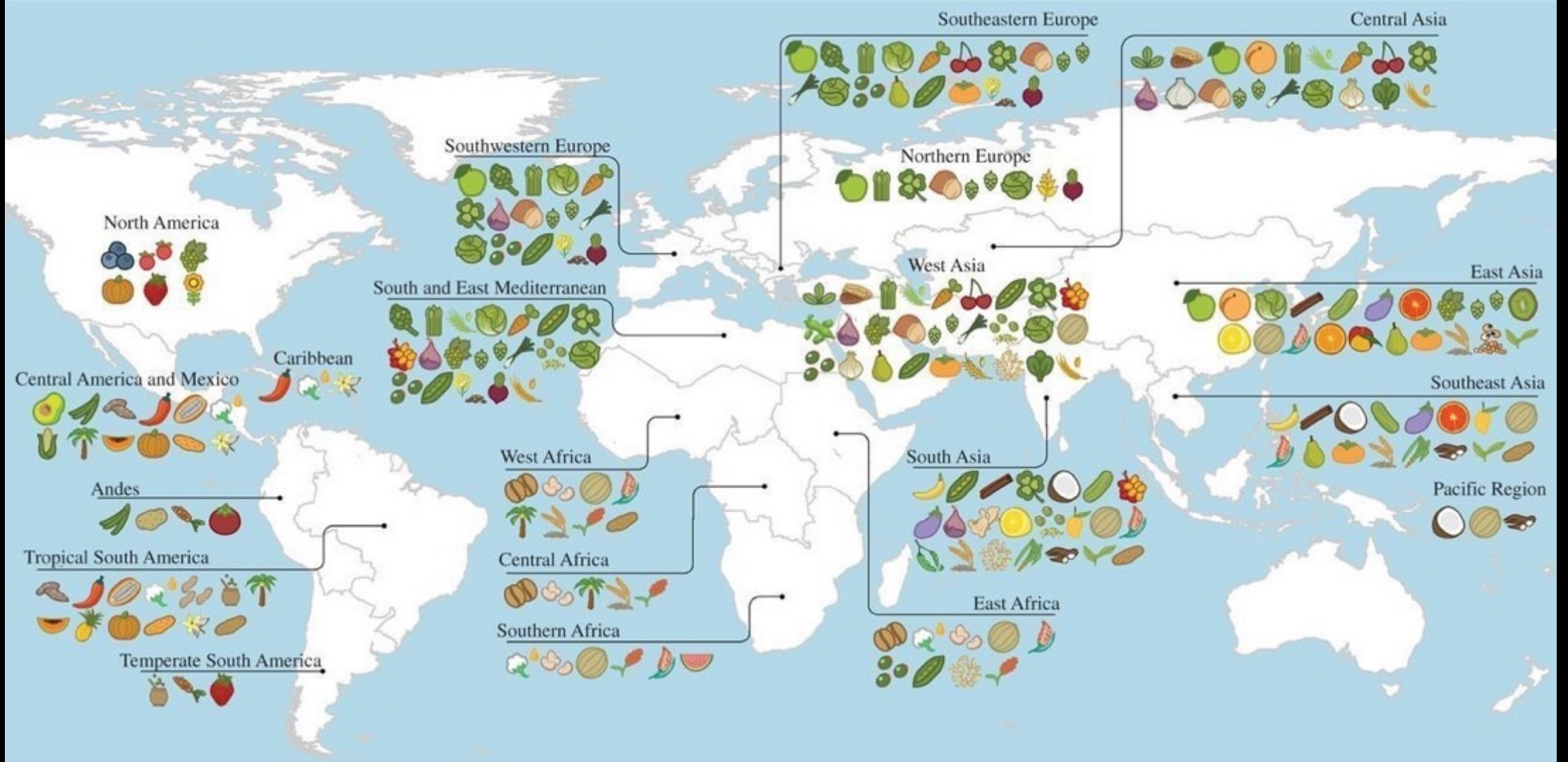
Apples

Orange

Tomato

Watermelon





- | | | | | | | | | |
|-----------------------|----------------------|----------------|------------|------------------|------------------------|-----------------------|--------------|----------------|
| alfalfa | beans | clover | eggplants | hops | melons | pears | rice | sunflower |
| almonds | blueberries | cocoa beans | faba beans | kiwi | millets | peas | rye | sweet potatoes |
| apples | cabbages | coconuts | figs | leeks | oats | pigeonpeas | sesame | taro |
| apricots | carrots | coffee | garlic | lemons and limes | olives | pineapples | sorghum | tea |
| artichokes | cassava | cottonseed oil | ginger | lentils | onions | potatoes | soyabean | tomatoes |
| asparagus | cherries | cowpeas | grapefruit | lettuce | oranges | pumpkins | spinach | vanilla |
| avocados | chickpeas | cranberries | grapes | maize | papayas | quinoa | strawberries | watermelons |
| bananas and plantains | chillies and peppers | dates | groundnut | mangoes | peaches and nectarines | rape and mustard seed | sugar beet | wheat |
| barley | cinnamon | | hazelnuts | mate | | | sugarcane | yams |

Gardening Terms & Plant Types

First Frost Free Date:

That date after which the chance of frost greatly decreases (Apr.21-30)

Last Frost Free Date:

That date after which the chance of frost greatly increases (Oct. 11-20)

Cool season Vegetables:

Plant 4-6 weeks before FFFD

Warm season Vegetables:

Plant 0-2 weeks after FFFD



What to plant: types of vegetables

Cool Season annuals:

Beets

Broccoli

Brussels Sprouts

Cabbage

Carrots

Cauliflower

Lettuce

Mustard

Onions

Peas

Potatoes

Radish

Spinach



What to plant: types of vegetables

Warm Season annuals:

Beans

Corn

Cucumbers

Eggplant

Okra

Peppers

Squash

Sweet potatoes

Tomatoes

Watermelon



What to plant: types of vegetables

Perennial vegetables:

Asparagus

Rhubarb

Horseradish





Site Selection

Light: Full sun (6-8 hours of unimpeded sun)

Soil: you need to be serious about this one: Soil build

Close to the house

Close to water source

Good Air movement





Choose Site & Type of Garden

General considerations:

How big?

Consider 100 sq. ft. per person

What kind?

In the ground, raised bed, or container









Raised bed gardening

Warmer soil early & late
You control soil make-up
More frequent irrigation



Raised Bed “Prep”

Add Soil, OM, compost, soil conditioner etc.

Add lime: 5-10 pounds/ 100ft.²

Add fertilizer:

2-3 lbs. 10-10-10/100ft.² or

75- 100lbs. cow manure/100ft.²

ORGANIC vs. SYNTHETIC?

NO₃⁻ vs. NO₃⁻







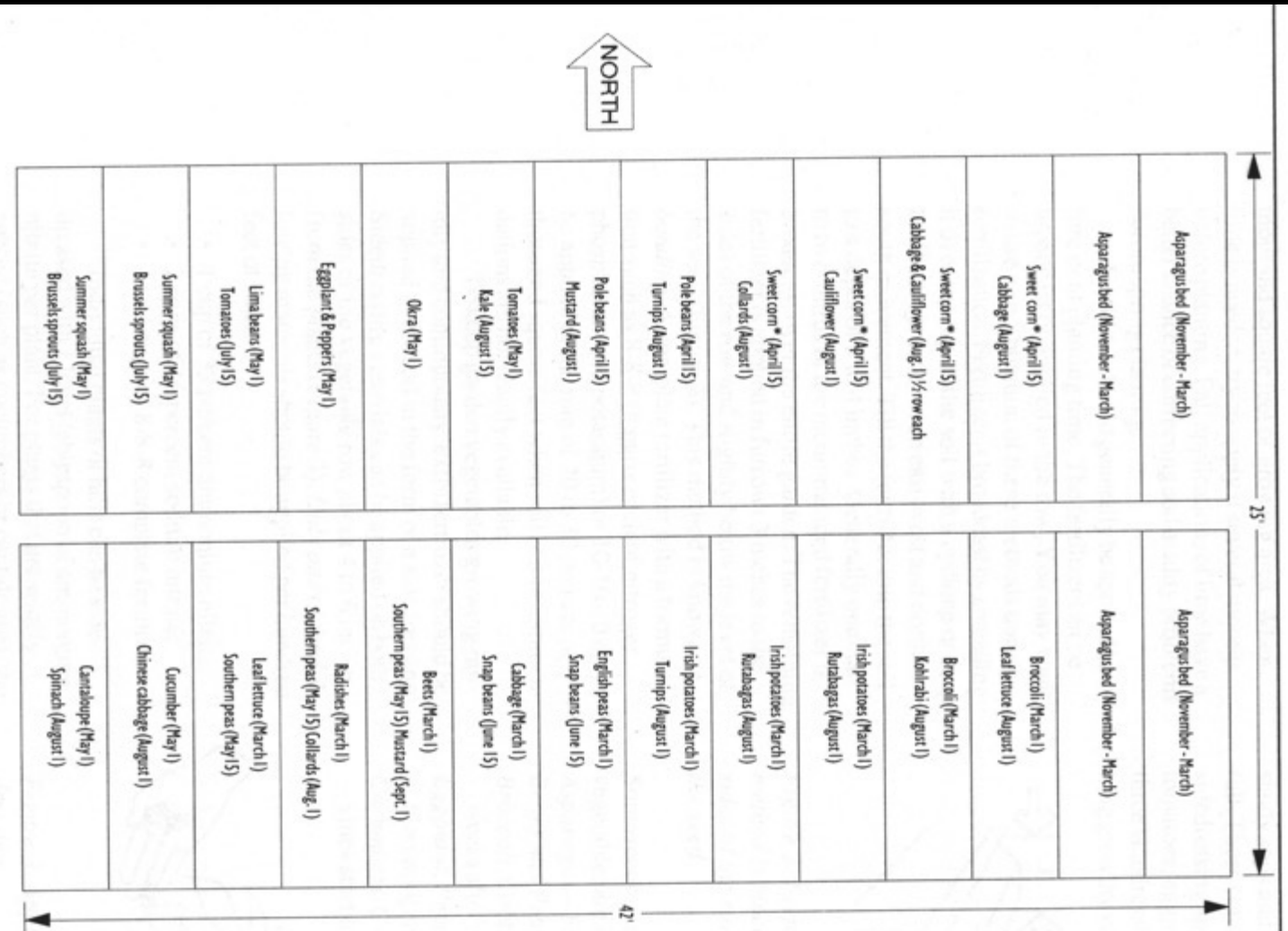


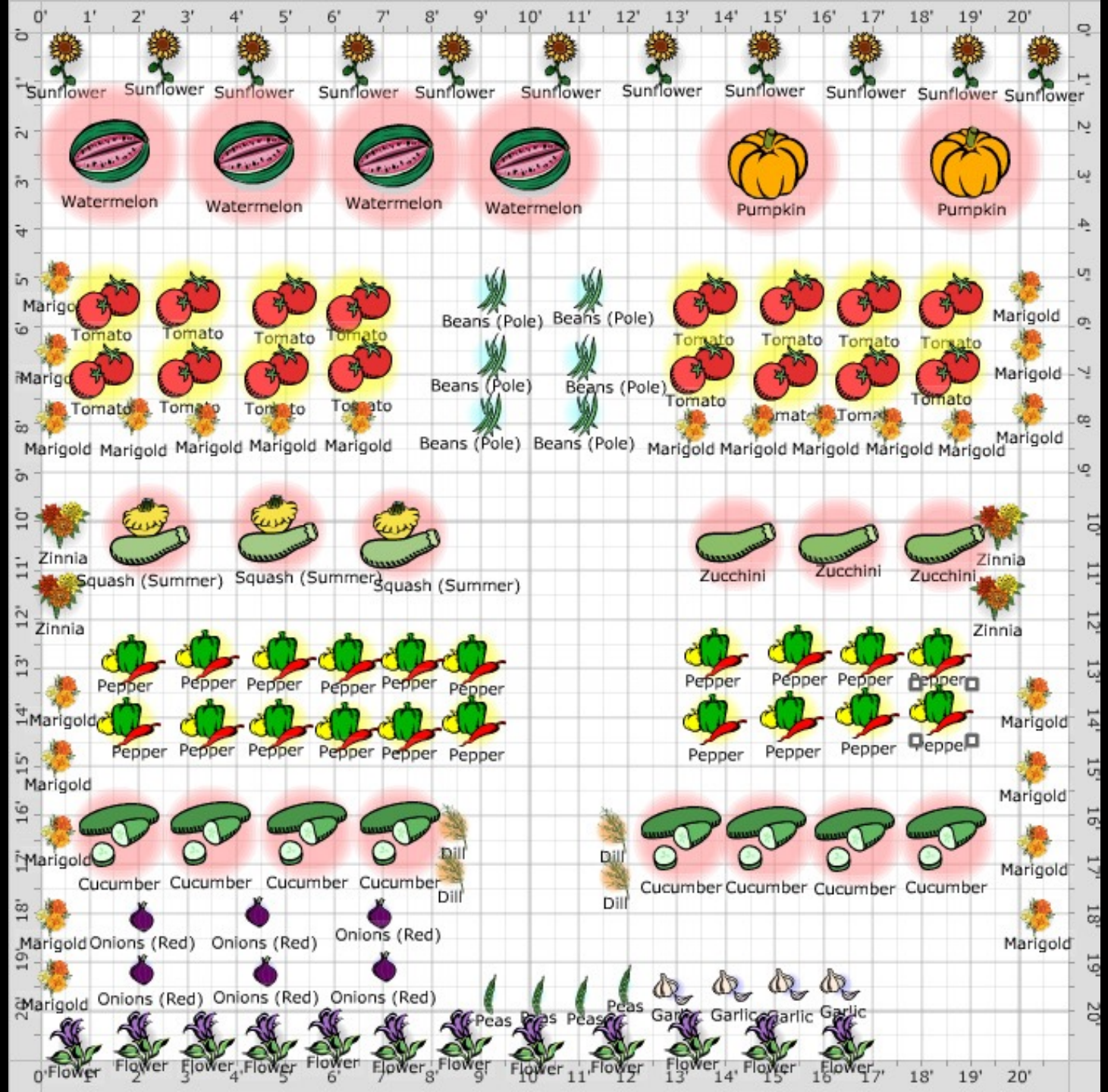
Rows:

Configuration









































Orient North-South

Tallest in North to Northeast

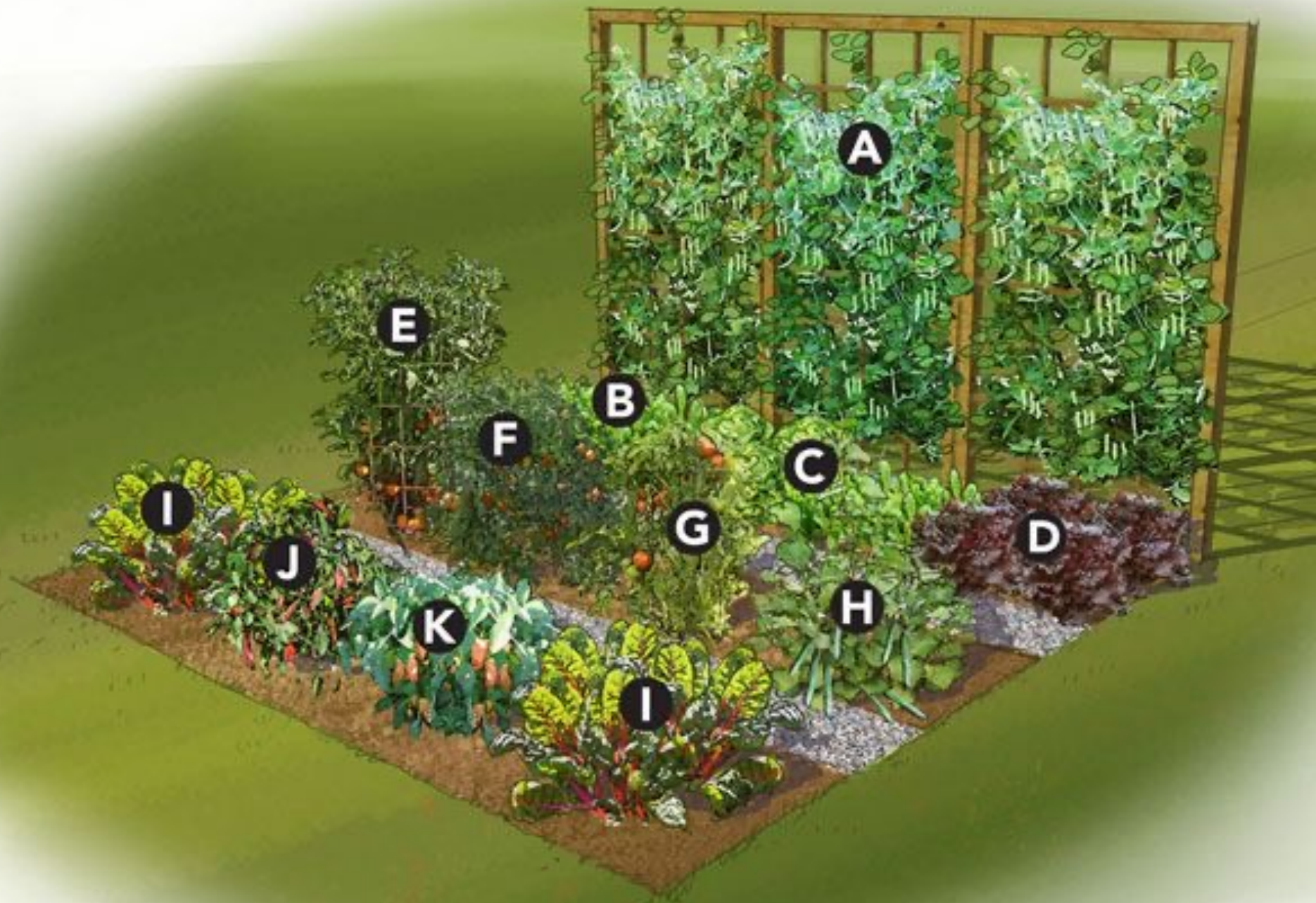




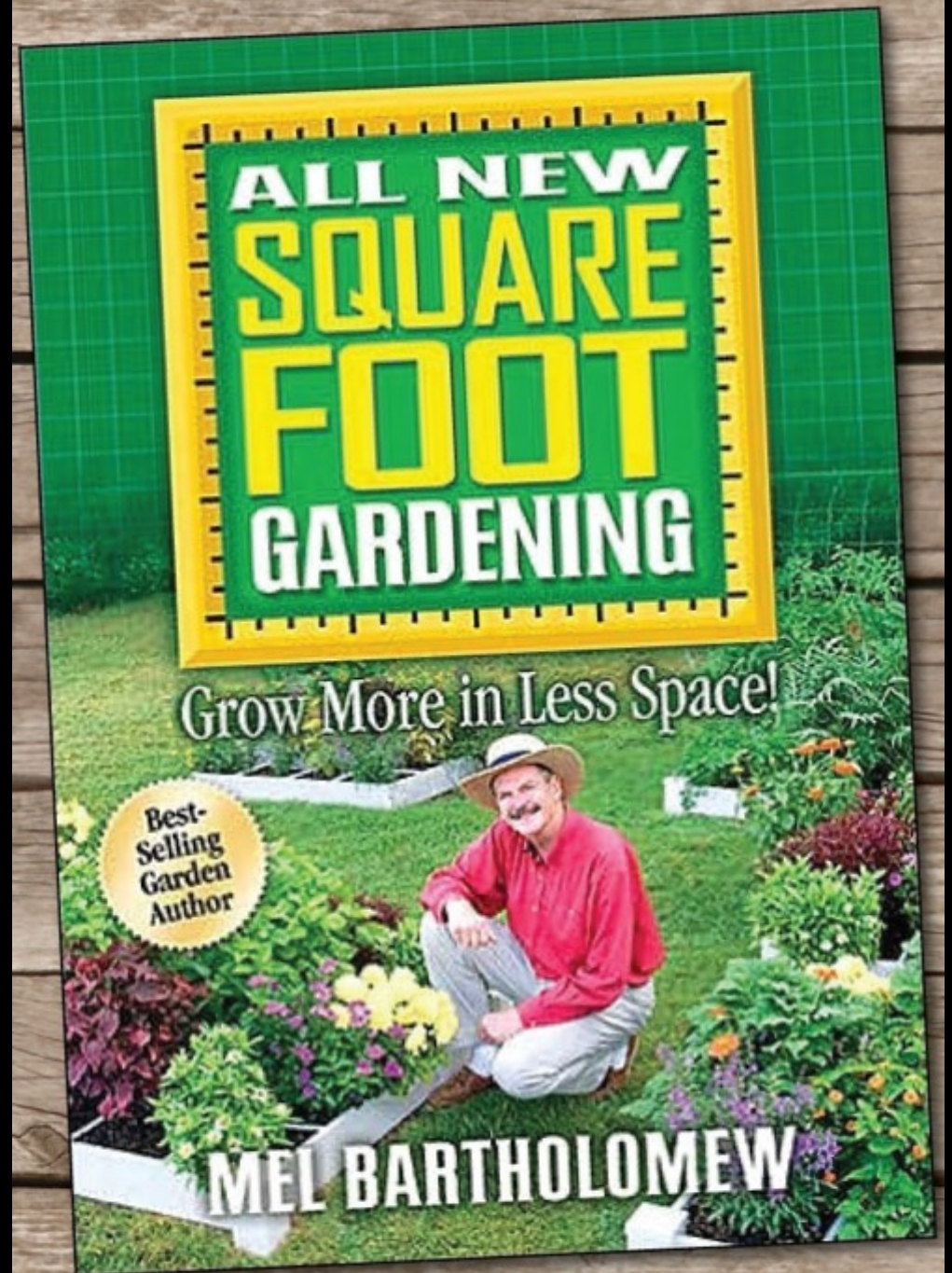
Square Foot Garden Planting Guide

 Tomatoes 1	 Peppers 1	 Onions 9	 Head Lettuce 4	 Carrots 16	 Leaf Lettuce 16	 Cucumbers 2	 Cabbage 1
 Hot Peppers 1	 Winter Squash 1	 Sweet Potatoes 1	 Potatoes 2	 Pumpkins 1	 Cauliflower 1	 Corn 2	 Peas 8
 Beets 9	 Eggplant 1	 Spinach 9	 Garlic 4	 Radishes 16	 Melons 1	 Celery 2	 Turnips 9
 Brussel Sprouts 1	 Kale 2	 Summer Squash 1	 Rosemary 1	 Cilantro 9	 Sage 1	 Chives 1	 Parsley 2
 Bush Beans 4	 Pole Beans 4	 Basil 2	 Bok Choy 1	 Parsnips 9	 Dill 9	 Oregano 1	 Thyme 2

Numbers represent the number of plantings per square foot







Goals:

- weed suppression
- water conservation
- aesthetics

Best mulches?

most available, least expensive plant residue

Leaves, leaf mulch, pine straw, salt marsh hay, and...

NEWSPAPER!!

Mulching



Organic mulches

Decompose over time, builds soil

Retain moisture

Moderate soil temperatures in Summer

Spread to early keeps soil cool

Aesthetically pleasing







Inorganic mulches

Warm soil early

Excellent weed suppression

Heat up soil in Summer

Does not decompose or build soil

Extra labor to remove

Can be costly



Watering

Optimum amount: 1" per week

Per plant? 16 -64 oz. every 3 days...

(depends on size of plant, rainfall and temperature)

Conserve water:

Apply water close to roots

Mulch for water conservation

Water in early morning (40 – 60% less water)

Do you know your flow rate ?



Fertilizing

Don't guess... soil test

Follow recommendations from the soil test & from the fertilizer product

Plan ahead... organic vs. synthetic fertilizers



Types of Chemical fertilizers

Organic: (Carbon based)

usually plant/animal derived

Released slowly;

Mineralized by microbes into NH_4^+

NH_4^+ Nitrified by microbes into NO_3^-

Apply in fall or as directed



Exclusive
BIO-TONE®
Formula

instrucciones en español
(ver panel posterior)

SINCE 1929
Espoma
ORGANIC

Plant-tone®

All Purpose Plant Food

Plant-tone is the original all natural plant food made from the finest quality ingredients. No fillers or fillings are ever used. The Organics in Plant-tone break down gradually to provide a safe, long lasting food reservoir throughout the growing season. We also add Bio-tone, a proprietary blend of microbes that biologically enhances our plant food to ensure superior plant growth.

Derived from: Hydrolyzed Feather Meal, Pasteurized Poultry Manure, Bone Meal, Alfalfa Meal, Greensand, Humates, Sulfate of Potash, and Sulfate of Potash Magnesia.

*Contains 3.0% Slow Release Nitrogen from Hydrolyzed Feather Meal, Pasteurized Poultry Manure, Bone Meal, and Alfalfa Meal.

NET WEIGHT 50 LBS. (22.67 kg)
Plant-tone 5-3-3
GUARANTEED ANALYSIS

ALSO CONTAINS NON-PLANT FOOD INGREDIENTS

Contains a total of 624 Colony Forming Units (CFU) per gram of the following species:

Total Nitrogen (N).....	5.0%
0.4% Ammoniacal Nitrogen	
1.6% Other Water Soluble Nitrogen	
3.0% Water Insoluble Nitrogen*	
Available Phosphate (P ₂ O ₅).....	3.0%
Soluble Potash (K ₂ O).....	3.0%
Calcium (Ca).....	3.0%
Magnesium (Mg).....	1.0%
0.6% Water Soluble Magnesium (Mg)	
Sulfur (S).....	1.0%

Bacillus Sphaericus	200 CFU per gram
Bacillus megaterium	200 CFU per gram
Bacillus pasteurii	200 CFU per gram

Expiration Date:

The microbes in this product are best used prior to the date printed on the side panel of this bag. After that time their numbers may be reduced.

Information regarding the contents and levels of metals in this product is available on the internet at www.regulatory-info-es.com

The Espoma Co. • 6 Espoma Rd. • Millville, NJ 08332 F1181

FOR ORGANIC GARDENING

Bigger Growth & Blooms

All Natural • Long Lasting

The Original Organic for Flowers,
Vegetables, Trees & Shrubs

NET WEIGHT 50 LBS. (22.67 kg)

Espoma Organic®
GUARANTEED

Total Nitrogen (N)	5.0%
0.4% Ammoniacal Nitrogen	
1.6% Other Water Soluble Nitrogen	
3.0% Water Insoluble Nitrogen*	
Available Phosphate (P ₂ O ₅)	3.0%
Soluble Potash (K ₂ O)	3.0%
Calcium (Ca)	3.0%
Magnesium (Mg)	1.0%
0.6% Water Soluble Magnesium (Mg)	
Sulfur (S)	1.0%

Derived from: Feather Meal, Poultry Manure, Bone Meal, Alfalfa Meal, Greensand, Sulfate of Potash, and Sulfate of Potash Magnesia.

*3.0% Slow Release Nitrogen from Feather Meal, Poultry Manure, Bone Meal, and Alfalfa Meal.

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INSTRUCTIONS



6-4-0 GUARANTEED ANALYSIS	
Total Nitrogen (N)	6.0 %
2.0 % Water Soluble Nitrogen	
4.0 % Water Insoluble Nitrogen*	
Available Phosphate (P ₂ O ₅)	4.0 %
Calcium (Ca)	1.2 %
Iron (Fe)	2.5 %
Derived from Biosolids	
*4.0 % Slowly Available Nitrogen Derived from Biosolids.	

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F648





NET WEIGHT 3 LBS. (1.36 kg)
Blood Meal 12-0-0
GUARANTEED ANALYSIS

Total Nitrogen (N).....	12.0%
12%	Water Insoluble Nitrogen

Derived from: Blood Meal F1381

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NET WEIGHT 4.5 LBS. (2.04 kg)
Bone Meal 4-12-0
GUARANTEED ANALYSIS

Total Nitrogen (N).....	4.0%
4.0%	Water Insoluble Nitrogen
Available Phosphate (P ₂ O ₅).....	12.0%
Calcium (Ca).....	12.0%
Derived from: Bone Meal	F1381

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Scotts AccuGreen Drop

6.0
5

The above spreader settings will vary according to the rate of walk and the mechanical condition of the spreader. Adjustment to the spreader may be required to apply the proper amount. Spreader settings are to be used as a guide. For best results calibrate your spreader.

La configuración del spreader anterior variará de acuerdo con la tasa de caminar y la condición mecánica del spreader. Es posible que se requiera un ajuste al esparcidor para aplicar el cantidad adecuada. Los ajustes del esparcidor se deben usar como una guía. Para mejores resultados, calibre su esparcidor.

GUARANTEED ANALYSIS		F-99
Total Nitrogen (*N)	5.00%	
2.00% Water Soluble Nitrogen		
4.00% Water Insoluble Nitrogen		
Available Phosphate (P ₂ O ₅)	3.00%	
Total Iron as Fe	2.00%	
Calcium (Ca)	2.10%	
Derived from Bio-Solids		
*4.0 % Slowly Available Nitrogen derived from Bio-Solids		

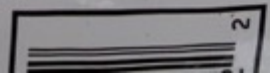
Apply only to actively growing turf. **Do not** apply near water, storm drains or drainage ditches. **Do not** apply if heavy rain is expected. Apply this product only to your lawn, and sweep any product that lands in the driveway, sidewalk, or street, back onto your lawn. Check with your local Cooperative Extension Agency to obtain specific information on local turf best management practices. Check with your county or city government to determine if there are local regulations for fertilizer use.

Aplicar solo para césped en crecimiento activo. **No** aplique cerca del agua, desagües pluviales o zanjas de drenaje. **No** aplique si se esperan fuertes lluvias. Aplique este producto solo a su césped y barra cualquier producto que caiga en el camino de entrada, la acera o la calle, nuevamente sobre su césped. Consulte con su Agencia de Extensión Cooperativa local para obtener información específica sobre las mejores prácticas locales de gestión de césped. Consulte con el gobierno de su condado o ciudad para determinar si existen regulaciones locales para el uso de fertilizantes.

KEEP OUT OF REACH OF CHILDREN
Caution: Contains Calcium Carbonate. Breathing Dust may be Harmful to Respiratory System.

MANTENER FUERA DEL ALCANCE DE LOS NIÑOS
Precaución: contiene carbonato de calcio. Respirar el polvo puede ser nocivo para el sistema respiratorio.

Net. Wt. 30 lb (13.6 kg)
 THIS PRODUCT IS...





Espoma Organic® Bio-tone® Starter Plus 4-3-3 GUARANTEED ANALYSIS

Total Nitrogen (N)	4.0%
1.6%	Water Soluble Nitrogen
2.4%	Water Insoluble Nitrogen*
Available Phosphate (P ₂ O ₅)	3.0%
Soluble Potash (K ₂ O)	3.0%
Calcium (Ca)	5.0%
Magnesium (Mg)	1.0%
0.4%	Water Soluble Magnesium (Mg)
Sulfur (S)	1.0%

Derived from: Feather Meal, Poultry Manure, Bone Meal, Alfalfa Meal, Greensand, Sulfate of Potash, and Sulfate of Potash Magnesia.
*2.4% Slow Release Nitrogen from Feather Meal, Poultry Manure, Bone Meal, and Alfalfa Meal.

ALSO CONTAINS NON PLANT FOOD INGREDIENTS

Active Ingredients:

Contains a total of 9,000,000 Colony Forming Units (CFU) per gram of the following species:

Bacillus amyloliquefaciens	1,500,000 CFU/gram
Bacillus licheniformis	1,500,000 CFU/gram
Bacillus megaterium	1,500,000 CFU/gram
Bacillus pumilus	1,500,000 CFU/gram
Bacillus subtilis	1,500,000 CFU/gram
Paenibacillus polymyxa	1,500,000 CFU/gram

Ectomycorrhizal Fungi: 55,555 propagules/gram (PPG) of the following 5 species:

Pisolithus tinctorius	51,147 PPG
Rhizopogon luteolus	1,102 PPG
Rhizopogon roseolus	1,102 PPG
Scleroderma citrinum	1,102 PPG
Rhizopogon verrucosum	1,102 PPG

Endomycorrhizal Fungi: 3.08 propagules/gram (PPG) of the following 2 species:

Rhizophagus irregularis	1.54 PPG
Septoglomus deserticola	1.54 PPG

1% Humic Acids derived from Leonardite

98.9% Inert Ingredients (inert as a non-plant food ingredient) – Fertilizer

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Bio-tone Starter Plus



Holly-tone®



Plant-tone®



Garden-tone®

For Naturally Delicious Vegetables

[PRODUCT DETAILS](#)



Berry-tone®

For Blueberries, Strawberries & Raspberries

[PRODUCT DETAILS](#)



Rose-tone®

For All Types of Roses

[PRODUCT DETAILS](#)



Bulb-tone®

For All Bulbs

[PRODUCT DETAILS](#)



Flower-tone®

Bloom Booster

[PRODUCT DETAILS](#)



Tree-tone®

For Shade, Fruit & Ornamental Trees

[PRODUCT DETAILS](#)



Evergreen-tone™

For Evergreen Trees & Shrubs

[PRODUCT DETAILS](#)



Tomato-tone®

For Plump and Juicy Tomatoes

[PRODUCT DETAILS](#)



Azalea-tone

For Azaleas, Rhododendron & Evergreens

[PRODUCT DETAILS](#)



Palm-tone®

For Palms, Hibiscus & Tropical Plants

[PRODUCT DETAILS](#)



Citrus-tone®

For Citrus and Avocado

[PRODUCT DETAILS](#)



Iron-tone®

Turns Yellow to Green

[PRODUCT DETAILS](#)

Espoma Organic® Holly-tone® 4-3-4

GUARANTEED ANALYSIS

Total Nitrogen (N)	4.0%
0.3%	Ammoniacal Nitrogen
1.2%	Other Water Soluble Nitrogen
2.5%	Water Insoluble Nitrogen*
Available Phosphate (P ₂ O ₅)	3.0%
Soluble Potash (K ₂ O)	4.0%
Calcium (Ca)	5.0%
Magnesium (Mg)	1.0%
0.7%	Water Soluble Magnesium (Mg)
Sulfur (S)	5.0%

Derived from: Feather Meal, Poultry Manure, Bone Meal, Alfalfa Meal, Greensand, Sulfate of Potash, Sulfate of Potash Magnesia, and Elemental Sulfur.

*2.5% Slow Release Nitrogen from Feather Meal, Poultry Manure, Bone Meal, and Alfalfa Meal.

ALSO CONTAINS NON PLANT FOOD INGREDIENTS

Active Ingredients:

Contains a total of 6,000,000 Colony Forming Units (CFU) per gram of the following species:

Bacillus amyloliquefaciens	1,000,000 CFU/gram
Bacillus licheniformis	1,000,000 CFU/gram
Bacillus megaterium	1,000,000 CFU/gram
Bacillus pumilus	1,000,000 CFU/gram
Bacillus subtilis	1,000,000 CFU/gram
Paenibacillus polymyxa	1,000,000 CFU/gram

1% Humic Acids derived from Leonardite

98.9% Inert Ingredients (inert as a non-plant food ingredient) – Fertilizer

Espoma Organic® Evergreen-tone™ 4-3-4

GUARANTEED ANALYSIS

Total Nitrogen (N)	4.0%
0.3%	Ammoniacal Nitrogen
1.2%	Other Water Soluble Nitrogen
2.5%	Water Insoluble Nitrogen*
Available Phosphate (P ₂ O ₅)	3.0%
Soluble Potash (K ₂ O)	4.0%
Calcium (Ca)	5.0%
Magnesium (Mg)	1.0%
0.7%	Water Soluble Magnesium (Mg)
Sulfur (S)	5.0%

Derived from: Feather Meal, Poultry Manure, Bone Meal, Alfalfa Meal, Greensand, Sulfate of Potash, Sulfate of Potash Magnesia, and Elemental Sulfur.

*2.5% Slow Release Nitrogen from Feather Meal, Poultry Manure, Bone Meal, and Alfalfa Meal.

ALSO CONTAINS NON PLANT FOOD INGREDIENTS

Active Ingredients:

Contains a total of 6,000,000 Colony Forming Units (CFU) per gram of the following species:

Bacillus amyloliquefaciens	1,000,000 CFU/gram
Bacillus licheniformis	1,000,000 CFU/gram
Bacillus megaterium	1,000,000 CFU/gram
Bacillus pumilus	1,000,000 CFU/gram
Bacillus subtilis	1,000,000 CFU/gram
Paenibacillus polymyxa	1,000,000 CFU/gram

1% Humic Acids derived from Leonardite

98.9% Inert Ingredients (inert as a non-plant food ingredient) – Fertilizer

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Espoma Organic® Palm-tone® 4-1-5

GUARANTEED ANALYSIS

Total Nitrogen (N)	4.0%
0.3%	Ammoniacal Nitrogen
1.2%	Other Water Soluble Nitrogen
2.5%	Water Insoluble Nitrogen*
Available Phosphate (P ₂ O ₅)	1.0%
Soluble Potash (K ₂ O)	5.0%
Calcium (Ca)	5.0%
Magnesium (Mg)	0.5%
0.2%	Water Soluble Magnesium (Mg)
Sulfur (S)	1.0%

Derived from: Feather Meal, Poultry Manure, Bone Meal, Alfalfa Meal, Greensand, Sulfate of Potash, and Sulfate of Potash Magnesia.

*2.5% Slow Release Nitrogen from Feather Meal, Poultry Manure, Bone Meal, and Alfalfa Meal.

ALSO CONTAINS NON PLANT FOOD INGREDIENTS

Active Ingredients:

Contains a total of 6,000,000 Colony Forming Units (CFU) per gram of the following species:

Bacillus amyloliquefaciens	1,000,000 CFU/gram
Bacillus licheniformis	1,000,000 CFU/gram
Bacillus megaterium	1,000,000 CFU/gram
Bacillus pumilus	1,000,000 CFU/gram
Bacillus subtilis	1,000,000 CFU/gram
Paenibacillus polymyxa	1,000,000 CFU/gram

1% Humic Acids derived from Leonardite

98.9% Inert Ingredients (inert as a non-plant food ingredient) – Fertilizer

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Espoma Organic® Tomato-tone® 3-4-6

GUARANTEED ANALYSIS

Total Nitrogen (N)	3.0%
0.2%	Ammoniacal Nitrogen
0.7%	Other Water Soluble Nitrogen
2.1%	Water Insoluble Nitrogen*
Available Phosphate (P ₂ O ₅)	4.0%
Soluble Potash (K ₂ O)	6.0%
Calcium (Ca)	8.0%
Magnesium (Mg)	0.9%
0.6%	Water Soluble Magnesium (Mg)
Sulfur (S)	2.5%

Derived from: Feather Meal, Poultry Manure, Bone Meal, Alfalfa Meal, Greensand, Sulfate of Potash, and Sulfate of Potash Magnesia.

*2.1% Slow Release Nitrogen from Feather Meal, Poultry Manure, Bone Meal, and Alfalfa Meal.

ALSO CONTAINS NON PLANT FOOD INGREDIENTS

Active Ingredients:

Contains a total of 6,000,000 Colony Forming Units (CFU) per gram of the following species:

Bacillus amyloliquefaciens	1,000,000 CFU/gram
Bacillus licheniformis	1,000,000 CFU/gram
Bacillus megaterium	1,000,000 CFU/gram
Bacillus pumilus	1,000,000 CFU/gram
Bacillus subtilis	1,000,000 CFU/gram
Paenibacillus polymyxa	1,000,000 CFU/gram

1% Humic Acids derived from Leonardite

98.9% Inert Ingredients (inert as a non-plant food ingredient) – Fertilizer

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Espoma Organic® Garden-tone® 3-4-4

GUARANTEED ANALYSIS

Total Nitrogen (N)	3.0%
0.2%	Ammoniacal Nitrogen
0.6%	Other Water Soluble Nitrogen
2.2%	Water Insoluble Nitrogen*
Available Phosphate (P ₂ O ₅)	4.0%
Soluble Potash (K ₂ O)	4.0%
Calcium (Ca)	5.0%
Magnesium (Mg)	1.0%
0.7%	Water Soluble Magnesium (Mg)
Sulfur (S)	2.0%

Derived from: Feather Meal, Poultry Manure, Bone Meal, Alfalfa Meal, Greensand, Sulfate of Potash, and Sulfate of Potash Magnesia.

*2.2% Slow Release Nitrogen from Feather Meal, Poultry Manure, Bone Meal, and Alfalfa Meal.

ALSO CONTAINS NON PLANT FOOD INGREDIENTS

Active Ingredients:

Contains a total of 6,000,000 Colony Forming Units (CFU) per gram of the following species:

Bacillus amyloliquefaciens	1,000,000 CFU/gram
Bacillus licheniformis	1,000,000 CFU/gram
Bacillus megaterium	1,000,000 CFU/gram
Bacillus pumilus	1,000,000 CFU/gram
Bacillus subtilis	1,000,000 CFU/gram
Paenibacillus polymyxa	1,000,000 CFU/gram

1% Humic Acids derived from Leonardite

98.9% Inert Ingredients (inert as a non-plant food ingredient) – Fertilizer

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Nutritional values of some organic sources

Compost: 1.5 - .5 - 1

Cow Manure: .5 - .5 - .5

Chicken Manure: 5 - 2 - 1

Coffee Grounds: 2 - .3 - .2

Grass Clippings: .5 - .2 - .7

Wood Ash: 0 - 5 - 4

Bat Guano: 10 - 3 - 1



Types of chemical fertilizers

Inorganic(synthetic): derived from non-living materials

Derived from rock, or fossil fuels

Usually readily available, or leached

Forms: granular, pelleted, slow release, concentrated solid or liquid



Miracle-Gro® Water Soluble All Purpose Plant Food 24-8-16

GUARANTEED ANALYSIS

F 1198

Total Nitrogen (N)	24%	Molybdenum (Mo)	0.0005%
3.5% Ammoniacal Nitrogen		Zinc (Zn)	0.06%
20.5% Urea Nitrogen		0.06% Water Soluble Zinc (Zn)	
Available Phosphate (P ₂ O ₅)	8%	Derived from Ammonium Sulfate,	
Soluble Potash (K ₂ O)	16%	Potassium Phosphate, Potassium Chloride,	
Boron (B)	0.02%	Urea, Urea Phosphate, Boric Acid, Copper	
Copper (Cu)	0.07%	Sulfate, Iron EDTA, Manganese EDTA,	
0.07% Water Soluble Copper (Cu)		Sodium Molybdate, and Zinc Sulfate.	
Iron (Fe)	0.15%	Information regarding the contents and	
0.15% Chelated Iron (Fe)		levels of metals in this product is available	
Manganese (Mn)	0.05%	on the Internet at	
0.05% Chelated Manganese (Mn)		http://www.regulatory-info-sc.com	



Granular Blend

10-10-10

#4108

GUARANTEED ANALYSIS:

Total Nitrogen (N).....	10.000%
3.08% Nitrate Nitrogen	
6.92% Ammoniacal Nitrogen	
0.00% Water Soluble Nitrogen	
0.00% Urea Nitrogen	
0.00% Water Insoluble Nitrogen	
Available Phosphorous (P ₂ O ₅).....	10.000%
Soluble Potassium (K ₂ O).....	10.000%
Chlorine (Cl), not more than.....	10.000%
Boron (B).....	0.020%
Total Copper (Cu).....	0.020%
Total Zinc (Zn).....	0.040%
Total Iron (Fe).....	0.108%
Total Manganese (Mn).....	0.040%

Derived from: Ammonium Nitrate, Di-Ammonium Phosphate, Muriate Potash, Copper Oxide, Manganese Oxide, Iron Oxide, Sodium Borate, Zinc Oxide

Obtain s
Avoid a
contents
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GENERAL PURPOSE

20-10-20

(For Continuous Liquid Feed Programs)

Guaranteed Analysis	F1143
Total nitrogen (N)	20%
7.77% ammoniacal nitrogen	
12.23 % nitrate nitrogen	
Available phosphate (P ₂ O ₅)	10%
Soluble potash (K ₂ O)	20%
Magnesium (Mg) (Total)	0.05%
0.05% Water Soluble Magnesium (Mg)	
Boron (B)	0.0068%
Copper (Cu)	0.0036%
0.0036% Chelated Copper (Cu)	
Iron (Fe)	0.05%
0.05% Chelated Iron (Fe)	
Manganese (Mn)	0.025%
0.025% Chelated Manganese (Mn)	
Molybdenum (Mo)	0.0009%
Zinc (Zn)	0.0025%
0.0025% Chelated Zinc (Zn)	

Derived from: ammonium nitrate, potassium phosphate, potassium nitrate, magnesium sulfate, boric acid, copper EDTA, manganese EDTA, iron EDTA, zinc EDTA, sodium molybdate. Potential acidity: 487 lbs. calcium carbonate equivalent per ton.

Vigoro® Tomato & Vegetable Garden Plant Food Plus Calcium 12-10-5

GUARANTEED ANALYSIS:

Total Nitrogen (N)	12.0%
5.5% Ammoniacal Nitrogen	
6.5% Urea Nitrogen*	
Available Phosphate (P ₂ O ₅)	10.0%
Soluble Potash (K ₂ O)	5.0%
Calcium (Ca)	3.0%
Magnesium (Mg)	3.0%
1.5% Water Soluble Magnesium (Mg)	
Sulfur (S)	5.0%
5.0% Combined Sulfur (S)	
Boron (B)	0.02%
Copper (Cu)	0.05%
0.01% Water Soluble Copper (Cu)	
Iron (Fe)	1.0%
0.9% Water Soluble Iron (Fe)	
Manganese (Mn)	0.05%
0.01% Water Soluble Manganese (Mn)	
Molybdenum (Mo)	0.0005%
Zinc (Zn)	0.05%
0.01% Water Soluble Zinc (Zn)	

Derived from: Polymer-coated Urea, Ammonium Sulfate, Diammonium Phosphate, Potassium Chloride, Potassium Magnesium Sulfate, Sodium Borate, Calcium Carbonate, Copper Sulfate, Copper Oxide, Ferrous Sulfate, Ferric Oxide, Manganese Sulfate, Manganese Oxide, Magnesium Carbonate, Molybdic Oxide, Zinc Sulfate and Zinc Oxide.
 *Contains 6.4% slowly available nitrogen from coated urea.

NOTICE: This fertilizer contains molybdenum (Mo). The application of fertilizers containing molybdenum (Mo) may result in forage crops containing levels of molybdenum (Mo) which are toxic to ruminant animals.



DREN

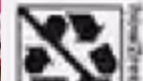
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 price you paid.



\$10⁹⁷

\$8⁴⁷

\$8⁴⁷

\$6⁴⁷

\$7⁹⁷

\$6⁴⁷

\$4⁴⁷

Miracle-Gro®

Shake 'n Feed

ALL PURPOSE
plant food

Fertilizante para TODO PROPÓSITO

CONTAINS NATURAL INGREDIENTS
TO FEED MICROBES IN THE SOIL!
CONTIENE INGREDIENTES NATURALES PARA
ALIMENTAR A LOS MICROBIOS EN LA TIERRA!

- + Kelp
- + Earthworm Castings
- + Feather Meal
- + Bone Meal

NOURISHES
ABOVE

FEEDS
FOR UP TO
3
MONTHS

AND
BELOW
THE SOIL

NET WT / PESO NETO 8 lb (3.6 kg)

Miracle-Gro® Shake 'n Feed® All Purpose Plant Food 12-4-8
F1144

GUARANTEED ANALYSIS

Total Nitrogen (N)	12%	Copper (Cu)	0.06%
0.92% Ammoniacal Nitrogen		0.001% Water Soluble Copper (Cu)	
10.45% Urea Nitrogen*		Iron (Fe)	0.95%
0.63% Water Insoluble Nitrogen*		0.001% Water Soluble Iron (Fe)	
Available Phosphate (P ₂ O ₅)	4%	Manganese (Mn)	0.35%
Soluble Potash (K ₂ O)	8%	0.23% Water Soluble Manganese (Mn)	
Calcium (Ca)	7.6%	Zinc (Zn)	0.12%
Magnesium (Mg)	2.5%	0.001% Water Soluble Zinc (Zn)	
0.7% Water Soluble Magnesium (Mg)			
Sulfur (S)	3.2%		
3.2% Combined Sulfur (S)			

Derived from: Polymer-coated Urea, Urea, Ammonium Phosphate, Feather Meal, Kelp Meal, Alfalfa Meal, Earthworm Castings, Bone Meal, Potassium Sulfate, Calcium Carbonate, Dolomitic Limestone, Magnesium Oxide, Magnesium Sulfate, Copper Oxide, Copper Sulfate, Iron Oxide, Ferrous Sulfate, Manganese Oxide, Manganese Sulfate, Zinc Oxide and Zinc Sulfate.

*8.6% slow-release nitrogen (N) from coated urea and water insoluble nitrogen derived from feather meal.

Information regarding the contents and levels of metals in this product is available on the Internet at

<http://www.regulatory-info-sc.com>



Keep Out Of Reach Of Children

CAUTION Stop! Read the entire label first. Observe all precautions and follow directions carefully. Eye contact with contents may cause irritation. Flush eyes with water as soon as possible after contact.

Store in a cool, dry place out of the reach of children.

Ecoscraps Slow-Release Fertilizer 4-2-0 F2571

GUARANTEED ANALYSIS

Total Nitrogen (N)	4%
0.3% Water Soluble Nitrogen	
3.7% Water Insoluble Nitrogen†	
Available Phosphate (P ₂ O ₅)	2%
Iron (Fe)	2%
Molybdenum (Mo)	0.001%

Derived from: Biosolids
+3.7% slowly available Nitrogen from Biosolids.

†When used as directed.



**Osmocote® Smart-Release®
Plant Food Plus
Outdoor & Indoor 15-9-12**

GUARANTEED ANALYSIS F643

Total Nitrogen (N) [†]	15%
8.4% Ammoniacal Nitrogen	
6.6% Nitrate Nitrogen	
Available Phosphate (P ₂ O ₅) [†]	9%
Soluble Potash (K ₂ O) [†]	12%
Magnesium (Mg) [†]	1.3%
0.9% Water Soluble Magnesium (Mg)	
Sulfur (S) [†]	6.0%
6.0% Combined Sulfur (S)	
Boron (B) [†]	0.02%
Copper (Cu)	0.05%
0.05% Water Soluble Copper (Cu)	
Iron (Fe) [†]	0.46%
0.09% Water Soluble Iron (Fe)	
0.01% Chelated Iron (Fe)	
Manganese (Mn) [†]	0.06%
0.06% Water Soluble Manganese (Mn)	
Molybdenum (Mo) [†]	0.02%
Zinc (Zn)	0.05%
0.019% Water Soluble Zinc (Zn) [†]	

Derived from: Polymer-Coated: Ammonium

Sustainable Pest Management

Integrated Pest Management

“Economic Threshold” (insects or lesions per sq. centimeter

“Home Gardening Threshold”

Plants that are thriving are more resistant to pests...

Maintain high numbers of nectar bearing plants...

Improves pollination and fruiting

Increases numbers of predatory and parasitic insects

Avoid broad spectrum pesticides



Sustainable Pest Management

Know your plant

Know your pest

Strategies:

cultural

mechanical

biological

“chemical”



Cultural Pest Management

Proper Soil Preparation

Proper Plant Selection: Pest Free...

Crop Rotation: mix it up, really?

Sanitation (clean up)

Trap Crops... attracts pest to “trap crop”



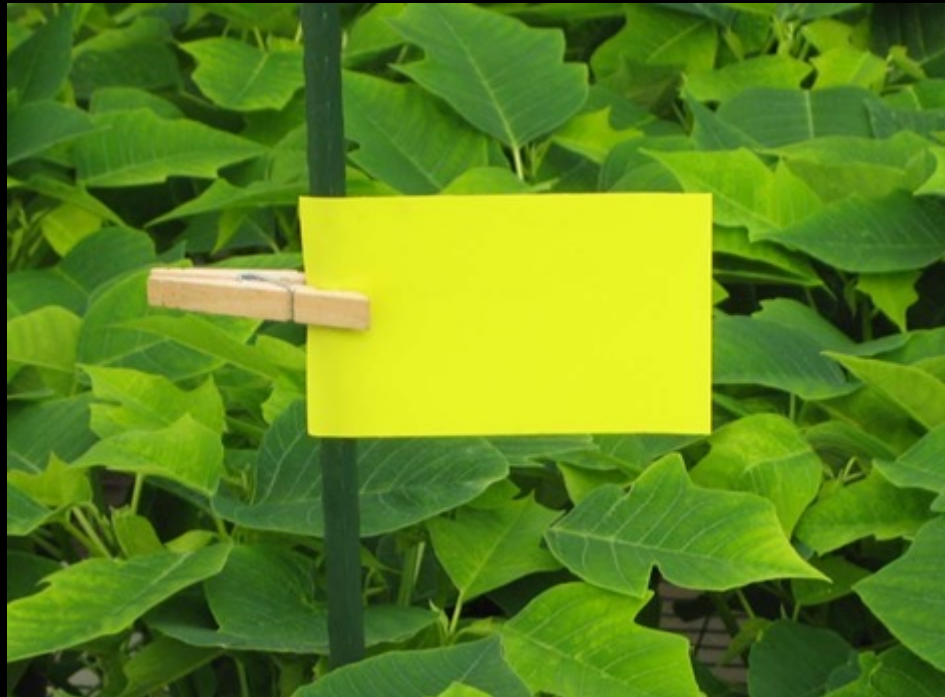
Mechanical Pest Management

Hand picking

Traps and attractants

Barrier

Physical removal (pruning & debris removal)





Biological

Predatory insects:

lady bug beetles

predatory wasps

praying mantis



Dipel & Milky Spore Disease



Chemical Pesticides

Organic: naturally occurring

Synthetic: made by humans

Two concerns:

toxicity

residual life (DDT)



LD50: Chemical toxicity(mg/kg of body weight)

The lower the LD50 the more toxic

Nicotine:	50	(“Black leaf 40”)	organic
Rotenone:	132	(kills fish)	organic
Asprin:	200		
Caffeine:	200		
Sevin:	800	(kills bees)	
Malathion:	1375		
Pyrethrum:	1500	(kills bees)	organic
Table Salt:	3000		
Round up:	4300		

Thanks for Your Attention!

