DSD Shares

Summary Sheet

Functional Area: DSD Library

Title of Article or Material: Innovative Rose Growing Techniques

Type of material: ☐ Word File ■PDF ☐ PowerPoint ☐ Spreadsheet ☐ Web hot link ☐ Other

Author: Dr. Tommy Cairns

Contact e-Mail: DrTommyC@aol.com Contact: Phone:

Date Submitted : 2-3-2010 Date Posted: Date Last Updated:

Target Audience for this information: All Rosarians

Abstract:

This presentation on Innovative Rose Growing is perhaps one of the most comprehensive sets of tools for the rosarian that exists. The photographs themselves will help as a tool to evaluate garden pests.

The topics covered include:

Soil Chemistry
Pruning
Fertilization
Pesticides
The Importance of Water
Myths and Legends
The Blue Rose

Dr. Cairns is very appreciated for giving the Deep South District the privilege of posting this material for all to use.

Innovative Rose Growing Techniques

[i.e. Common Sense]


TOPICS
Soils
Fertilization
Pesticides
The Blue Rose
Myths & Legends

Soil Chemistry

First Step is Soil Testing

- Recommended before giving advice
- Sampling Techniques
- Interpretation of Analysis
- Remedial actions to correct deficiencies

Soil Factors

1. Natural soil drainage & overflow conditions
2. Soil depth favorable to roots 
3. Texture
4. Structure
5. Permeability

Soil Texture

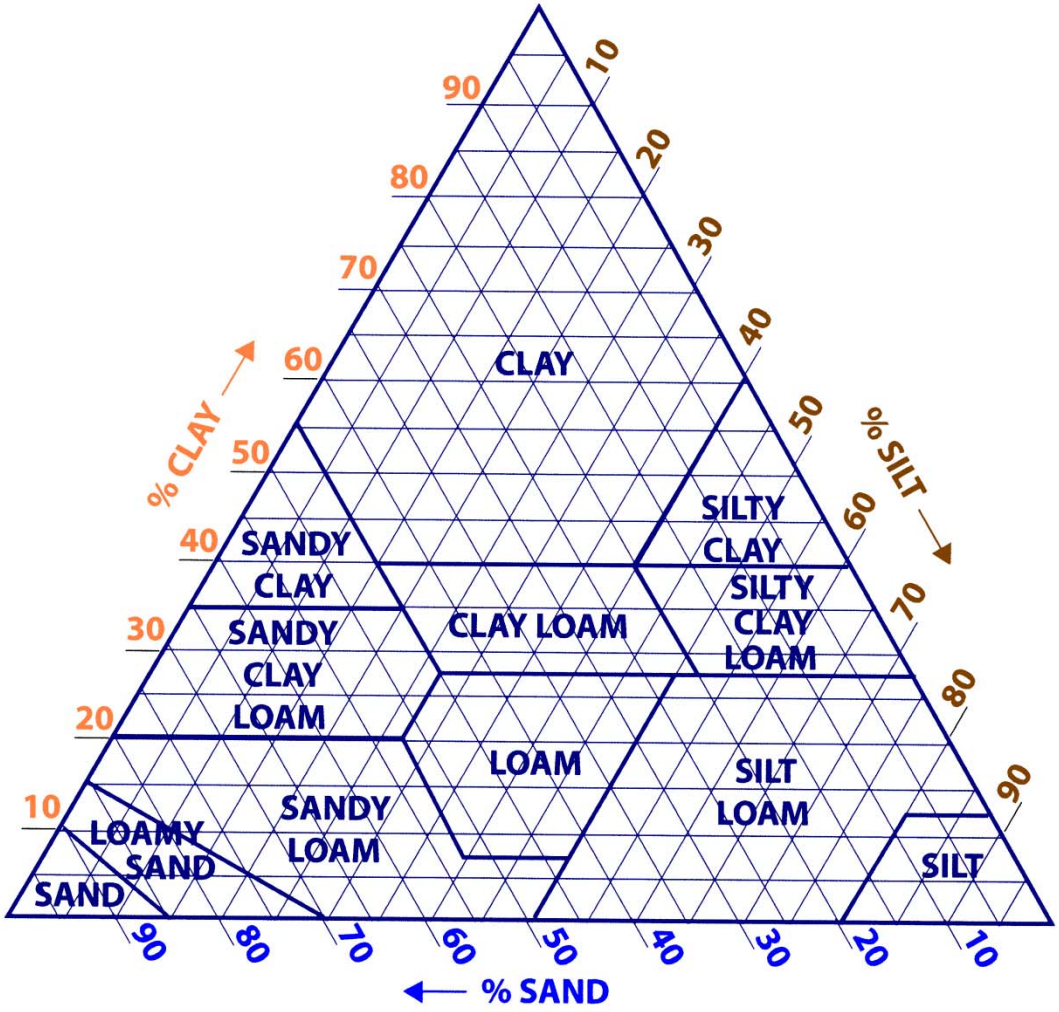
- Great influence on soil productivity
- Reflects proportion of Sand, Silt and Clay
  - Sand is 2.0 to 0.05 mm
  - Silt is 0.05 to 0.002 mm
  - Clay is 0.002 mm or less

Soil Permeability

- Quality which permits movement of water and air through the most restrictive layer in the root zone
- Roses need a balanced supply of both water and oxygen to grow well
- Best soils are Sandy Loams

Soil Texture

Triangle



Typical Soil Test Results Report

	pH	P	K	Ca	Mg	NH4	NO3	Salts
Old	**5.8**	**100**	**55**	**107**	**70**	**3**	**27**	**1200**
New	**6.5**	**65**	**21**	**44**	**70**	**0**	**38**	**640**

Values listed in ppm (parts per million)

Guidelines for Plant Concentration Levels

Nutrient	Acceptable	Optimum	High	Very High
P	3-5	6-9	10-19	20+
K	61-149	150-249	250-349	350+
Ca	80-199	200-325	326-399	400+
Mg	30-69	70-99	100-149	150+
NH4	10	10-20	20+	
NO3	40-99	100-199	200-299	300+

Values listed in ppm (parts per million)

Effect of Concentration of Soluble Salts

ppm	Rating	Interpretation
0-520	**very low**	**Negligible**
5211- 1390	**low**	**Suitable for seedlings**
1391-2440	**medium**	**Favorable for most plants**
2441-3500	**m. high**	**Satisfactory for roses**
3501-4200	**High**	**Wilting/leaf burn**
4200+	**v. high**	**Severe salt injury**

Definition of pH

“The logarithm of the reciprocal of the hydrogen ion concentration on moles per liter”

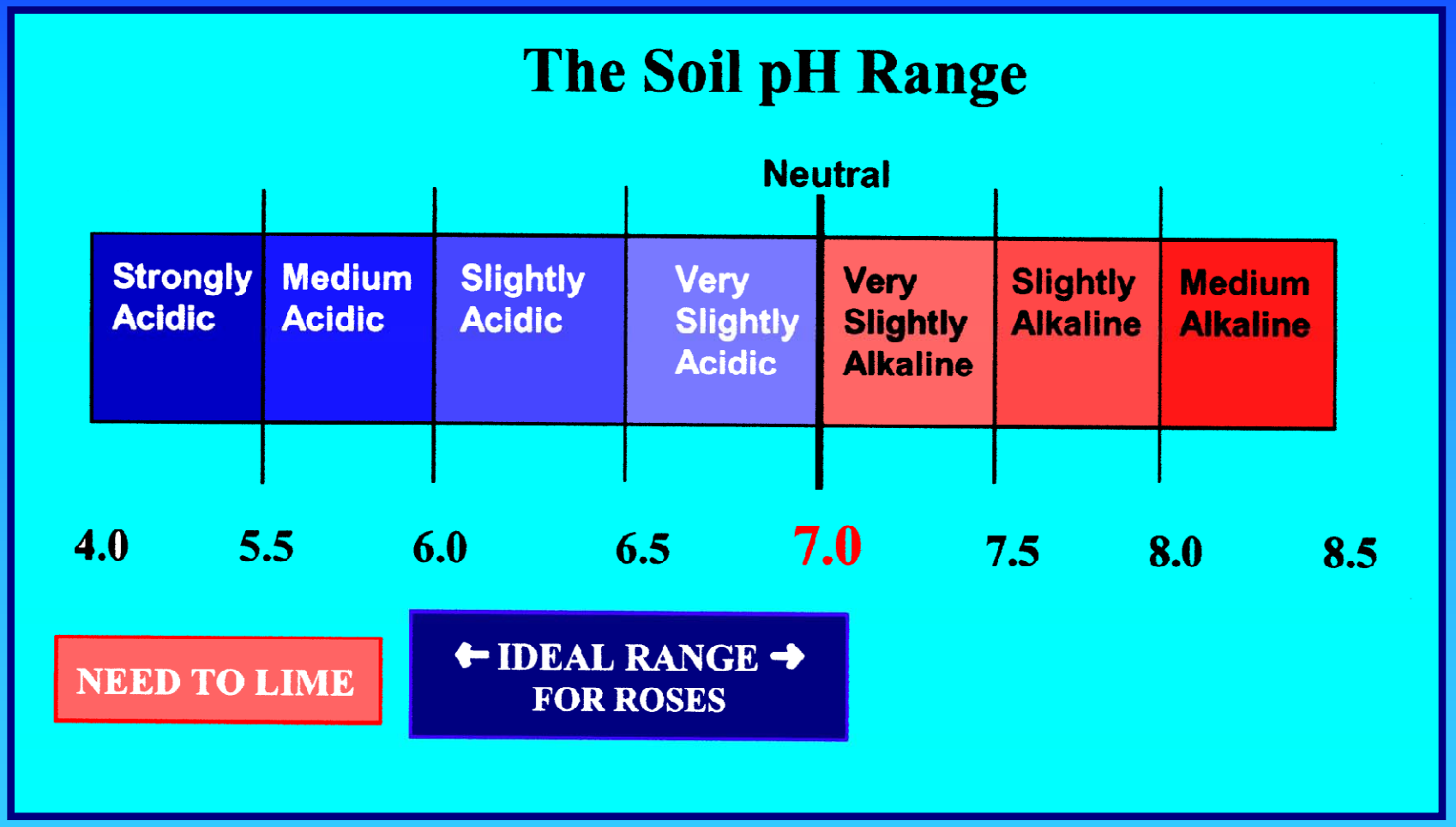
Translated into lay terms

“A value indicating the soil is either acidic or alkaline”

Examples of pH

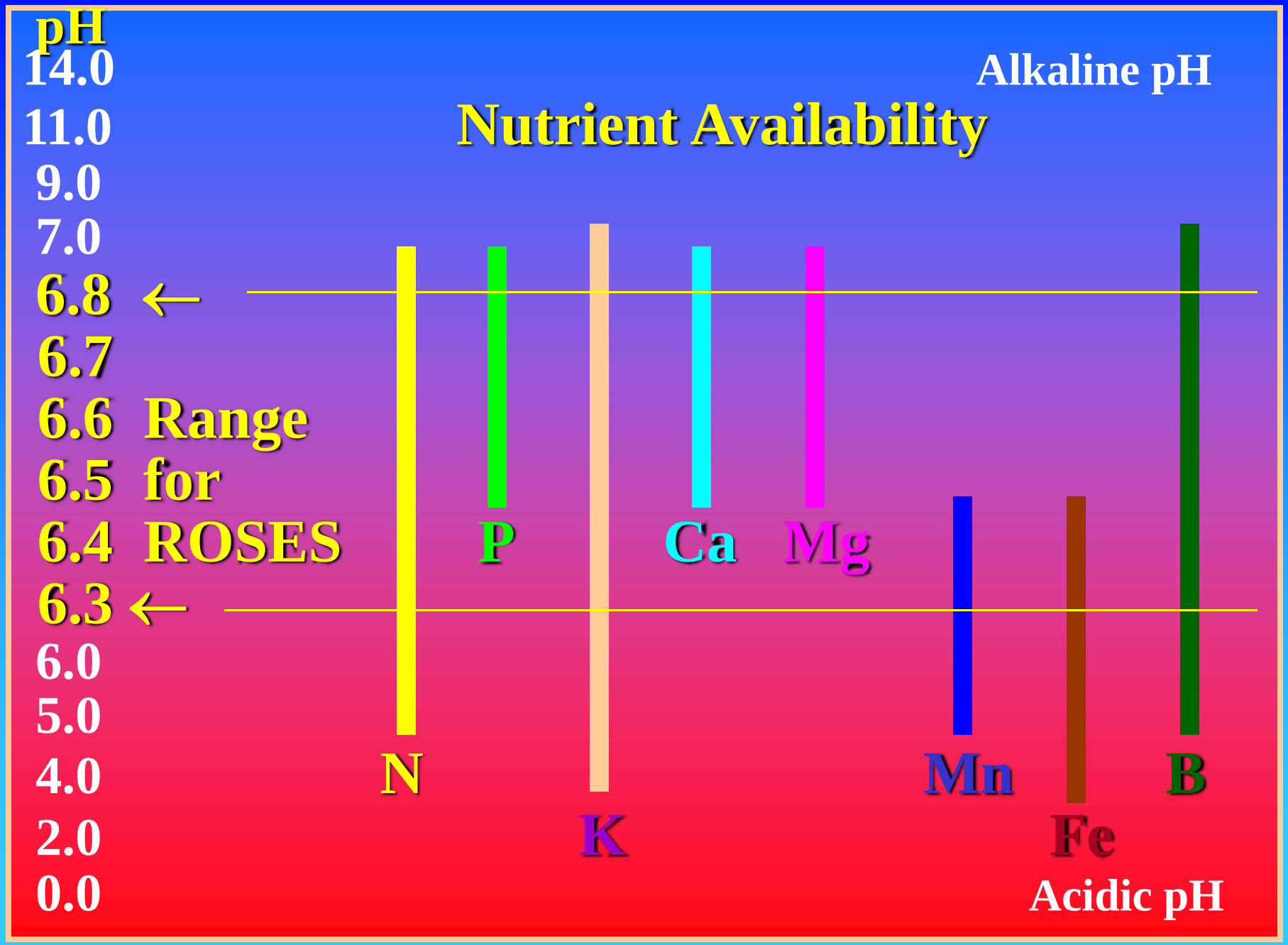
- Water is pH=7, neutral
- Lemon Juice is pH=3, acidic
- Orange Juice is pH=4, acidic
- Milk is pH=6, alkaline
- Soap solution is pH=9, alkaline

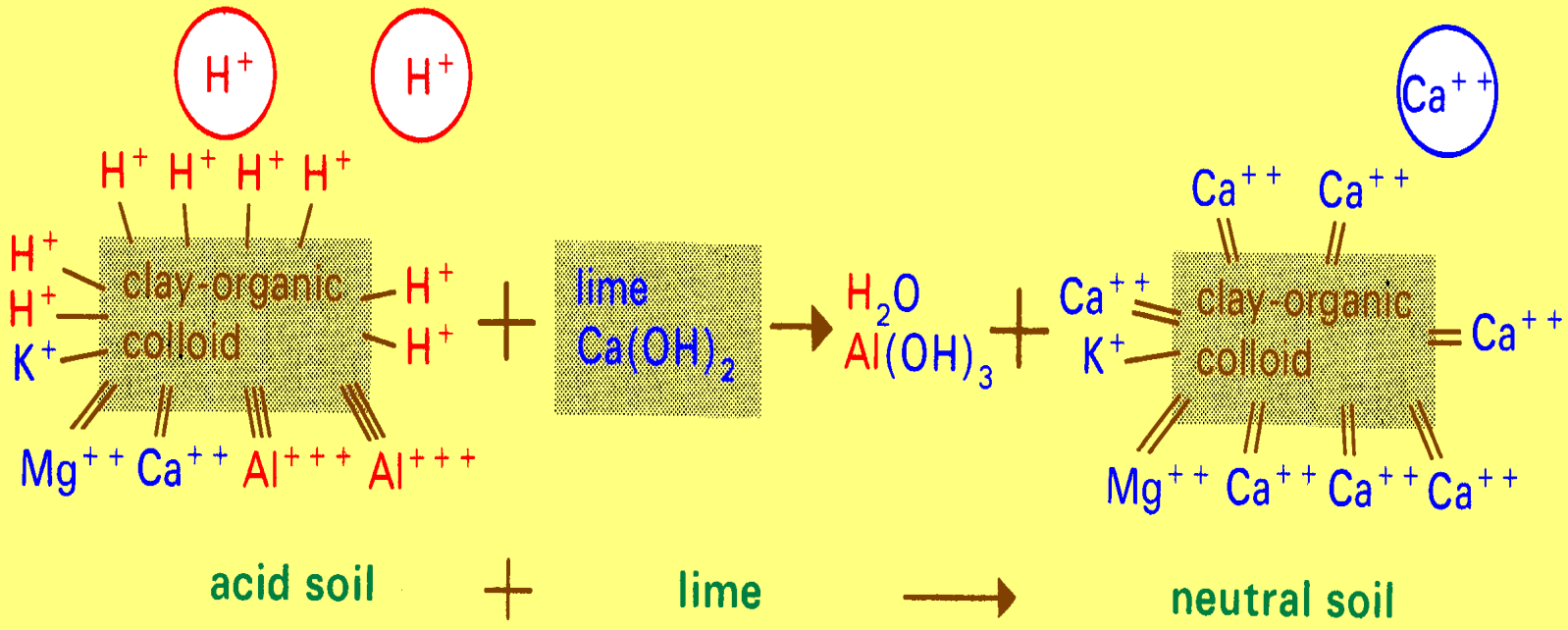
All About pH


The Soil pH Range
Neutral
Strongly Acidic
Medium Acidic
Slightly Acidic
Very Slightly Acidic
Very Slightly Alkaline
Slightly Alkaline
Medium Alkaline
4.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
NEED TO LIME
← IDEAL RANGE →
FOR ROSES

Availability of Nutrients

- Dependent on pH
- Range of availability is pH 5 – 6.9
- Below pH 4 elements not available
- Chlorosis is diagnostic tool
- Correct pH becomes vital


pH
14.0
11.0
9.0
7.0
6.8 ←
6.7
6.6 Range
6.5 for
6.4 ROSES
6.3 ←
6.0
5.0
4.0
2.0
0.0
Alkaline pH
Nutrient Availability
N
P
K
Ca
Mg
Mn
Fe
B
Acidic pH



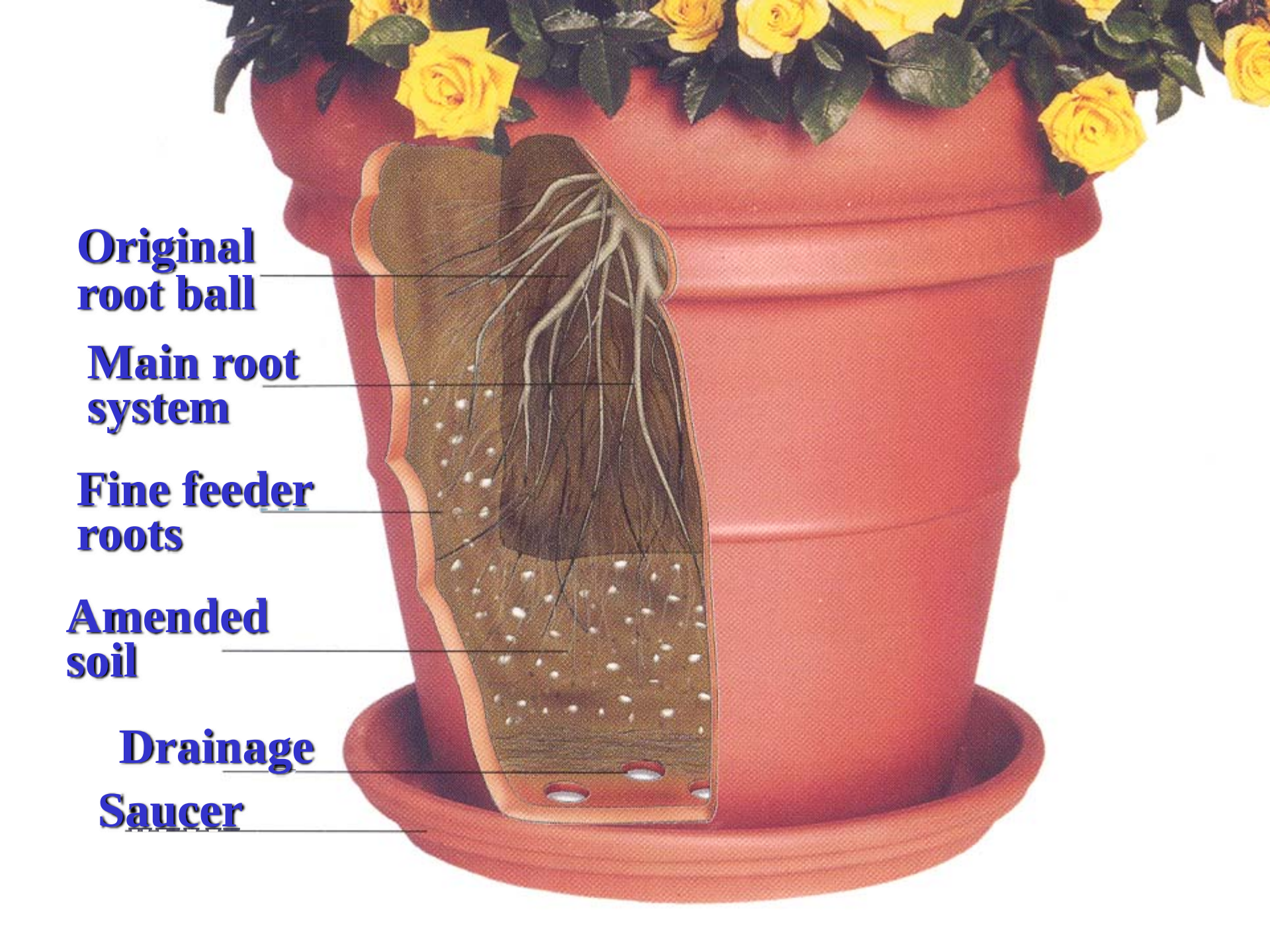
H^+	hydrogen ion in soil solution (active acidity)
H^+	replaceable hydrogen ion (potential acidity)
Ca^{++}	calcium ion in soil solution
Ca^{++}	replaceable calcium ion
Mg^{++}	replaceable magnesium ion
Al^{+++}	replaceable aluminum ion
K^+	replaceable potassium ion
$Al(OH)_3$	aluminum hydroxide

Soil Amendments

- Correcting too acidic a pH
  - Dolomitic Limestone
  - Hydrated Limestone
  - Calcitic Limestone (used when Mg is high)
- Correcting too alkaline a pH
  - Organic matter
  - Sulfur

Your Health in the Dirt

- Protect yourself against tenanus by having an annual booster shot every 10 years
- Wear gloves
- Disinfect cuts, etc.
- Wash hands, under fingernails, etc.


Original root ball
Main root system
Fine feeder roots
Amended soil
Drainage
Saucer

Pruning Roses

Locating the Budeye for cutting

Budeye face-on

Budeye 90º

Budeye cut

New Growth

In 3-4 weeks the budeye will swell and begin to grown

Cutting Too High

The portion above the cut will die and weaken the new stem and flower.

Cutting Too Close

Can cause cane to split allowing infection to damage the health of the plant.

Fertilization

Composition of a Typical Plant

Element	% Amount
Oxygen	45
Carbon	44
Hydrogen	6
Nitrogen	2
Phosphorus	0.5
Potassium	1.0

Element	% Amount
Calcium	0.6
Sulfur	0.4
Magnesium	0.3
Boron	0.005
Chlorine	0.015
Copper	0.001
Iron	0.020
Manganese	0.050
Molybdenum	0.0001
Zinc	0.010
TOTAL:	99.9011

Fertilization of Roses

PRIMARY NUTRIENTS

Nitrogen (N)

Phosphorus (P)

Potassium (K)

Fertilization of Roses

SECONDARY NUTRIENTS

Calcium (Ca)

Magnesium (Mg)

Sulfur (S)

Fertilization of Roses

MICRONUTRIENTS

Iron (Fe)
Boron (B)
Copper (Cu)
Manganese (Mn)
Zinc (Zn)

Nitrogen

Proteins, nucleic acids, chlorophylls and alkaloids are all nitrogen containing compounds which the rose plant needs to synthesis biochemically for a healthy growth development

Deficiency of N results in stunted growth and a yellowing of foliage

Phosphorus

Essential for carbohydrate transformation, respiration, and cell division. Aids root growth, plant maturity, and bigger blooms

Deficiency of P results in dark green foliage and retarded growth. Sometimes the lower leaves turn yellow between the veins but more often they turn purplish

Potassium

Catalyst in the production of proteins, fats, and carbohydrates.

Deficiency of P can be diagnostically detected by observing the lower leave sets mottled, usually with necrotic areas near the tips and margins. Progressive yellowing starts at the margins and spreads towards the center.

Sulfur

Proteins contain sulfur as well as other phenol like compounds affording protection against fungi.

Deficiency of S arises by indicating dead spots on the new light green leaves. Veins are usually lighter than the adjoining inter-veinal areas.

Calcium

Plays a key role in the translocation of carbohydrates and amino acids.

Deficiency of Ca can result in terminal bud death. Earlier symptoms are necrosis at the tips and margins of young leaves (often hooked at the tip). Death of the root system has usually preceded all these symptoms and correction is a losing battle

Magnesium

Metallic center piece of the chlorophyll molecule essential to photosynthesis.

Observance of the lower older leaves to be chlorotic are the first symptoms of the deficiency. Often these symptoms are mistakenly attributed to Iron deficiency.

Photosynthesis

$$6CO_2 + 6H_20 \rightarrow C_6H_{12}O + 6O_2$$

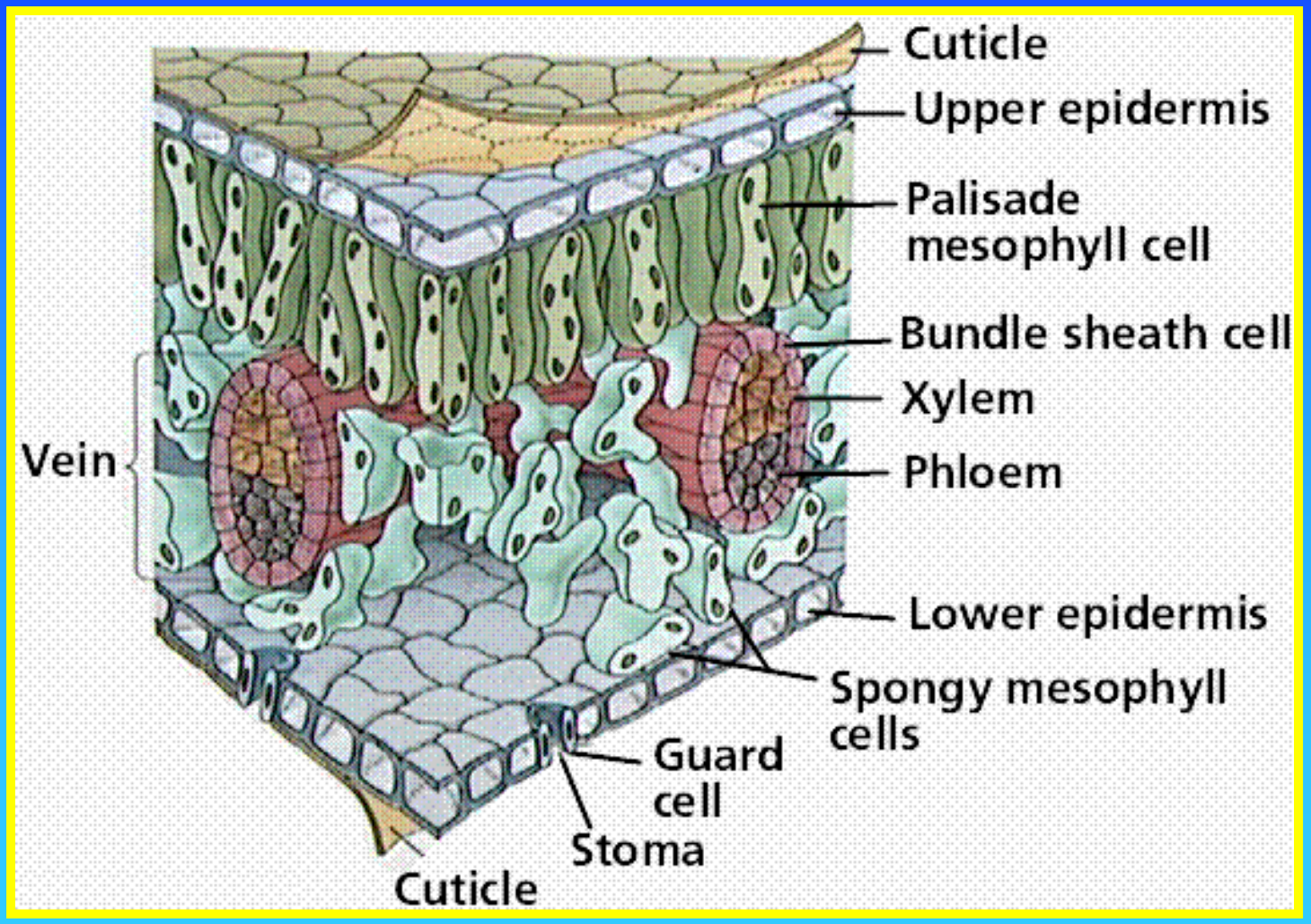
Carbon Dioxide Glucose Oxygen

Respiration

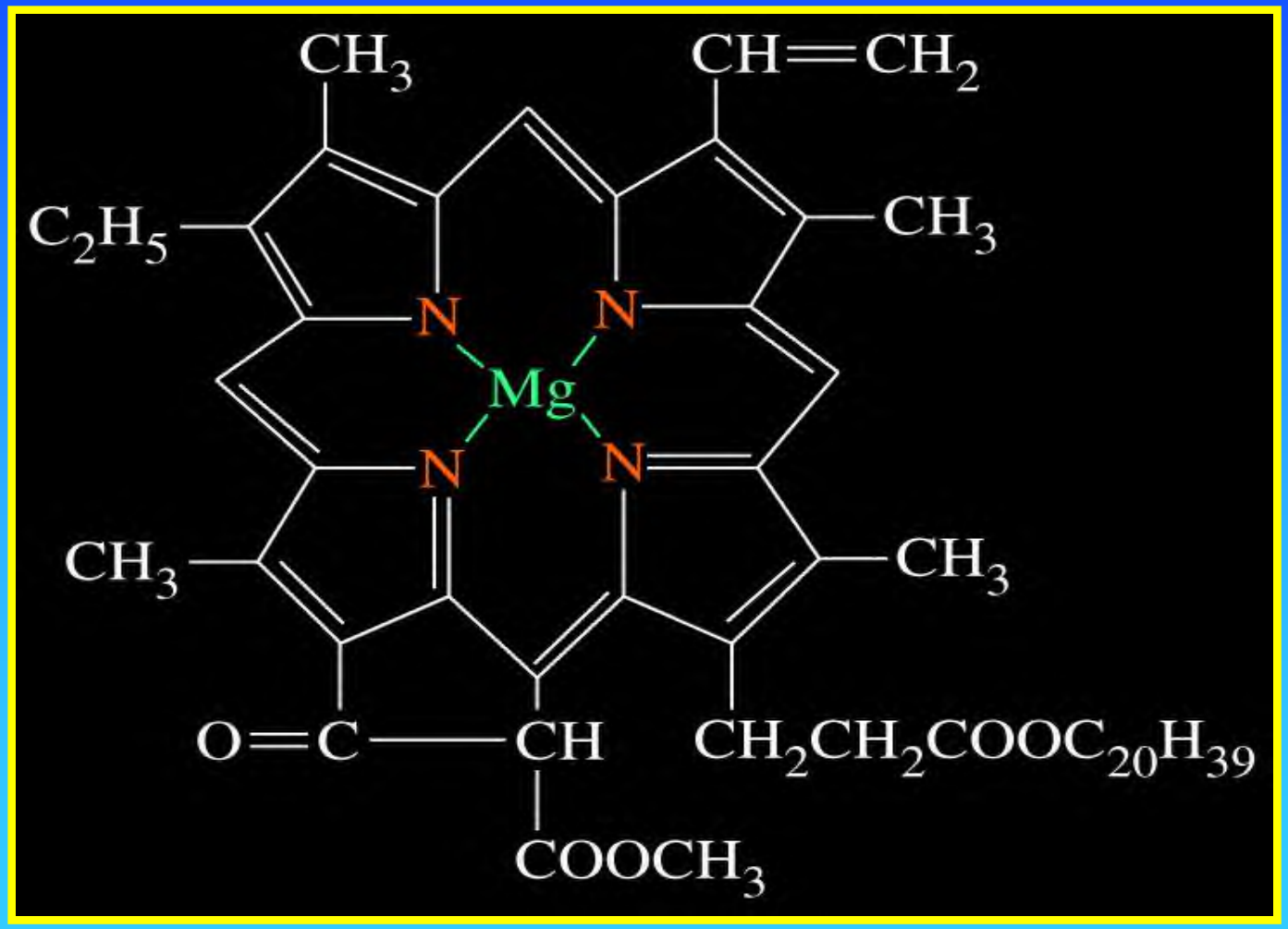
$$C_6H_{12}O + 6O_2 \rightarrow 6CO_2 + 6H_20$$

Stomata

Leaf Structure



Chlorophyll Structure



Iron

Closely allied to the synthesis of chlorophyll, Iron plays an important role in respiration and root growth.

Deficiency of Fe results in new leaves being chlorotic between the veins.

Boron

Essential for starch formation, cell division and bloom production.

Deficiency of B can be diagnostically detected by observing the young leaves being light green at the base and twisted.

Zinc

Catalyst in the production of stem growth and bloom production.

Deficiency of Zn detected by large areas of dead tissue at tips and between veins. Usually due to unavailability of Zn due to low pH.

Malnutrition Diagnosis

- **Mature foliage affected**
  - **Nitrogen: leaves light green to yellow**
  - **Phosphorus: dark green with red and purple colors**
  - **Potassium/Zinc/Mangesium: leaves chlorotic, mottled, dead spots**

Malnutrition Diagnosis

- **Emerging foliage affected**
  - Calcium: leaves hooked dying at tips and edges
  - Boron: leaves light green and twisted
  - Copper: permanently wilted with no chlorosis

Guaranteed Analysis

- **Mixed Fertilizer (NPK)**
  - **% Composition reported as elemental**
  - **Exceptions:**
    - **Phosphoric acid/oxide (P_2O_5)**
    - **Potassium Oxide (K_2O) – soluble Potash**
  - **Declared as N:P:K equals say 8:10:8**

Sources of Nitrogen

Summation of total Nitrogen from three popular sources

1. **Ammonium Phosphate – NH_4 (medium)**
2. **Potassium Nitrate – NO_3 (instant)**
3. **Urea – NH_4 (medium)**
4. **Manures (slow)**

GROW MORE

MAGNUM GROW

ROSEFOOD 8-10-8

With Chelated Micronutrients & Soil Penetrant Water Soluble Concentrate

Guaranteed Analysis

Total Nitrogen (N)	8%
5.8% Ammonium Nitrogen	
1.2% Nitrate Nitrogen	
1.0% Urea Nitrogen	
Available Phosphoric Acid (P_2O_5)	10%
Soluble Potash (K_2O)	8%
Magnesium (Mg)	1.5%
Sulfur (S) combined	8%
Copper (Cu)	0.06%
0.06% Chelated Copper	
Iron (Fe)	0.11%
0.11% Chelated Iron	
Manganese (Mn)	0.11%
0.11% Chelated Manganese	
Molybdenum (Mo)	0.058%
Zinc (Zn)	0.05%
0.05% Chelated Zinc	

Derived from Ammonium Phosphate, Potassium Nitrate, Potassium Sulfate, Potassium Phosphate, Magnesium Nitrate, Magnesium Sulfate, Copper EDTA, Iron EDTA, Manganese EDTA, Ammonium Molybdate, and Zinc EDTA.

ALSO CONTAINS NON-PLANT FOOD INGREDIENT:

0.05% Alkylphenoxypolyethoxyethanol
(Soil Penetrant)

SPECIAL FORMULA FOR ROSES

A complete one-step water soluble concentrated plant food especially formulated to meet the comprehensive nutritional demands

Natural Sources of Fertilizers

1. Bone Meal – 20-30% P_2O_5
2. Dried Blood – 12% organic N
3. Cottonseed Meal – 6:2:1
4. Fish Scraps – 9:7:1
5. Guanos – 12:11:2
6. Manures – 0.5:0.3:0.4
7. Humus – end of composting
8. Peat (Muck) – moisture retention
9. Sewage Sludge – 5:3:2
10. Tankage – 7:10:0

Organic Matter

- Litter - Un-decayed leaves
- Duff – Partially decayed leaves
- Leaf Mold – Duff + fungal
- Humus – Resistant to further decomposition

Chemical Sources of Fertilizers

1. Ammonium Nitrate NH_4NO_3 – 33% N
2. Ammonium Phosphate $NH_4H_2PO_4$ with an N:P:K of 10:53:0
3. Ammonium Sulfate $(NH_4)_2SO_4$ – 20% N
4. Calcium Nitrate $Ca(NO_3)_2.4H_2O$ – 15:15:0
5. Chelates – EDTA makes available
6. Dolomite – $(MgCO_3.CaCO_3)$
7. Gypsum $(CaSO_4.2H_2O)$

Chemical Sources of Fertilizers

1. Limestone Ca/Mg to reduce soil acidity
2. Magnesium Sulfate $MgSO_4.7H_2O$)
3. Potassium Phosphate KH_2PO_4
4. Potassium Nitrate KNO_3 12:0:44
5. Potassium Sulfate 0:0:48
6. Sodium Nitrate (Saltpeter) $NaNO_3$
7. Urea $[CO(NH_2)_2]$ 42:0:0

Nitrogen Fixation

Amino Acids $\rightarrow$ NH_4^+ **(ammonium ion)**

(*many bacteria*) ↓ **(*Nitrosococcus*)**

(*Nitrosomonas*)

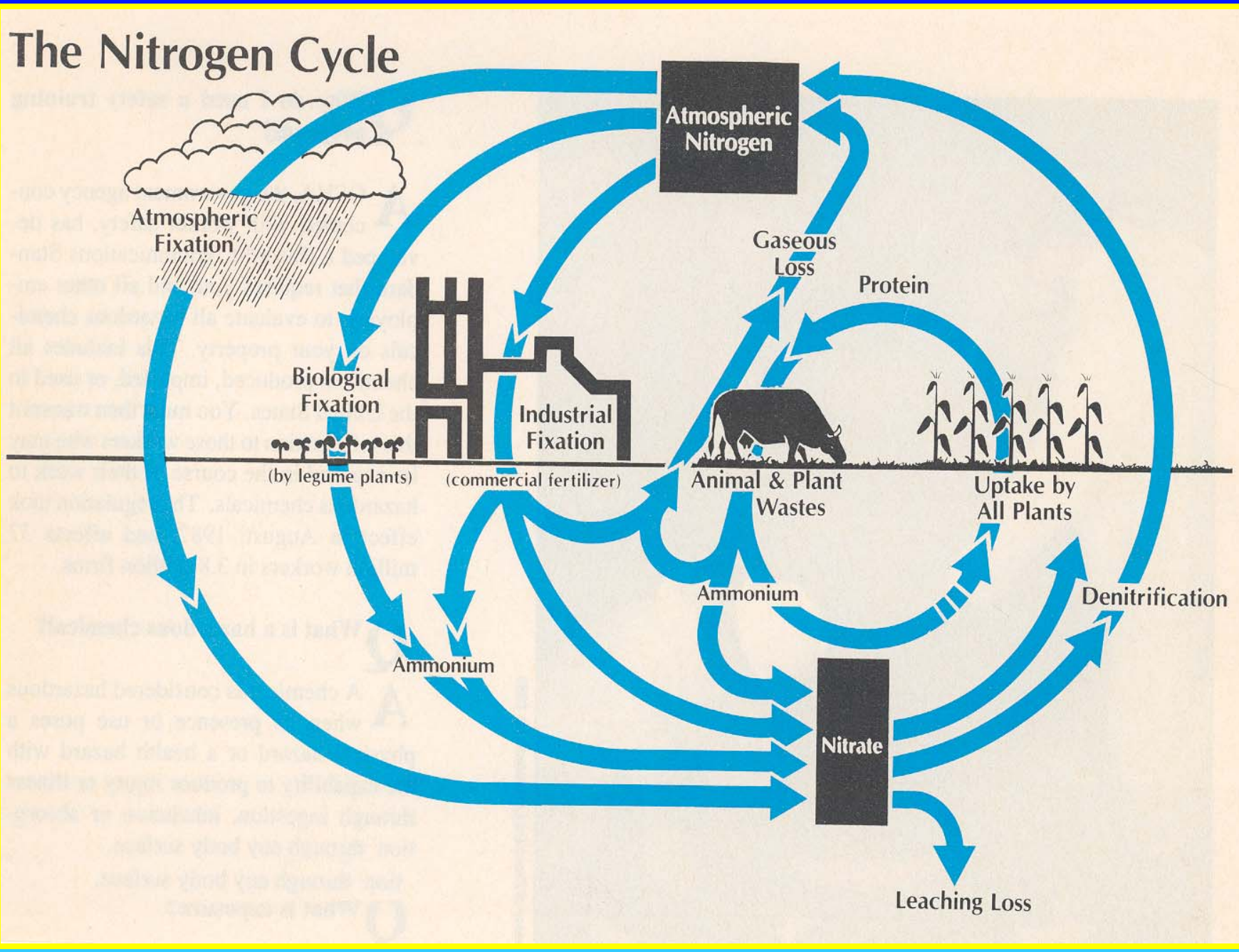
NO_2^-

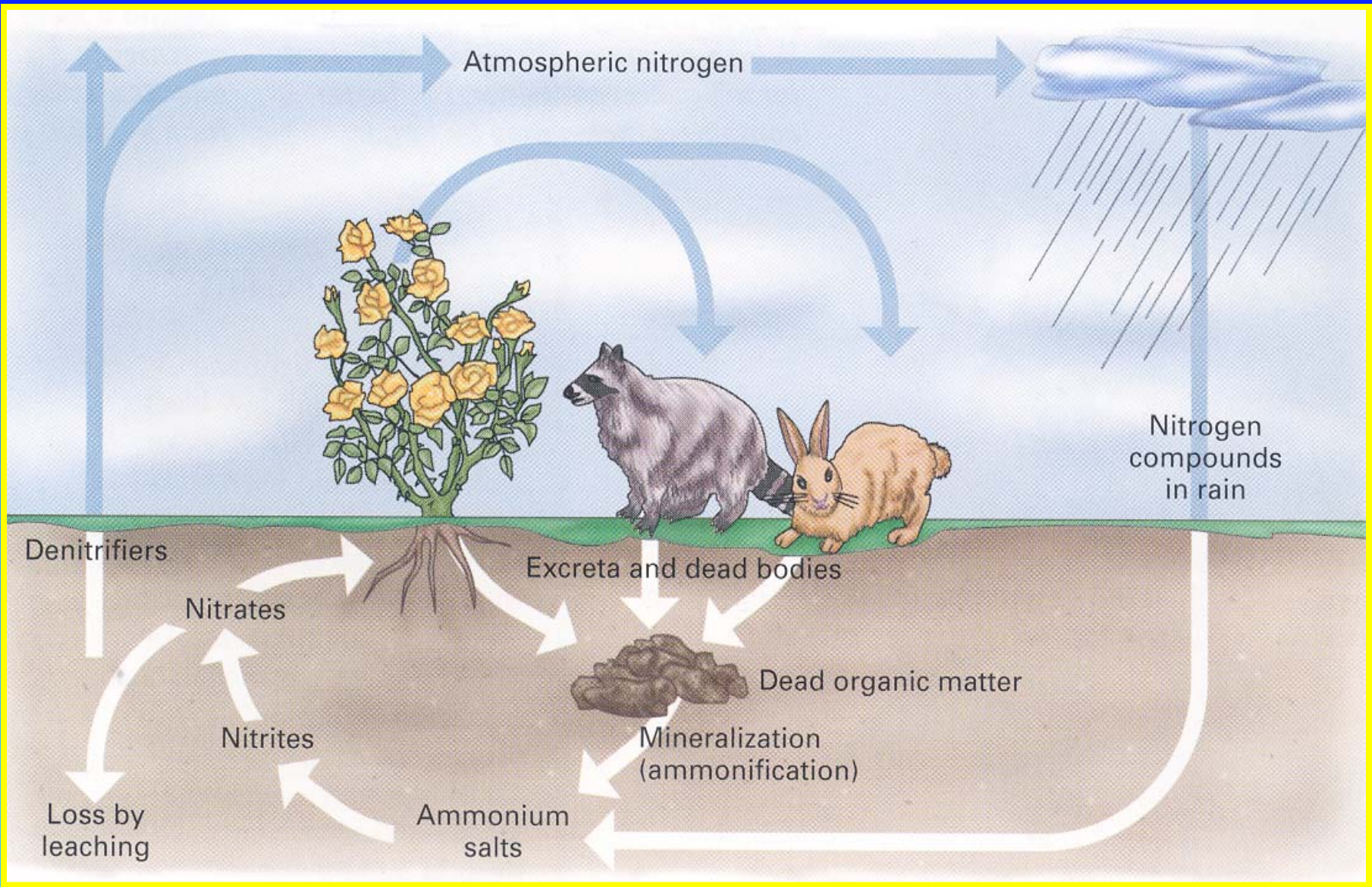
(Nitrite ion)

↓ **(Nitrobacter)**

NO_3^-

(Nitrate ion)


The Nitrogen Cycle
Atmospheric Nitrogen
Atmospheric Fixation
Gaseous Loss
Protein
Biological Fixation
(by legume plants)
Industrial Fixation
(commercial fertilizer)
Animal & Plant Wastes
Uptake by All Plants
Ammonium
Denitrification
Ammonium
Nitrate
Leaching Loss


Atmospheric nitrogen
Nitrogen compounds in rain
Denitrifiers
Excreta and dead bodies
Nitrates
Dead organic matter
Nitrites
Mineralization (ammonification)
Loss by leaching
Ammonium salts

Pesticide Chemistry

Pesticides

The word comes from the Latin cida, "to kill", and pestis, for "plague", which is exactly what it means – pesticides are substances used to kill or control unwanted insects, plants, fungi, mites, rodents, bacteria, or other pests!

Pesticides

Categories

Insecticides against insects

Fungicides against fungi

Acaricides against mites

Herbicides against weeds

Crown Gall is caused by bacteriums
Rose Mosaic Virus is caused by a viral infection

Pesticides

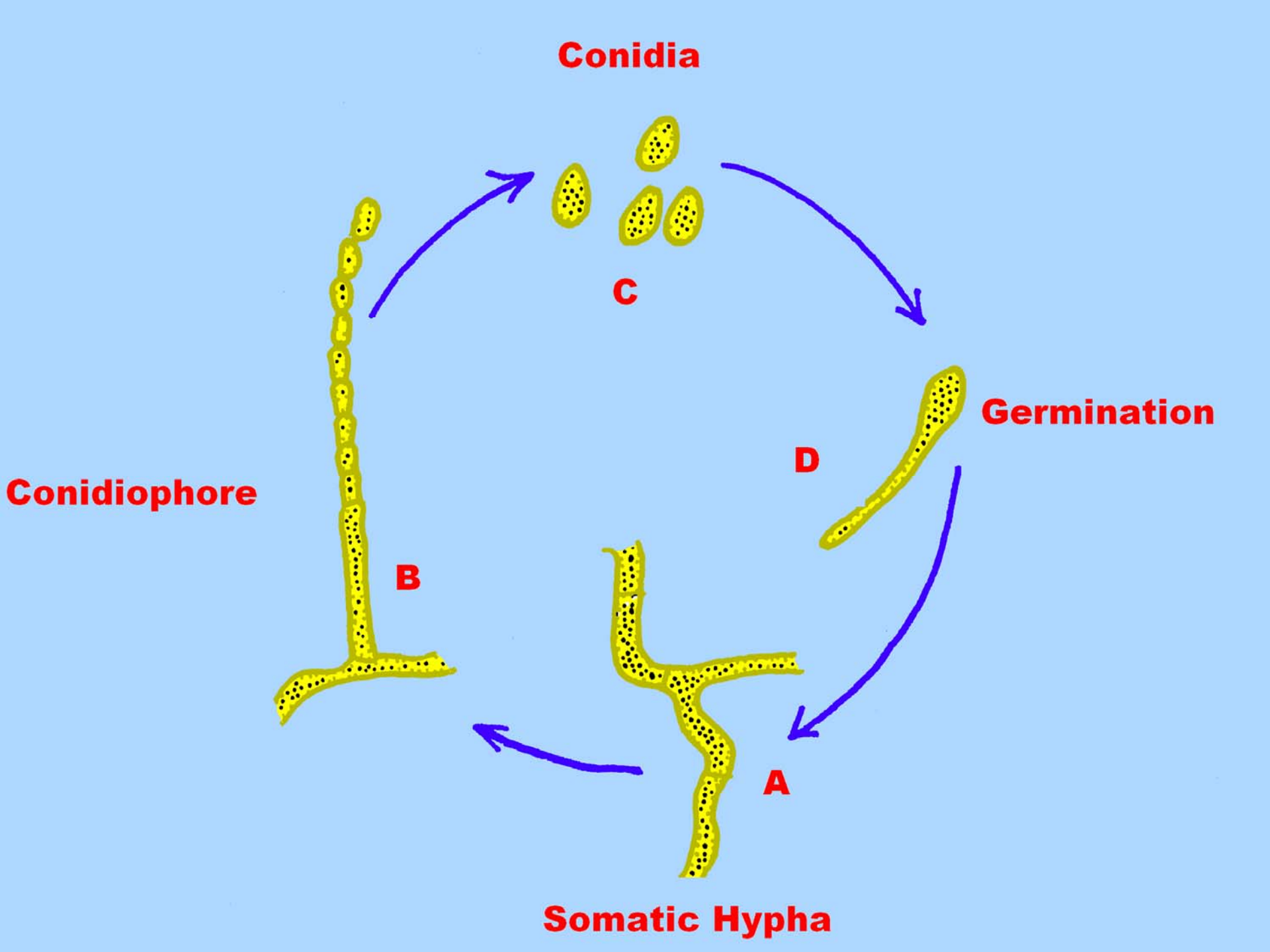
- **Modes of Action of Fungicides**

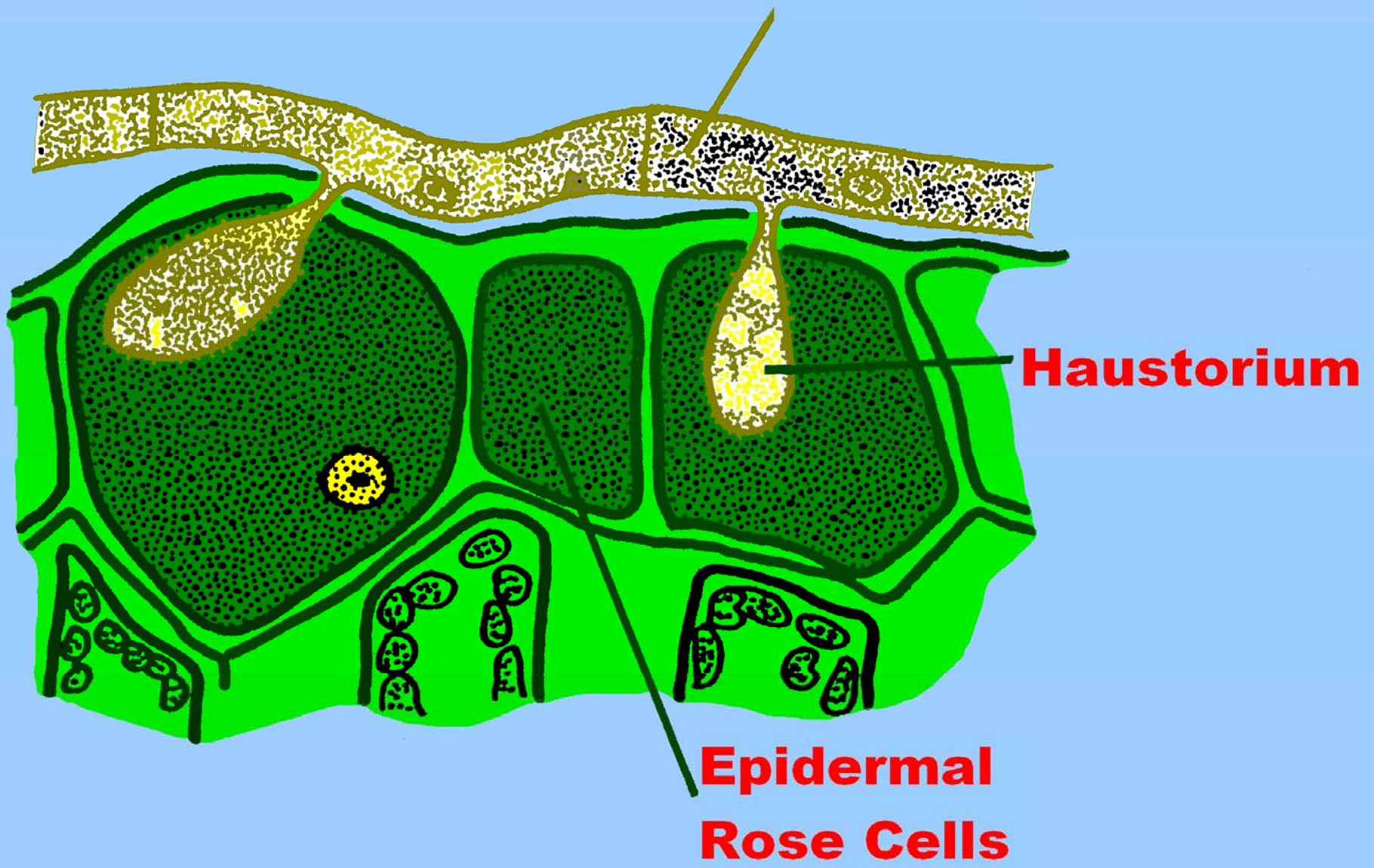
Protectants

Contact

Eradicants

Systemic


Conidia
C
Germination
D
Conidiophore
B
A
Somatic Hypha


Somatic
Hypha
Haustorium
Epidermal
Rose Cells

Preventive Control of Fungi

- Application of “Volck Oil”, “Lime & Sulfur” & “Copper” immediately after pruning
- Destroy all foliage
- No composting please
- Repeat within 7 days


ORTHO
VOLCK OIL SPRAY
DORMANT SEASON
INSECT KILLER
Concentrate
Kills over-wintering insects and their eggs
For Home Use Only
KEEP OUT OF REACH OF CHILDREN
CAUTION
NET 16 FL OZ (1 PT) 473 mL
6.49
Cooke
KOP-R-SPRAY
CONCENTRATE
A Fungicidal Garden Spray for Control of Powdery Mildew, Blossom Brown Rot, Peach Leaf Curl, Shothole Fungus and Leaf Spot on Listed Fruits, Nuts and Vegetables.
ACTIVE INGREDIENT:
Copper, Metallic (from Copper Ammonium Complex) 8%
INERT INGREDIENTS 92%
Contains 0.784 lbs. Copper per gallon.
Keep out of reach of children
CAUTION
NET CONTENTS
1 QT. (946 ml)
SEEDS NURSERY
$ 11.99
6.99
Year Around Disease Control
Lilly Miller
POLYSUL Summer & DORMANT SPRAY
CONCENTRATE
Protects roses, fruit trees and ornamental shrubs
Controls powdery mildew, peach leaf curl, rust, brown rot, and certain other plant diseases
ACTIVE INGREDIENT:
INERT INGREDIENTS ... 71.3%
Lime-Sulfur Fungicide
NET CONTENTS
1 PINT (473 ml)
Keep out of reach of children
DANGER

Controlling Growth Factors for Powdery Mildew

- Temperature & Humidity
- Creation of Micro-Humidity
- Watering Practices
- Proper maintenance
- Importance of sulfur
- Appropriate use of fungicides

Pesticide Control of PM

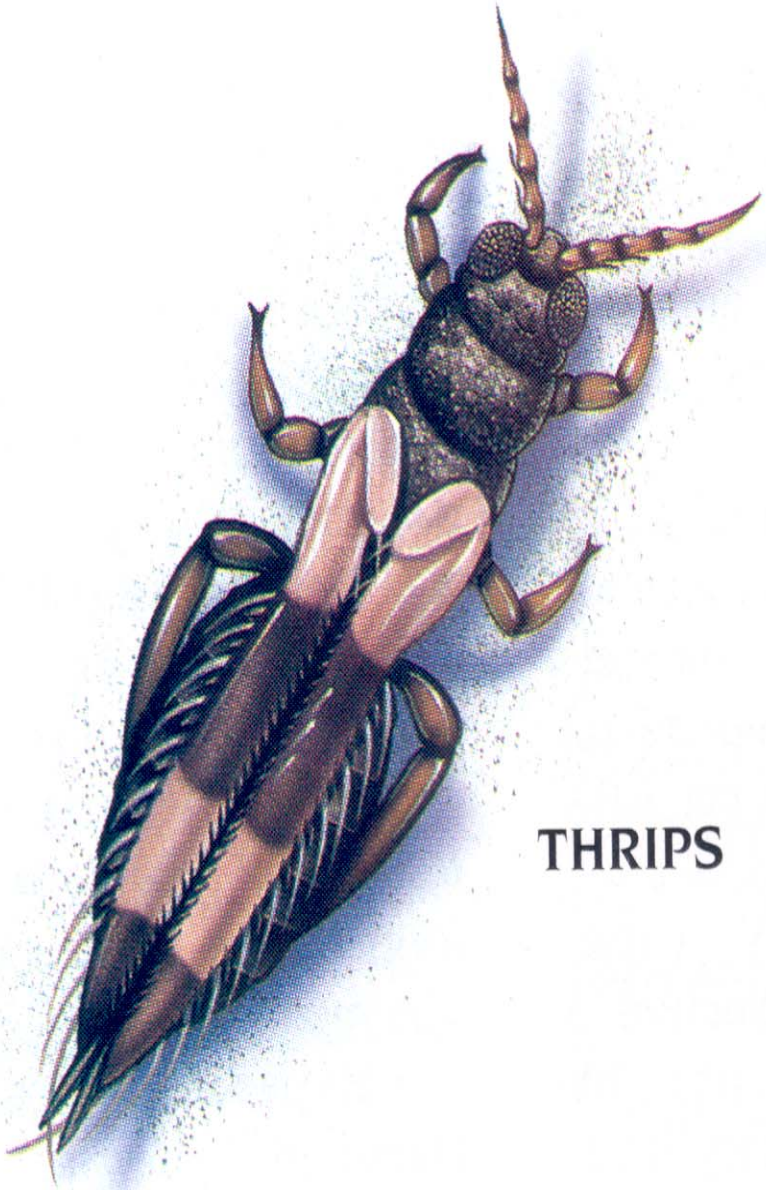
- Ability to recognize the right climatic conditions most likely for infection to occur
- Regular application of low toxicity fungicide can provide some preventive control
- More toxic chemicals required to regain full control before returning to regular low toxicity pesticides

Fungicides

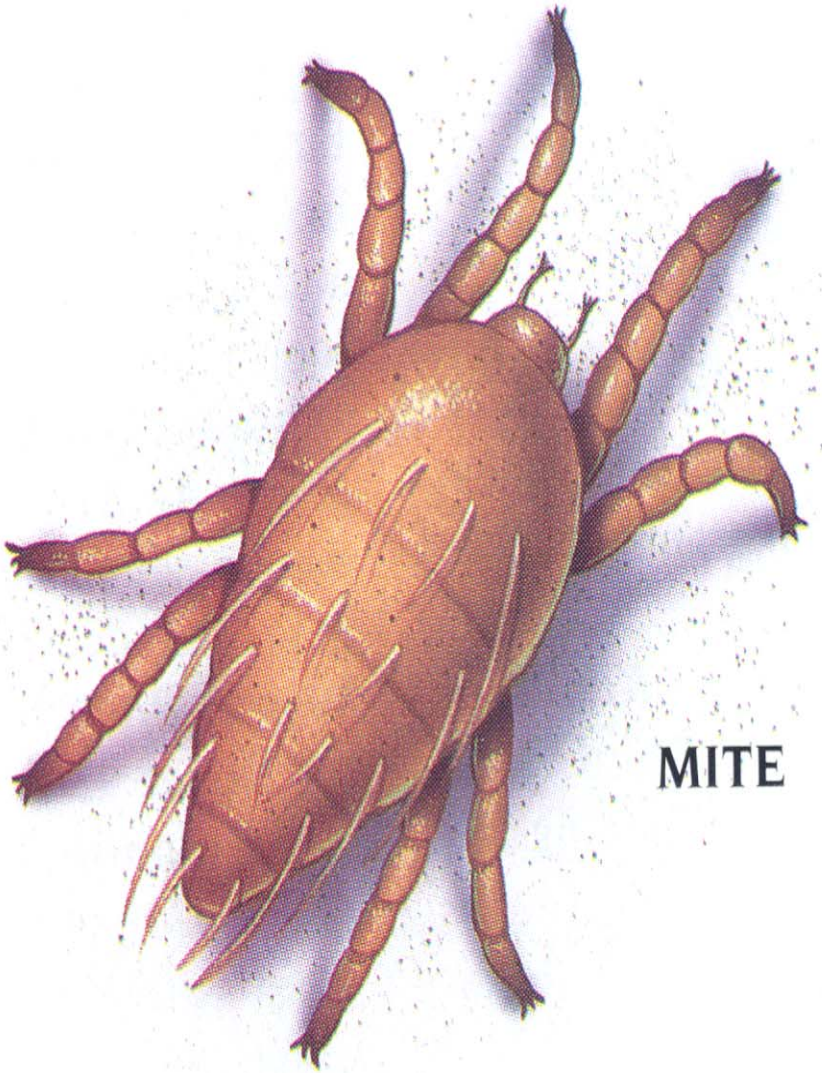
- BannerMax
- Bayleton/Strike
- Benomyl/Benlate
- Captan
- Compass
- Daconil/Bravo
- Eagle/Rally/Immunox
- Fore/Manzate
- Funginex/Triforine
- Rubigan


PULL HERE TO OPEN
Banner MAXX
FUNGICIDE
Broad spectrum and systemic disease control for turf and ornamentals
Active Ingredient:
Propiconazole (CAS No. 60207-90-1) 14.3%
Other Ingredients: 85.7%
Total: 100.0%
Banner MAXX contains a nominal 1.3 pounds of active ingredient per gallon
KEEP OUT OF REACH OF CHILDREN.
WARNING/AVISO
Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)
See additional precautionary statements and directions for use inside booklet.
EPA Reg. No. 100-741
EPA Est. 4-NY-1
Product of Switzerland
Formulated in the USA
ONE PINT
U.S. Standard Measure
NCP 741B-M4A 1199
NOVARTIS
PULL HERE TO OPEN
Compass™
FUNGICIDE
For control of certain foliar, stem, and root diseases of turfgrass including golf courses, institutional, commercial and residential lawns, sod farms, sports fields, parks, municipal grounds and cemeteries, and of ornamentals grown in interiorscapes, field nursery plantings, forest nurseries, residential and commercial landscapes, greenhouses, lath and shade houses, containers, and other enclosed structures.
Active Ingredient:
Trifloxystrobin (CAS No. 141517-21-7) . . 50.0%
Other Ingredients: 50.0%
Total: 100.0%
Compass is a water-dispersible granule.
Made in Switzerland
KEEP OUT OF REACH OF CHILDREN.
CAUTION
See additional precautionary statements and directions for use inside booklet.
EPA Reg. No. 100-920
EPA Est. 67545-AZ-1
NCP 920A-L2A 0799
For Professional Use Only.
8 OUNCES U.S. Standard Measure
NOVARTIS


DCWG6171
SePRO
Decree
50 WDG Fungicide
For Use in Water as a Spray for Control of Botrytis cinerea Diseases of Ornamentals.
FOR ORNAMENTAL HORTICULTURAL USE ONLY
Not For Residential Use
INGREDIENTS
ACTIVE INGREDIENT:
Fenhexamid* 50.0%
INERT INGREDIENTS: 50.0%
Total 100.0%
*N-(2,3-dichloro-4-hydroxyphenyl)-1-methyl-cyclohexane carboxamide
KEEP OUT OF REACH OF CHILDREN
CAUTION
See back panel for precautionary statements.
EPA Registration No. 66330-35-67690
EPA Establishment No. 70989-AR-01
Decree is a registered trademark of Tomen Corporation
MANUFACTURED FOR:
SePRO Corporation • Carmel, IN 46032 U.S.A.
SC-50-0301



THRIPS



MITE

Pesticides

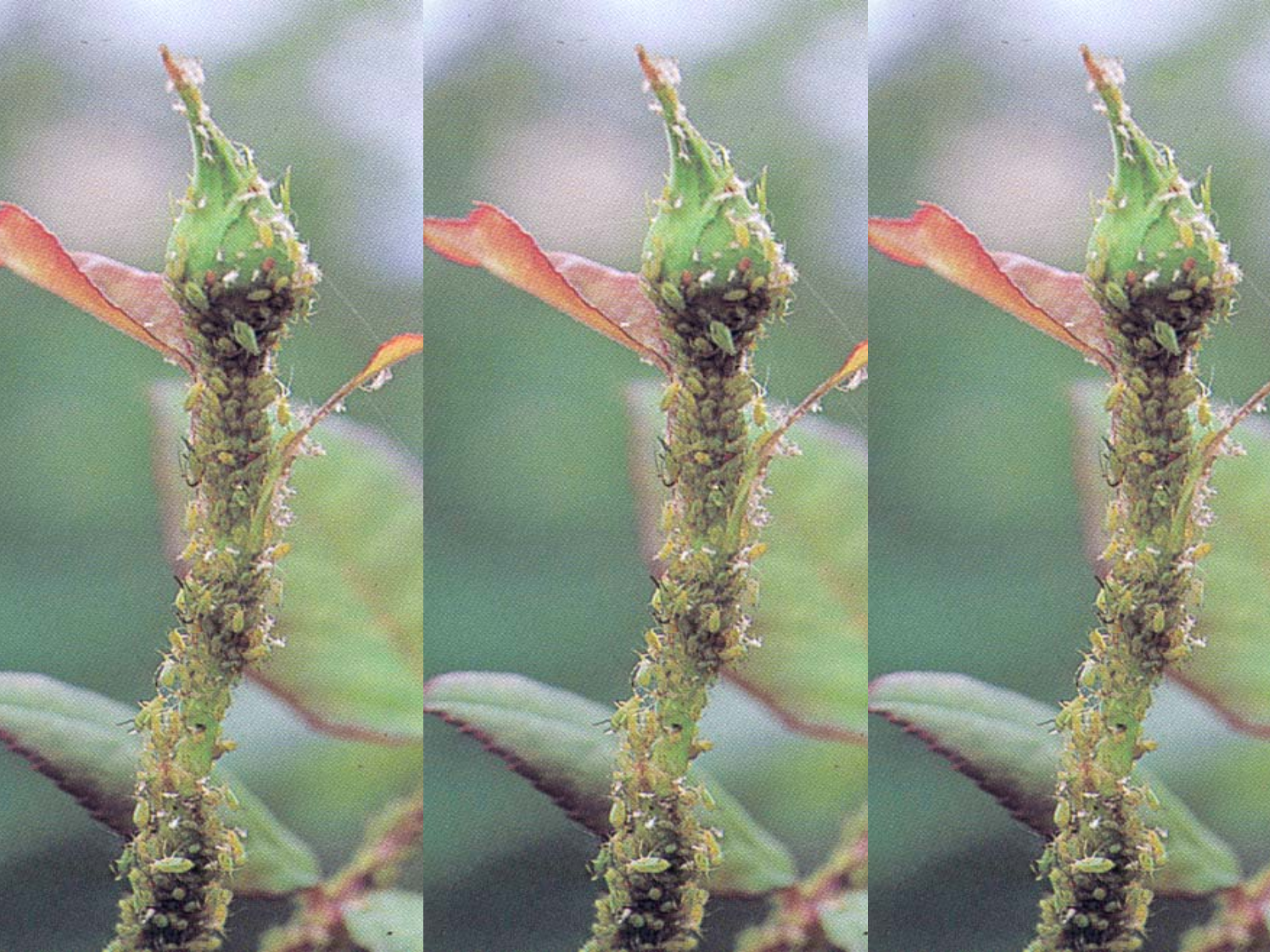
- **Modes of Action of Insecticides**
  - **Stomach**
  - **Contact**
  - **Residual Contact**
  - **Fumigant**
  - **Repellent**
  - **Systemic**

Chemical Insecticides

- Diazonin
- Dursban
- Isotox
- Malathion
- Mavrik Aquaflow
- Orthene
- Sevin

Organic Insecticides

- Azatin EC
- BioNeem
- Margosan
- Safer Insecticdal Soap
- Sunspray Oil



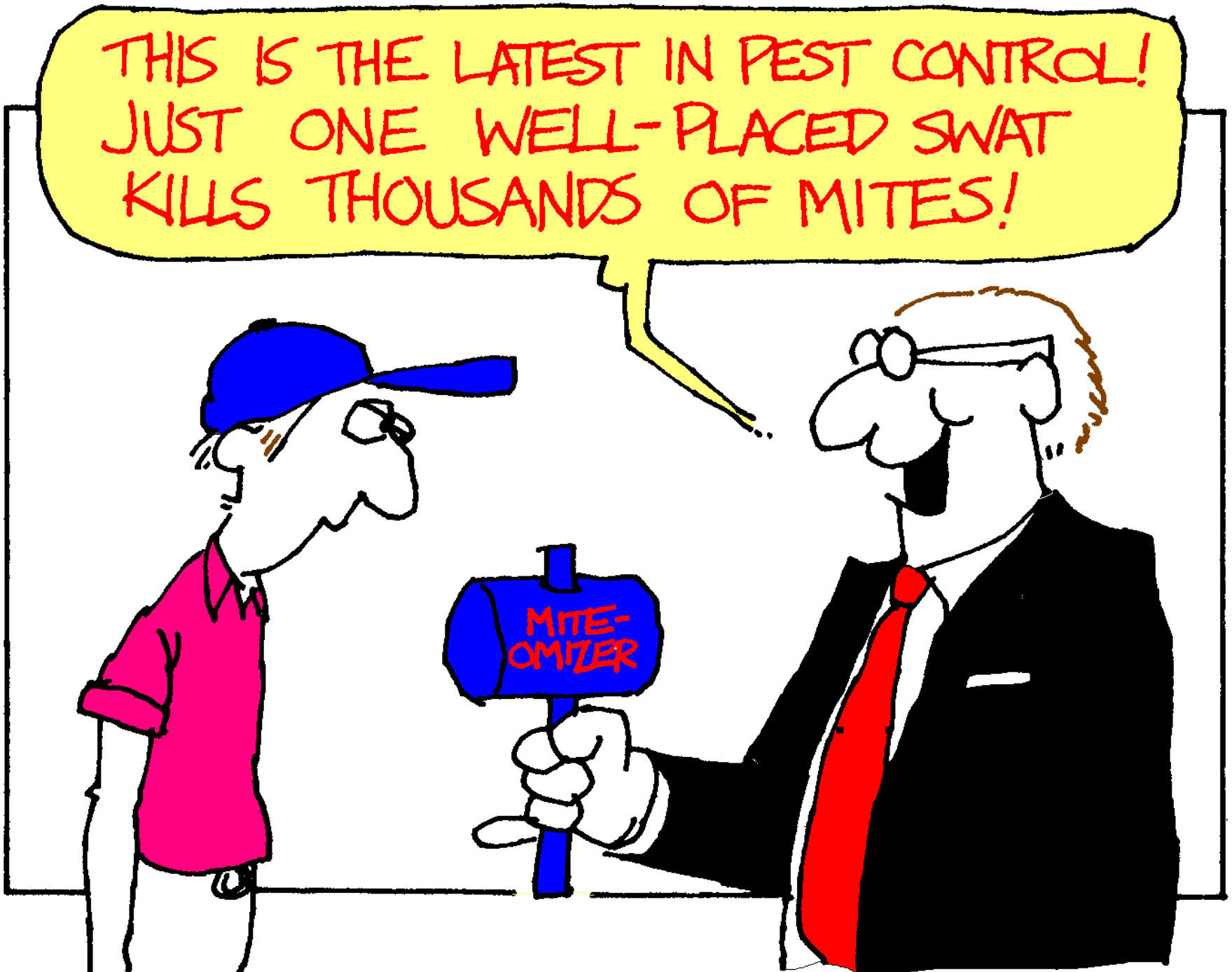
ORTHO®
ORTHENEX®
GARDEN INSECT & DISEASE CONTROL
AMERICAN ROSE SOCIETY ENDORSED
Concentrate
Systemic Protection from Insects, Diseases & Mites
KEEP OUT OF REACH OF CHILDREN
DANGER See back panel booklet for additional precautionary statements.
OUTDOOR USE ONLY
NET 16 FL OZ (1 PT) 473 mL

Miticides

- Avid
- Vendex
- Floramite
- Hexygon


PULL HERE TO OPEN
Avid® 0.15EC
MITICIDE/INSECTICIDE
For Control of Leafminers and Mites and Suppression of Aphids, Whiteflies, and Thrips on Ornamental Plants
Recommended for Agricultural/Commercial Use
Active Ingredient:
Abamectin (CAS No. 65195-55-3 and 65195-55-3) . . . 2.0%*
Other Ingredients: 98.0%
Total: 100.0%
*1 gal. contains 0.15 lb. abamectin
KEEP OUT OF REACH OF CHILDREN.
WARNING/AVISO
Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)
See additional precautionary statements and directions for use inside booklet.
EPA Reg. No. 100-896
EPA Est. 39578-TX-001
NCP 896A-L2B 0800
8 OUNCES
U.S. Standard Measure
NOVARTIS
NET CONTENTS:
250 ml
LIQUID CONTROLLED RELEASE CONCENTRATE
STIRRUP M
EPA Est. No. 53871-AZ-01
EPA Reg. No. 53871-2
CAUTION
Keep Out of Reach of Children
Behavior Modifying Biochemical used in combination with miticides in the suppression of tetranychid mites.
See side panel for other precautionary statements and statement of practical treatment.
U.S. Patent No. 4,775,534
ACTIVE INGREDIENTS
3,7,11-trimethyl-2,6,10-dodecatriene-1-ol . . . 0.972%
3,7,11-trimethyl-1,6,10-dodecatriene-3-ol . . . 0.788%
INERT INGREDIENTS: (Release Agents) 98.24%
100.00%
MFD. BY: TROY BIOSCIENCES, INC • 2620 N. 37 TH DR. • PHX., AZ 85009
LOT#M104101K
PART # 80185


Floramite™
ORNAMENTAL MITICIDE IN WATER SOLUBLE BAGS
COMPOSITION
Active Ingredient: (% by weight)
Bifenazate: Hydrazine carboxylic acid,
2-(4-methoxy-[1, 1-biphenyl]-3-yl)
1-methylethyl ester 50%
Inert Ingredients: 50%
Total: 100%
KEEP OUT OF REACH OF CHILDREN
CAUTION
UNIROYAL CHEMICAL
Uniroyal Chemical Company, Inc.
Middlebury, CT 06749
Ovicide/Miticide
Hexygon
50-WP
RECOMMENDED FOR COMMERCIAL ORNAMENTAL USE
KEEP OUT OF REACH OF CHILDREN
CAUTION
Compass
FUNGICIDE
KEEP OUT OF REACH OF CHILDREN
CAUTION
8 OUNCES
NOVARTIS


THIS IS THE LATEST IN PEST CONTROL! JUST ONE WELL-PLACED SWAT KILLS THOUSANDS OF MITES!
MITE-OMIZER

Pesticides

- **Modes of Action of Herbicides**
  - **Pre-planting**
  - **Pre-emergence**
  - **Post-emergence**
  - **Sterilant**

Pesticides

- **Formulations**

Dusts

Granules

Wettable Powder

Solutions

Emulsifiable Concentrates

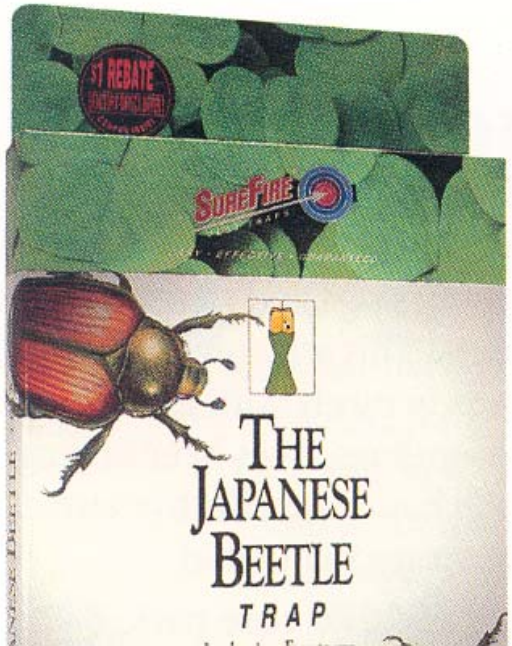
EPA Labeling
Toxicity Categories by Hazard Indicator

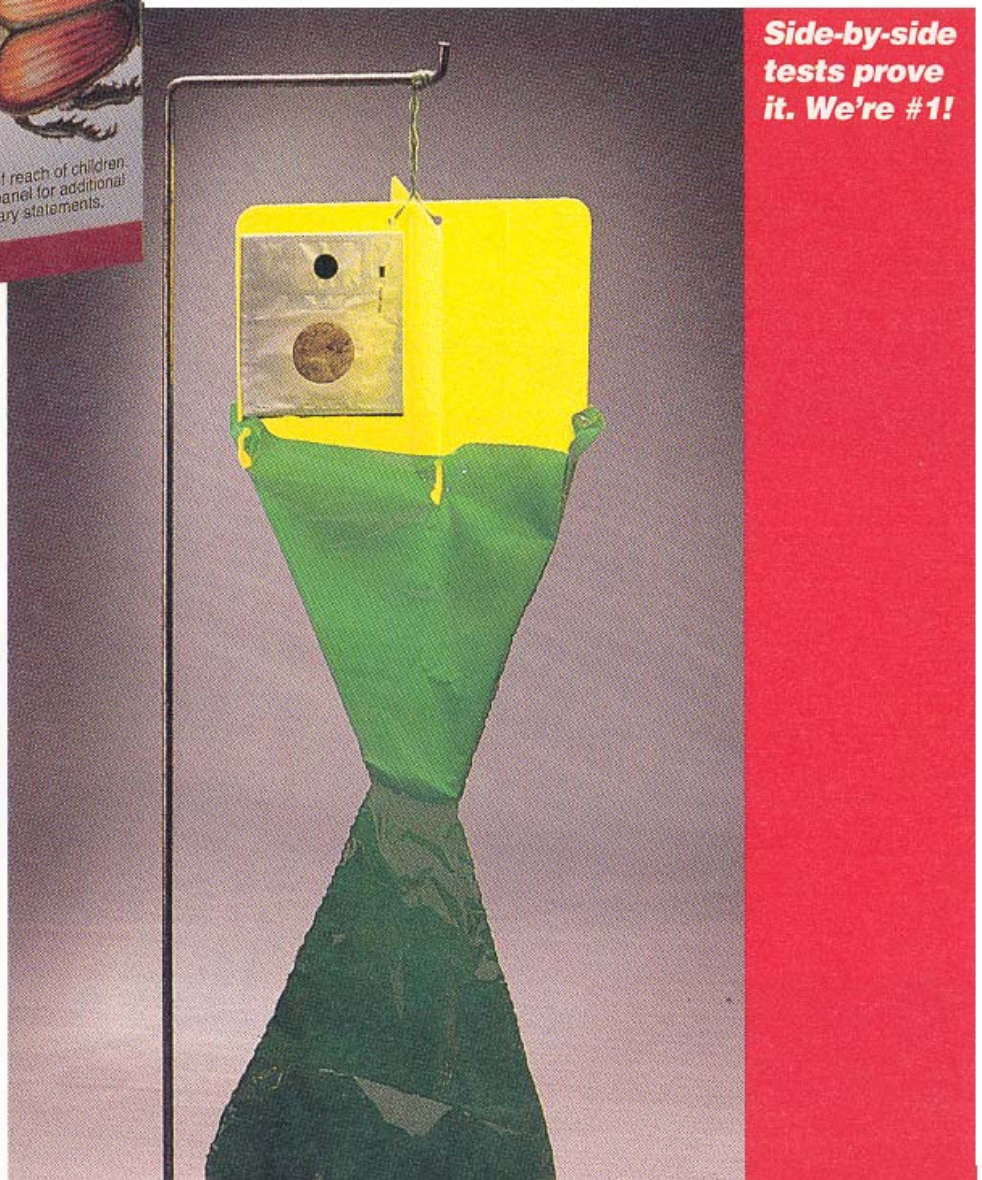
SIGNAL WORDS DISPLAYED ON LABEL

	Class I DANGER Highly Toxic	Class II WARNING Moder. Toxic	Class III CAUTION Slightly Toxic	Class IV CAUTION Toxic
Oral	<50	5-500	500-5000	>5000
Inhalation	<0.2	0.2 - 2.0	2-20	>20
Dermal	<200	200-2000	2000-20,000	>20,000


EASY · EFFECTIVE · GUARANTEED
PESTICIDE FREE!
THE YELLOW JACKET™
TRAP
Safe. Non-toxic.
Stops summer's toughest pest!
No mess. Easy disposal.
Easy to use.
NOW EVEN MORE EFFECTIVE!
APHID/WHITEFLY
GARDEN TRAP FOR FLYING INSECTS
Safe. Non-toxic. Easy to use.
Draws pests like a magnet!
Reusable.
3 TRAPS
SURE FIRE™ PRODUCTS
NEW!
THE PIT™
SLUG & SNAIL TRAP
Ready to use.
Safe. Non-toxic. Pesticide-free.
Attractive design blends with environment.
Reusable.
FOR GOPHERS & RATS!
NO POISONS. NO GASES.
THE BLACKHOLE RODENT™
TRAP
Safe. Non-toxic.
Easy to set. Guaranteed.
Controls gophers, rats and other small rodents.
THE JAPANESE BEETLE
TRAP
#1 REPEAT PACKAGED BEETLE TRAP IN AMERICA
THE JAPANESE BEETLE™
TRAP
Jumbo size. Easy to use.
With patented Biolure® lures.
No sprays. No mess.
CAUTION:
THE PANTRY PEST™
TRAP
Ready to use anywhere!
Attractive wood-grained traps.
Safe. Non-toxic. Long-lasting. Pesticide-free!
Traps grain moths, flour moths, meal moths and seed moths.
ALL NEW!
PESTICIDE FREE!


EASY • EFFECTIVE • GUARANTEED
THE JAPANESE BEETLE
TRAP
Jumbo size. Easy to use.
With patented Biolure® lures.
No sprays. No mess.
CAUTION: Keep out of reach of children. See back panel for additional precautionary statements.


$1 REBATE
SURE FIRE
THE JAPANESE BEETLE
TRAP


Side-by-side tests prove it. We're #1!

Integrated Pest Management

- Plant Selection and good gardening
- Close observation and inspection
- Natural and non-chemical intervention
- Low-toxicity chemical intervention
- Powerful chemical intervention


ORTHO
RosePride
Orthene
Insect & Disease
Protects Against Insects on Roses & Flowers
Controls Insects & Diseases
KEEP OUT OF REACH OF CHILDREN
WARNING
NET WT 14 OZ (396 g)
MAVRIK
AQUAFLOW
Insecticide/Miticide
CAUTION
ORTHO
MAKES 21 GALLONS DILUTED SPRAY
Orthene
Systemic Insect Control
CONCENTRATE
Kills Bugs on Contact
Lasting Protection & Control
Use on Lawns & Over 100 Plant Varieties
KEEP OUT OF REACH OF CHILDREN
WARNING
NET 32 FL OZ (1 QT) 946 mL
Avid
0.15EC
MITICIDE/
INSECTICIDE
KEEP OUT OF REACH OF CHILDREN
WARNING/AVISO
Spectracide
IMMUNOX
Fungicide
KEEP OUT OF REACH OF CHILDREN
CAUTION
NET CONTENTS 1 PT. (473mL)
Banner
MAXX
FUNGICIDE
KEEP OUT OF REACH OF CHILDREN
WARNING/AVISO
ONE PINT
NOVARTIS

Plant Health & Welfare

- Use Fertilizer with Sulfur
- Today's high-analysis grades of NPK, unlike many of the fertilizers used in the 1950s and 1960s, do not contain sulfur


WHITNEY FARMS
100% NATURAL ORGANIC
ROSE & FLOWER FOOD
Ideal for Perennials and All Flowering Plants
4-6-2
Bandini
ROSE FOOD
10-12-10
WITH IRON
A RICH DIET FOR BEAUTIFUL ROSES
MAGNUM Grow
ROSE FOOD
8-10-8
FORMULATED
GrowMore
0-50-30
Bayer
ADVANCED GARDEN
2-in-1 Systemic
Rose & Flower Care
Feeds and protects against insects for 6 weeks
Promotes strong roots and beautiful blooms
Rainproof protection
12-18-6
Miracle-Gro
All Purpose
Plant Food
Osmocote
Vegetable & Bedding
Miracle-Gro
for ROSES
Osmocote
Outdoor & Indoor
MAGNUM Grow
ROSE FOOD
8-10-8
FORMULATED


MASTER NURSERY
Root Master B-1
To prevent transplant shock to plants
CAUTION
NET CONTENTS 1 PINT
MASTER NURSERY
Fish emulsion
5-2-2 Organic Plant Food
Helps plants grow, flower, fruit & stay deep green
NET CONTENTS 1 QUART
NEW!
GROW MORE
GROW • VITE
FAST ACTING LIQUID FERTILIZER
16-4-2
WITH SOIL PENETRATING ACTION
FOR: GRASS & DICHONDRA LAWNS, FLOWERS, VEGETABLES & TREES
GROWMORE
SEAWEED EXTRACT
Liquified Organic Kelp
COLD WATER PROCESSED
PROMOTES PLANT GROWTH & VIGOROUS ROOT SYSTEM
FOLIAR FEED ROOT DIP SOIL DRENCH
16 FL.OZ. (1 Pint)
SUPERthrive
VITAMINS-HORMONES
EXTRA LIFE
World CHAMPION
GROW MORE
Jump Start
Plant Tonic
• Helps Plants Thrive
• Vitamins & Minerals
• Super Concentrate
16 OZ


GROW MORE
MAGNUM
Grow
ROSE FOOD
8-10-8
Water Soluble Concentrate
FORMULATED
FOR ALL TYPES OF ROSES
Feeds Through Leaves and Roots
NET WT. 4.5 LBS. (2.045 Kgs.)
With Chelated Micronutrients and Soil Penetrant


COOL SHAKER BAG! Applies Evenly.
STOPS WEEDS
A Pre-emergent Herbicide
Concern
Weed Prevention Plus
100% Natural Corn Gluten Pre-emergent Herbicide
Provides pre-emergent control of dandelions, crabgrass and other common lawn and garden weeds.
For use around roses, flowers, bulbs, vegetables, trees, shrubs & on lawns.
Safe for people, pets & wildlife
Net Wt. 5 lbs (2.26 kg)
PREVENTS WEEDS
Preen
GARDENS & BEDS
around flowers, bulbs, roses, shrubs, trees & vegetables.
Effective Weed Control
Easy to Apply
Handy Built-in Applicator
CAUTION
PRE-SEEDER
weeder
GRANULAR
PREVENTS WEEDS
KEEP OUT OF REACH OF CHILDREN
CAUTION
PRE-SEEDER
weeder
GRANULAR
PREVENTS WEEDS
KEEP OUT OF REACH OF CHILDREN
CAUTION
Net Weight: 1lb.
RAIN-PROOF IN TWO HOURS
Kills The Root
Roundup
WEED & GRASS KILLER
Concentrate

Pesticides

Good Spray Practices

- Spray top and undersides of foliage
- Water plants beforehand
- Stick with recommended concentration
- Tend to spray on cool mornings

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

SHAKE WELL

FOR BEST RESULTS

HOW TO APPLY

- Adjust spray nozzle to deliver a fine spray.
- Hold sprayer 12 inches from plant. Spray to uniformly cover upper and lower leaf surfaces, stems, and branches. When treating potted plants lightly spray the soil surface.

WHEN TO APPLY

- Spray when air is calm to avoid drift.
- Apply as necessary, waiting 7 to 14 days between each application. Hard to kill insects may require 2 to 3 applications.
- If temperature is expected to exceed 85° F, spray in early morning or late afternoon when it is cooler.

INSECTS CONTROLLED

Ants, aphids, armyworms, bagworms, black vine weevils, budworms, cabbage loopers, cankerworms, casebearers, catalpa sphinx moths, caterpillars, cherry laurel leaftiers, crane flies, elm leaf beetles, fungus gnats, grasshoppers, greenbugs, green striped mapleworms, gypsy moths, hornworms, Japanese beetles, lacebugs, leafhoppers, leafminers, leafrollers, omnivorous leaftiers, maple shoot moths, mealybugs, mimosa webworms, mites (including spider mites), oak webworm, orange striped oakworms, poplar tentmakers, rose midges, sawflies, scales (crawlers), sod webworms, sowbugs, spittlebugs, spiders, sunflower moths, tent caterpillars, thrips, tip moths, webworms, weevils, willow leafbeetles and whiteflies

People and pets may enter treated area after spray has dried

STORAGE AND DISPOSAL

STORAGE: Rotate nozzle to closed position. Store product in original container in a safe place. Keep from freezing.

DISPOSAL: Do not reuse container. Securely wrap partially filled or empty container in newspaper and put in trash.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS & DOMESTIC ANIMALS

CAUTION: Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling.

FIRST AID: IF IN EYES: Flush eyes with plenty of water. Call a physician if irritation persists. **Note to Physician:** Emergency Information call 1-800-225-2883.

ENVIRONMENTAL HAZARDS: This pesticide is extremely toxic to fish and aquatic invertebrates. Do not apply directly to water. Drift and run-off from treated areas may be hazardous to aquatic organisms in neighboring areas. Care should be used when spraying to avoid fish and reptile pets in/around ornamental ponds.

This product is highly toxic to bees exposed to direct treatment or residues on blooming plants. Do not apply this product or allow it to drift to blooming plants if bees are visiting the treatment area.

NOTICE: Buyer assumes all responsibility for safety and use not in accordance with directions.

Questions, Comments or Medical Information
call 1-800-225-2883 **www.ortho.com**

PRESS TO RESEAL

Manufactured for
The ORTHO Group
P.O. Box 1749 Columbus, OH 43216
Made in USA

Form 008900
EPA Reg. No. 239-2668
EPA Est. 239-IA-3[1], 56100-LA-1[G]
Superscript is first letter of lot number

Common Sense Logic with Pesticides

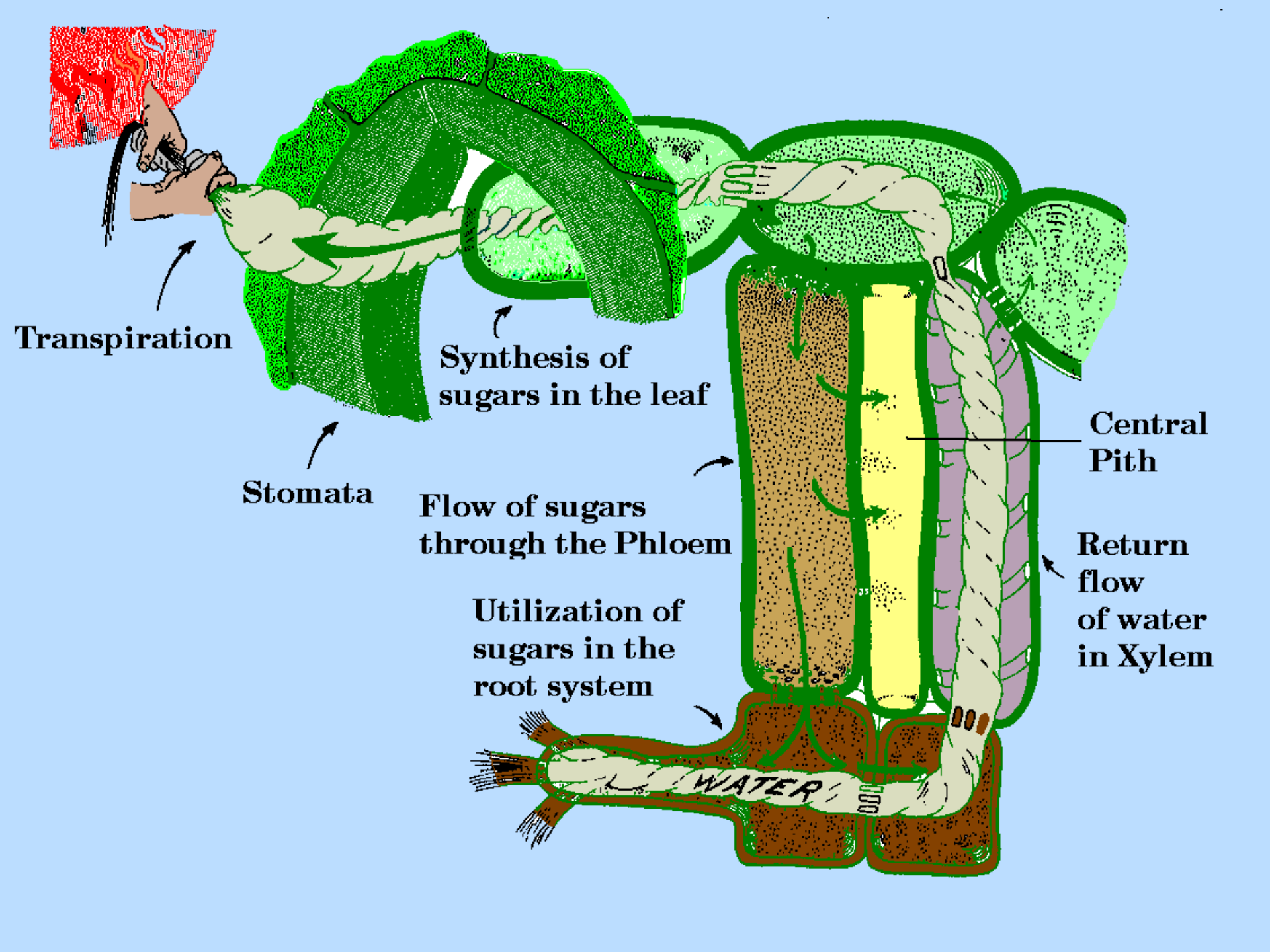
- Use fungicides on a regular basis to prevent outbreaks
- Never increase dose
- Use insecticides only when insects become a major problem
- Use the least toxic product first
- Give biological methods a try
- Respect Nature always

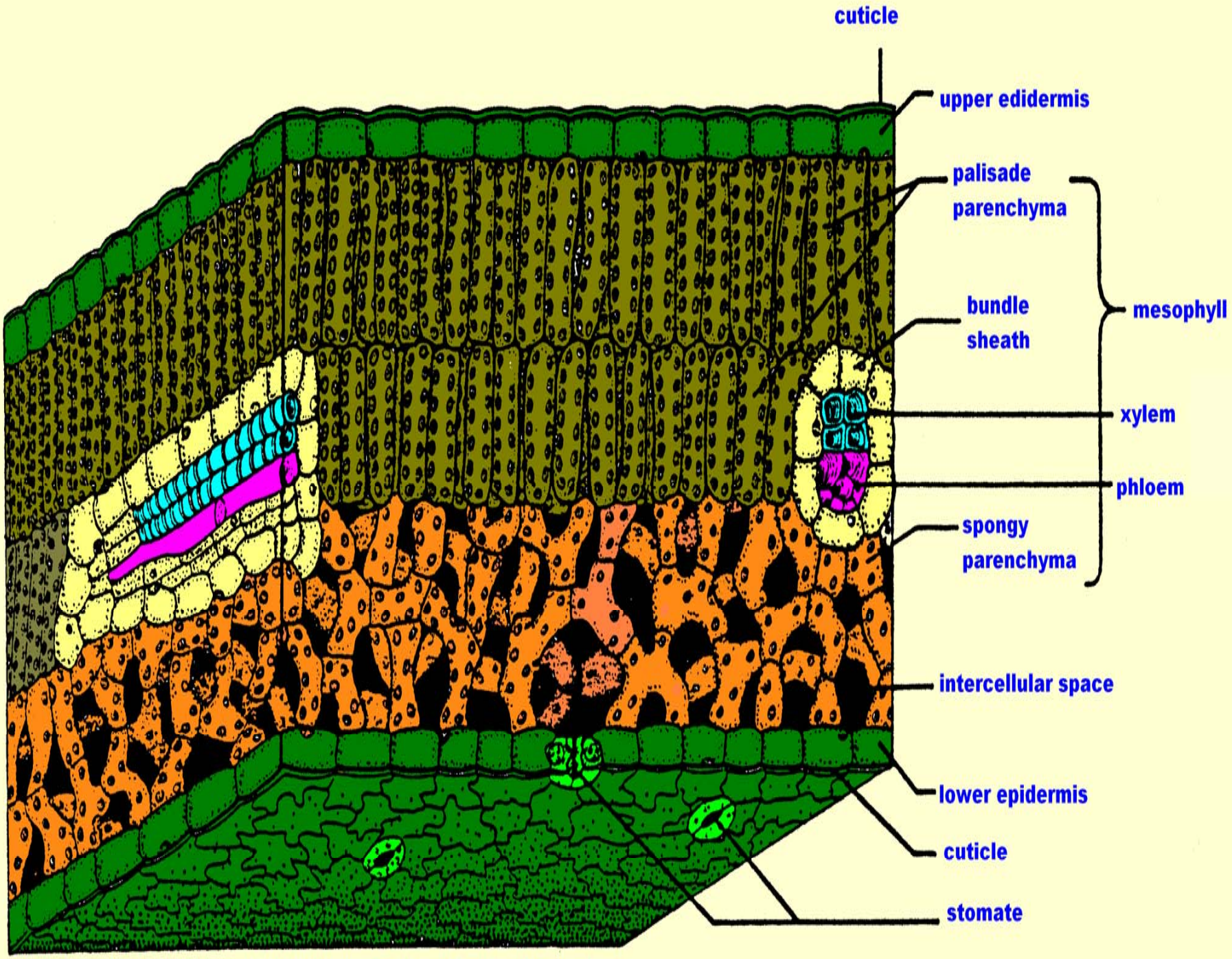
Pesticides

Precautions

- Keep in original containers
- Wearing rubber gloves for mixing and spraying
- Washing hands and face immediately afterwards
- Wash clothes to decontaminate

The Importance of Water


Transpiration
Synthesis of sugars in the leaf
Stomata
Central Pith
Flow of sugars through the Phloem
Return flow of water in Xylem
Utilization of sugars in the root system
WATER


cuticle
upper edidermis
palisade
parenchyma
bundle
sheath
mesophyll
xylem
phloem
spongy
parenchyma
intercellular space
lower epidermis
cuticle
stomate

Myths & Legends

Questions to ask when assessing scientific objectivity & credibility of popular literature

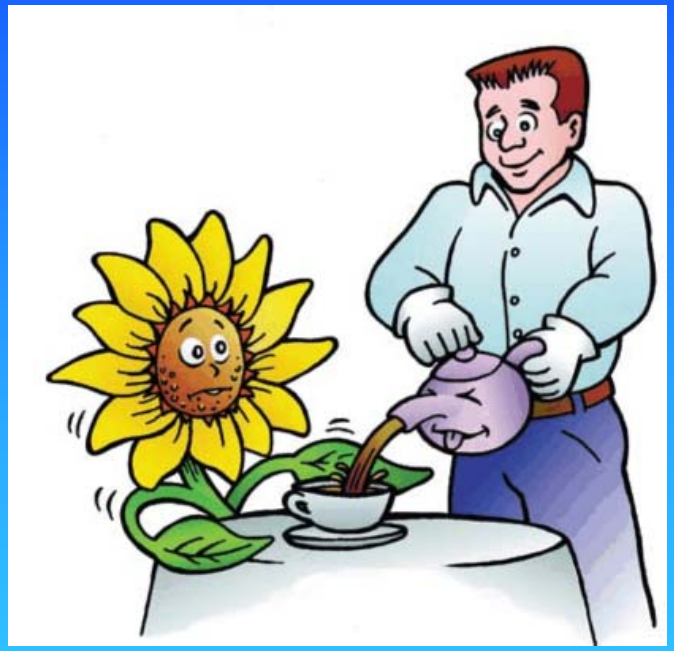
- *Does the author have legitimate ties to a mainstream academic or scientific institution?*
- *Does the article refain fom attempts to sell a product?*
- *Does the article present verifiable information?*
- *Does the article appeal to reason rather than emotion?*
- *If the answers to these questions are "yes," then the likelihood is high that the information is objective and credible.*

Does baking soda kill fungi?

- Researchers in the early 1930s discovered that sodium bicarbonate (SBC) solutions created pH conditions hostile to the growth of blue and green citrus molds.
- Early researchers thought baking soda was fungicidal (fungi were killed), later studies determined that it is fungistatic (fungi are prevented from growing but are not killed).
- From a practical standpoint, this means that fungal spores will not germinate as long as the pH of their environment is sufficiently alkaline. If and when the environment becomes more acidic, spore germination can resume.

What is Compost Tea?

The historical manufacture and use of compost leachates and extracts is a straightforward, centuries-old practice. Plant and animal wastes were placed into a permeable bag and held in a bucket of water until the water turned black. (It's easy to see how the analogy to tea emerged.)



"Epsom Salts"

Does it really grow great looking roses

With the increased consumer interest in managing gardens and landscapes sustainably, products are likewise being marketed as safe and natural. Epsom salts, also known as magesium sulfate ($MgSO_4$), is touted as "one of the most perfect nutrients for gardens and plants."

Numerous claims are made to its effectiveness in improving uptake of other nutrients, and enhancing growth and overall health. "Tried and true tips" are provided, which include specific formulations for roses.

The Blue Rose

Roses are red,Violets are blue

‘Lavande’

‘Madame Violet’

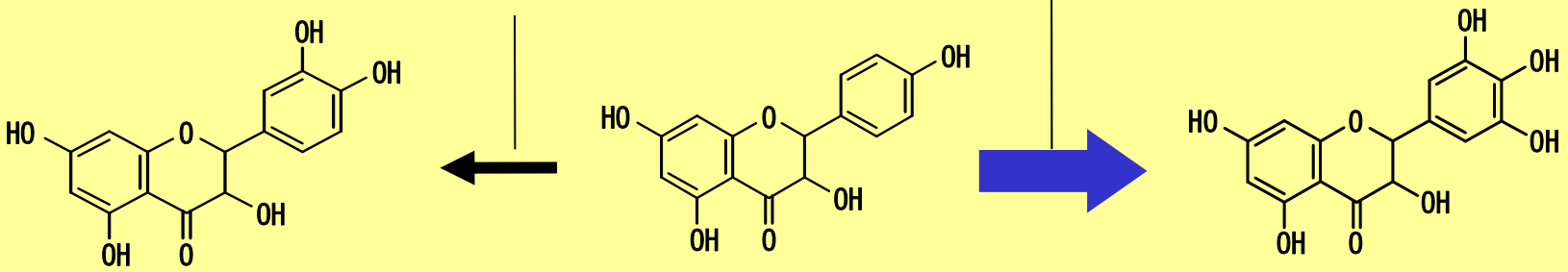
‘Blue Sky’

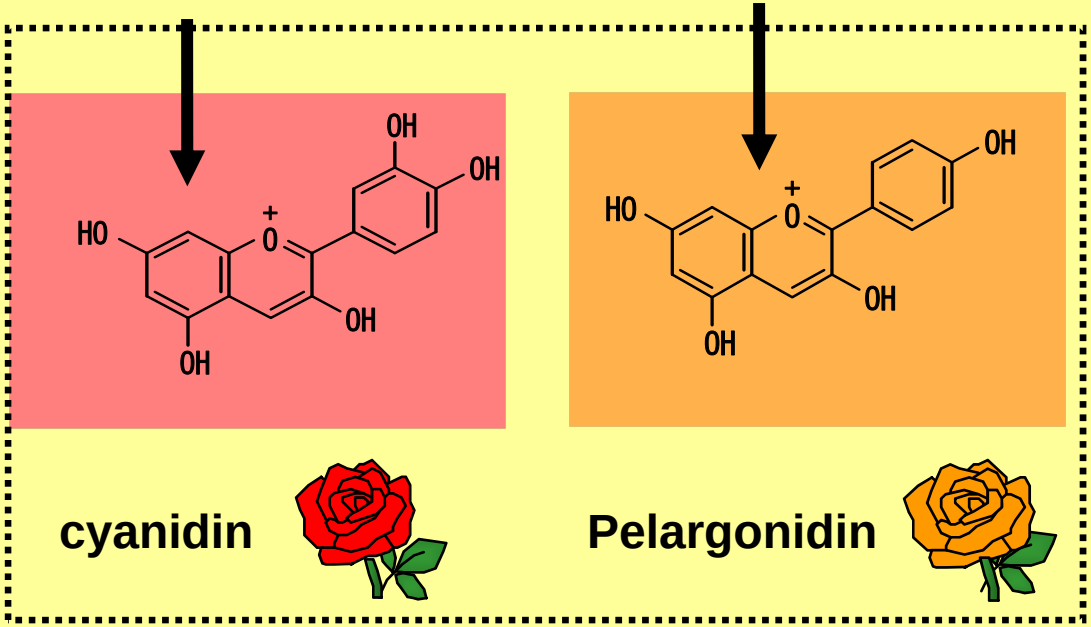
‘Blue Dragon’

Biosynthetic Pathway of Pigments

Flavonoid 3’-hydroxylase

Flavonoid 3’,5’-hydroxylase





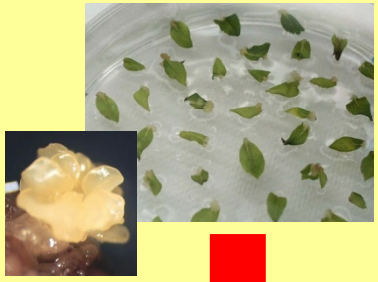
cyanidin

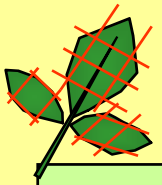
Pelargonidin

delphinidin
blue pigment

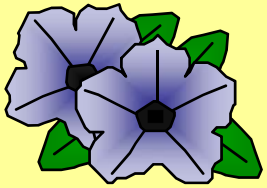
The pathway of roses

Generation of Blue Roses



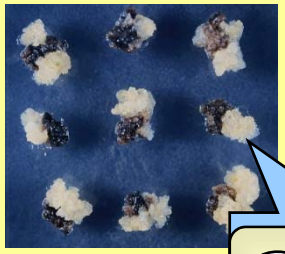


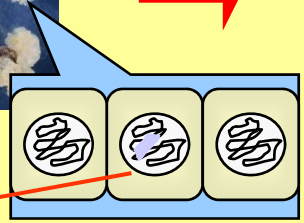
Induction of callus from leaves

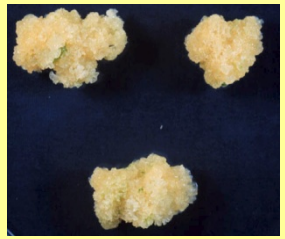


F3’5’H gene

Obtaining a F3’5’H gene from blue flowers







Transformed cell

Introduction of a F3’5’H gene and selection

Regeneration

Cultivation in glasshouse

Flowering

Pigment Analysis vs. Mauve Roses


First blue rose

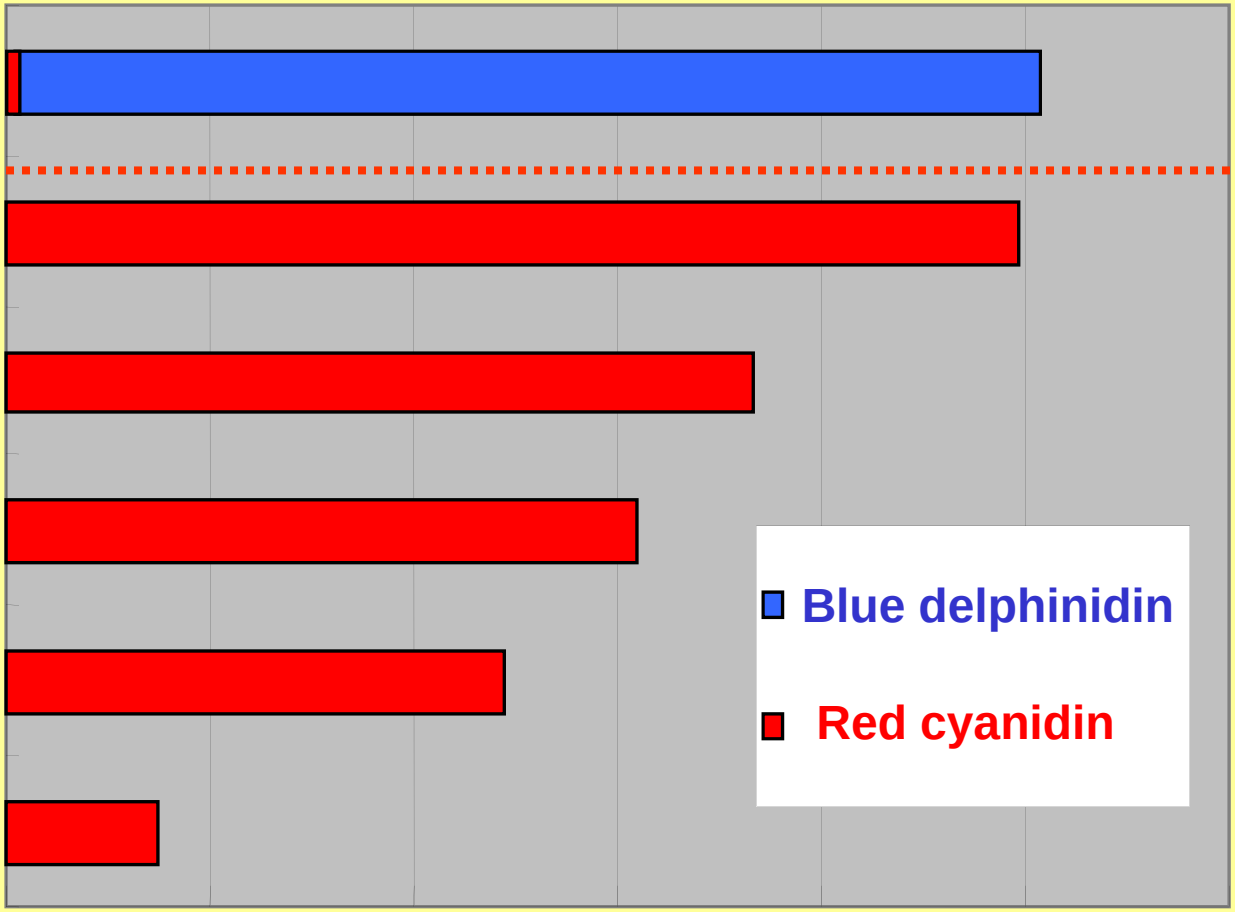

Lavande


A Mauve rose


Madam Violet


Blue Moon


Seiryu



In the end, Roses are Blue!

Host **Transgenic**

New Colors?

Really Cold Hardy Roses!

New Fragrances?

Rainbow Roses?

Payoff Time

“All Things Bright and Beautiful”

But without

“The Creatures Great & Small”

That's
All !