Tucson Cactus and Succulent Society

Thursday January 3, 2008 at 7 pm

Mark Fryer

"A View From the Bench - trials and tribulations in succulent horticulture"

I started growing cactus and succulent plants as a young boy in the mid-Willamette valley area of Oregon. My Grandfather was a farmer and my parents always had a passionate interest in gardening and planting interesting shrubs and trees, so the appreciation of flora was one that was instilled over and over in the course of my formative years. My first cactus garden died in the family attic during it's first year of growth (I dehydrated everything in it), I remember clearly the every other day jaunts up the ladder in the garage to check on my little mini-desert up under the eaves.

20 years later I found myself surrounded by 1000's of living things that were constant companions and inspiration over the years, things that offered more questions than answers and that I couldn't seem to shake. While my various education paths were never really agriculturally oriented, there were always elements of the natural sciences involved with summer jobs and other activities. I accidentally flowered some cactus one spring and wanted to learn more, which is when and where I was first exposed to the Cactus and Succulent Society of America, and the Oregon Cactus and Succulent Society.

Several years later I was obsessed with studying north American cacti in habitat and growing as many different plants as possible. As luck or fate had it, one of my neighbors at the time had a little business called Banana Gardens that was an overgrown backyard nursery operation, and was soon to be moving into new quarters on some acreage, called "Rare Plant Research" which was specializing in Lewisias, cold-hardy succulents, and rare tender succulents. I had a part-time job that was feeding the obsession. I tried to launch my own backyard nursery and actually got very close to success with it.

I was very dedicated to the Oregon C&S Society, and served officially for several years. Fast forward another decade or two and time finds me working in a good corporate job, relegating my passion to "well-developed hobby", and still devoted to study and experimentation. The "dot-com burst" of 2000 placed me in a challenging position after having relocated to San Diego where I married the girl of my dreams and settled down a bit. Moving to southern California after almost 4 decades in the Pacific Northwest, I got to relearn everything I thought I knew about growing plants, especially succulents. In between consulting gigs and chewing on the notion of buying a nursery, I struck a deal with the owner of C&J Cactus Nursery to do some temporary grafting work. After a month or so of working there, they made me an offer to come on as a manager of sorts, a propagator of sorts, someone to potentially buy the place and learn the ropes. Now in my 5th year there, this program will be an overview of what it's like to bring several hundred species of cacti and succulent plants from seed-production into plant-production, some of the successes and failures, and some of the neat anomalies we encounter along the way. I look forward to meeting with you all on January 3rd!

Be sure to come and welcome Mark to our first meeting of 2008!

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Tucson Cactus and Succulent Society

Thursday February 7, 2008 at 7 pm

Dr. Jerald E. Wheeler

The notes of this meeting are included below!

Dr. Wheeler's program will cover these four important informational topics that focus on the essentials needed for insuring a beautiful and healthy plant collection.

- Essential Nutrients & Beneficial Nutrients
- Fertilizer analysis-an explanation of the numbers on a bag of Fertilizer.
- Fertilizer rates
- Principle nutrients needed to increase plant resistant to disease.

Jerald E. Wheeler, Ph.D. is a Plant Pathologist. For those who need a better explanation of what a plant pathologist does, here is a short definition. A plant pathologist is one who studies, interprets, and diagnoses diseases and abnormalities of plants. Plant Pathology is defined as the study of the organisms and environmental conditions that cause disease in plants, the mechanisms by which this occurs, the interactions between these causal agents and the plant (effects on plant growth, yield and quality), and the methods of managing or controlling plant disease. It also interfaces knowledge from other scientific fields such as mycology, microbiology, virology, biochemistry, bio-informatics, etc.

Educational background

BS. Purdue University, 1966, Agriculture and Plant Sciences
MS. U. of Arizona, 1969, Plant Pathology/Botany
Ph.D. U. of Arizona, 1970, Plant Pathology/Agricultural Biochemistry
1968-1970 U. of Arizona, In charge of plant disease clinic under Dr. Hine

Professional History

1970-1971 Assistant Professor of Plant Physiology, Univ. of Freiburg, Germany
1971-1973 Assistant Professor of Agronomy and Plant Genetics at the University of Arizona
1973-1975 Development Plant Pathologist, University of Wisconsin, Brazil
1975-1988 Owned and/or Managed Acre, Inc.
1988-2002 Product Development Manager, United Agri Products
2002-2004 Product Development Manager, Western Farm Service
2003-present Product Development Manager, Agriliance/Winfield Solutions

Dr. Wheeler has also been published with his writings in 17 Scientific Publications in refereed journals.

This will be a special program that everyone should attend and enjoy. Dr. Wheeler is presenting our first program on Plant Pathology and this will be a very important area to be presented. You may learn a lot more about your plants and their particular needs so please join us in welcoming Dr. Wheeler and be sure to also bring your questions.

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Reduction of Plant Diseases Using Nutrients

"Fertilizer Labels-A Foreign Language"

Jerald E. Wheeler

Plant Pathologist/Agronomist
Winfield Solutions, LLC
Product Development Manager
Tucson, Arizona

Essential Plant Nutrients

17

Plant Nutrient Uptake

1. Dissolve in water (form ions)

   Soil Solution, Foliage

2. Gasses

   Carbon (CO_2), Nitrogen fixation (N_2)

Nutrients: 3 of 17

Carbon C (Carbon Fixation, Photosynthesis)

Oxygen O

Hydrogen H

Mainly from air and water

Essential Nutrients, 14

Nutrient	Fertilizer	Uptake Form
Nitrogen N	Urea, NH4, NO3	NH_4^+, NO_3^-
Phosphorus P	Phosphate	HPO_4^{-2}, $H_2PO_4^{-1}$
Potassium K	Potash	K^+
Ca, Mg, Zn, Mn, Cu, Fe, Ni	(all as divalent cations)	$^{-2}$
Sulfur S	Sulfate	SO_4^{-2}
Chlorine Cl	Chloride	Cl^{-1}
Boron B	Borate	H_3BO_3
Molybdenum Mo	Molybdate	MoO_4^{-2}

Beneficial Nutrients

Not shown to be essential.

Many! Maybe 12 or more!

Another seminar!

14 Essential Nutrients Uptake

Must be soluble in water!

Soil Solution: Equilibrium

Insoluble ⟷ Soluble

Hydroponics

Foliar Feed Solution

Fertilizer Label

Nitrogen (N)

Percentage listed in pure form

20-20-20

20% Nitrogen

Fertilizer Label

Nitrogen

3 Chemical Forms

Urea

Ammonium

Nitrate

Fertilizer Label

Phosphorus (P) & Potassium (K)

Listed as % oxides.

Not in the elemental forms.

$$P_2O_5$$

$$K_2O$$

Fertilizer Analysis

20-20-20

Nitrogen	P_2O_5	K_2O
20%	43.6% P	83% K

Nitrate

Ammonium

Urea

Soil & Foliar Tests

Nutrients are listed in elemental forms.

N, P, K etc.

Typical/General Concentrations Found in Dried Plant Material as Dry Weight

Primary		Plant/Mobility
Nitrogen (N)	4.0%	High
Phosphorus (P)	0.5%	High
Potassium (K)	4.0%	Very High
Secondary		
Calcium (Ca)	1.0%	Low
Magnesium (Mg)	0.5%	High
Sulfur (S)	0.5%	Low -Medium

Typical/General Concentrations Found in Dried Plant Material as Dry Weight

Micronutrients		Plant/Mobility
Iron (Fe)	200 ppm ?	Low
Manganese (Mn)	200 ppm ?	Low
Zinc (Zn)	30 ppm	Low
Copper (Cu)	10 ppm ?	Low
Boron (B)	60 ppm	High
Molybdenum (Mo)	1	Nitrogen Utilization
Nickel (Ni)	?	Nitrogen Fixation

Fertilizer Analysis: 10-30-20

Nitrogen **10 % N**

(Ammonium, Nitrate, Urea)

Phosphate 30 %(P_2O_5) X 43.6%) 13.08% P

Potash 20% (K_2O X 83%) 16.6 % K

Elemental Analysis: 10--13.08--16.6

Soluble Fertilizer Rates/Soilless Mixes

20-20-20, 10-30-20, 10-26-38

(all + micronutrients)

Normal Watering of Pots and Flats

2 lbs. in 100 gal.

Applied at 1 quart per sq. foot or as normal watering.

Soluble Fertilizer Rates/Soilless Mixes

Normal Watering of Pots and Flats

2 lbs. in 100 gal.

1 oz. in 3 gallons

1 tablespoon in 3 gallons

¾ teaspoon in 1 quart

Soluble Fertilizer Rates/Soilless Mixes

20-20-20, 10-30-20, 10-26-38

(all + micronutrients)

Injections Rates

200-300 ppm N per 7-21 days

Some labels go as high as 470 ppm N.

Fertilizer Rates/Soilless Mixes*

*Lower rates of solubles by 25-50%!

Amendment	Oz/Cu. Ft.	Nutrients
Dolomitic lime	2-10	Ca, Mg
Lime	2-10	Ca
Gypsum	2-10	Ca, S
K-Mag (21/10/21)	4-5	K, Mg, S
Ammonium Phosphate	2-3	N, P
Ferrous sulfate	1/4	Fe, S

Soilless Mixes

Slow-release

14-14-14

N = 100% **P = 43.6%** **K = 83%**

14--6.1--11.62

Soilless Mixes

Target soilless mix pH: 6.0-6.8

Best solubility of most nutrients best at 6.8.

Phosphorus most soluble at pH 6.5.

Soilless Mixes

The pH becomes too low, too acid.

1. Degradation of organic matter

2. Application of soluble fertilizers

3. Organic matter has low pH, e.g. peat moss

Soilless Mixes

Adjust up, increase pH using lime.

Calcium carbonate

Calcium/Magnesium carbonate

(Dolomitic lime)

Soilless Mixes

"Special Case"

Fusarium oxysporum-Crown Rot

This fungus kills ferrocacti if soil pH is acid.

Adjust soil pH to greater than 7.0.

Lime!

Cacti, Succulents and Native Plants Respond to Higher Nutrient Levels

1. Optimum Yield/Growth

2. Disease & Insect Resistance

Most Important Nutrients for Disease Resistance

K, Ca, Cu, B, Mn, S, Si*

*** Not essential, but beneficial**

Most Important Nutrients for Disease Resistance

"Context"

Sufficient Quantities of all Essential Nutrients Must be Delivered to the Plant

Potassium

K^+

1992 Dr. Steve Petrie

534 References Reviewed

K^+ Most Important

Insect and Disease Reduction

K^+

Potassium

1. Mobilization of Plant Defense System

2. Increases Cuticle Thickness

K+

Potassium

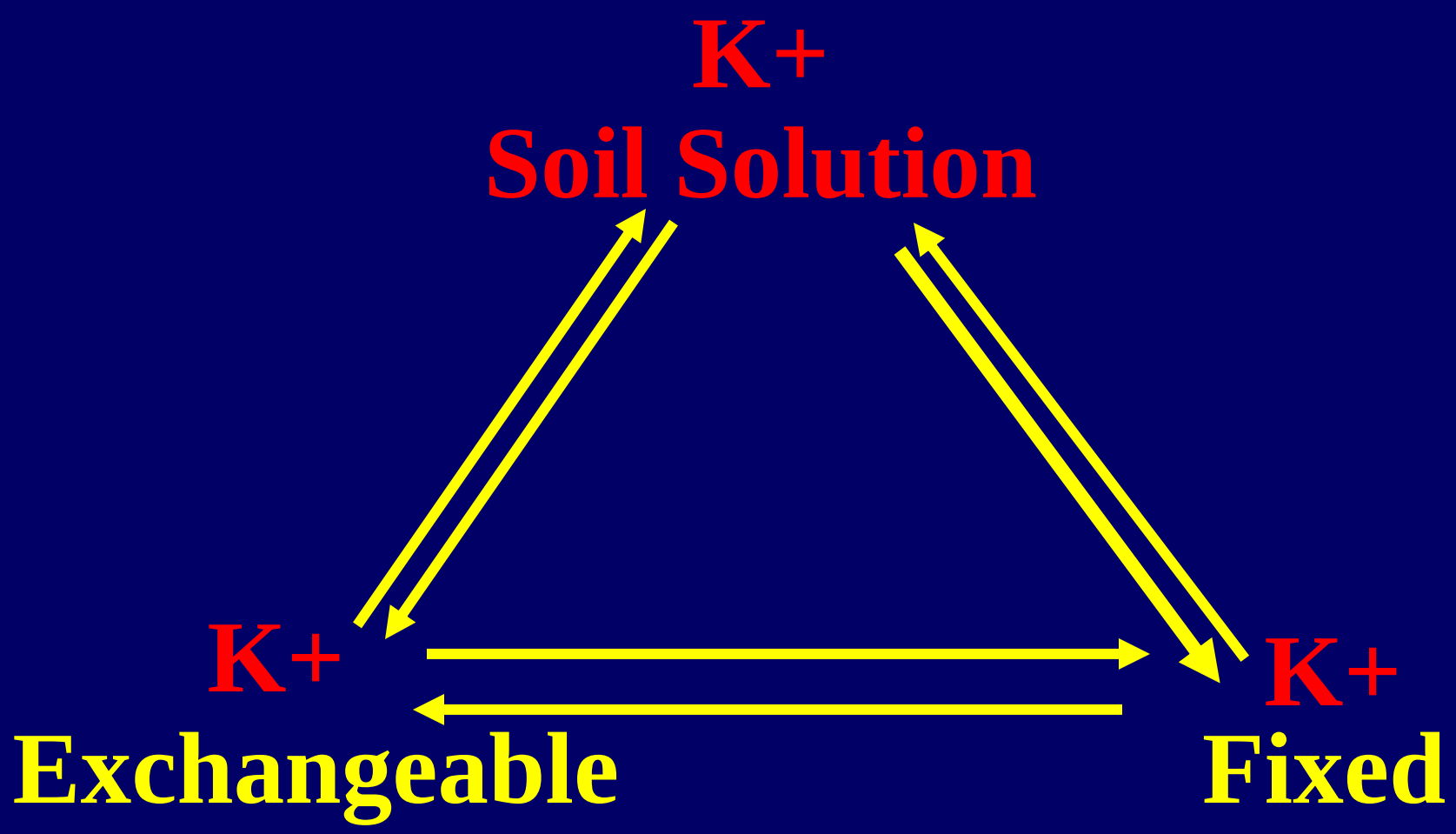
Tolerance to Adverse Conditions

Stress: Heat, Cold, Drought

Potassium K^+ : 4 Issues

1. Tied up in clay soils
2. Slowly available from native soils
3. Leaches out in light soils
4. High nitrogen overcomes K effect

Potassium
Behavior in Soil



Source: Unocal Nitrogen Group

Effect of K, N and Ca on Severity of Phytophthora Diseases

Pathogen	Host/Disease	Factor	Effect
P. infestans	Potato Late Blight	K	Decrease
		K	None
		High K	
		High N	Increase
P.capsici	Pepper Blight	K	Decrease
P.drechsleri	Pigeon Pea Blight		
		High K	
		Low N	Decrease
P.parasitica	Citrus gummosis		
		High K	
		Low Ca	Increase

Phytophthora, Its Biology, Taxonomy, Ecology and Pathology, 1983 APS Press, St. Paul, MN Page 191

K^+

Potassium

Solutions to K needs:

1. Increase soil concentration, apply more K more often (3% CEC)

2. Foliar applications of high K and low N fertilizers

Calcium Ca^{++}

1. Fortifies the Middle Lamella

Middle Lamella = Calcium Pectate

2. Slows degradation by pathogens

(Especially soft rot bacteria that attack cacti and succulents.)

Ca^{++}

More Calcium in Middle Lamella Reduces Pathogen Enzyme Activity

Pectolytic Enzyme Activity:

Polygalacturonase

<u>Ca^{++}</u>

Stops Motile Spores=Zoospores

Encyst or Stop Swimming

<u>Phytophthora</u> and <u>Pythium</u>

Pathogens of Cacti and Succulents

Phytophthora species

Hosts

Boogum-trees

Pathogens of Cacti and Succulents

Pythium species

Hosts

Agaves, Cacti & Euphorbiaceae seedlings

Calcium

1. Increases Plant Membrane Stability

2. Improves Soil Structure:
Water/Oxygen Distribution

3. Lime Increases Soil pH: Fusarim Spore Attachment (ferrocacti, bananas)

4. Reduces Rhizoctonia enzyme activity

Relationship Between Cation Content and Severity of Infection with *Botrytis cinerea* Pars. In Lettuce

Cation content (mg/g dry wt.)			Infection[1] with
K	**Ca**	**Mg**	***Botrytis***
14.4	10.6	3.2	4
23.8	5.4	4.1	7
34.2	2.2	4.7	13
48.9	1.8	4.2	15

[1] Infection index:

0-5 slight infection
6-10 moderate infection
11-15 severe infection

Based on Krauss (1971). 1998. "Mineral Nutrition of Higher Plants." 2nd ed. Horst Marschner. P.447

Tentative Summary of the Effect of Nitrogen and Potassium Levels on the Severity of Diseases Caused by Parasites

	Nitrogen Level	
Pathogen and Disease	**Low**	**High**
Obligate parasites		
Puccinia spp. **(rusts)**	+	+++
Erysiphe graminis **(powdery mildew)**	+	+++
Facultative parasites		
Alternaria spp. **(leaf spots)**	+++	+
Fusarium oxysporum **(wilts and rots)**	+++	+
Xanthormonas spp. **(spots and wilts)**	+++	+

Tentative Summary of the Effect of Nitrogen and Potassium Levels on the Severity of Diseases Caused by Parasites (continued)

	Potassium Level	
Pathogen and Disease	Low	High
Obligate parasites		
***Puccinia spp.* (rusts)**	++++	+
***Erysiphe graminis* (powdery mildew)**	++++	+
Facultative parasites		
***Alternaria spp.* (leaf spots)**	++++	+
***Fusarium oxysporum* (wilts and rots)**	++++	+
***Xanthormonas spp.* (spots and wilts)**	++++	+

Based on Kiraly (1976) and Perrenoud (1977). 1998. "Mineral Nutrition of Higher Plants. 2nd ed. Horst Marschner." p. 443.

Cu^{++} - Copper

- Increases cuticle thickness
- Cuticle: a barrier to infections
- Careful!

Cu^{++} - Copper

- Necessary for polyphenoloxidase activity.

- Polyphenoloxidase system produces some phytoalexins and other anti-pathogenic molecules.

Cu^{++} - Copper

Phytoalexins-antimicrobial compounds produced by plants in response to a host-parasite interaction.

Some phytoalexins are phenolics.

Others such as sulfur are not organic molecules.

Boron

B

1. Increases the uptake of cations (Blevins, Schon, U. of Missouri)

2. K, Ca and Cu are cations that are vital for plant resistance to disease.

3. Involved in the metabolism of phenolics.

Boron

B

Phenolics include phytoalexins and other molecules that are toxic to plant pathogens.

Phytoalexins are phenolics that are toxic to plant pathogens.

Qinones from phenolics may form: also toxic to plant pathogens.

Manganese Mn^{++}

1988 Study by Huber and Wilhelm

82 scientific papers were review

Papers addressed disease and Mn content.

All but 4 papers indicated that added Mn decreased disease.

Two of the 4 papers showed Mn in the toxic range.

Manganese Mn^{++}

- Involved in the production of lignin.

- Lignin is the principal component of wood and very difficult to degrade.

Manganese Mn^{++}

- Wheat with higher uptake of manganese has a higher content of lignin and is more resistant to take-all disease.

Manganese Mn^{++}

- Mn^{+2} inhibits the enzyme pectin methyl-esterase.

- Pectin methylesterase is a fungal pathogen exoenzyme for degrading host cell walls.

Diseases Reduced or Controlled by <u>the Addition of Manganese</u>

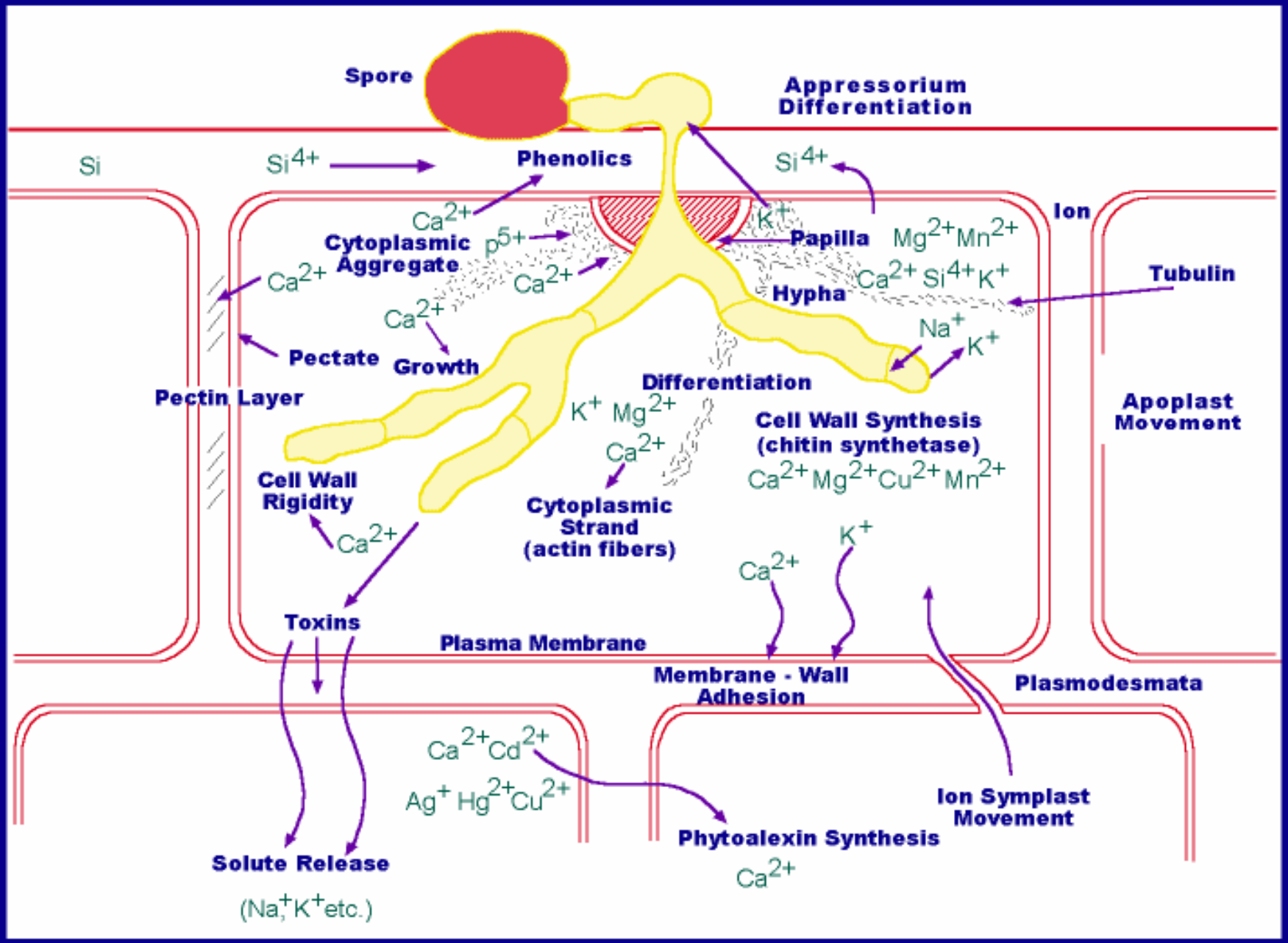
- Take-all and powdery mildew of wheat
- Common scab of potato
- Blast and leaf spot of rice
- Root rot of avocado
- Powdery mildew of canola, sorghum
- Nematodes attacking barley

Zinc Zn^{++}

- Not directly involved in disease resistance
- Most important micronutrient in plants
- A cofactor for more than 100 plant enzymes
- Applications to foliar almost always produce a response in plans.
- Dicots are more reactive than monocots

Thank you!

Questions!



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ANN. REV. PLANT. 1990.
28:93-111.

Major Turf Disease Problems

- Turfgrass patch diseases
- Pythium blight
- Dollar spot
- Fusarium blight

Patch Diseases

- More prevalent during the past 3 year.
- More positive IDs during last year.
- Several fungal pathogens involved.
- Identification/taxonomy is unclear.
- All ascomycetes: Indicates the active fungicides.

Pathogenic Patch Fungi

Genera

- Leptosphaeria Magnaporthe Gaeumannomyces

- Sexual stages: Ascomycetes (powdery mildews)
- All form black or olivaceous ectotrophic hyphae
- Ectotrophic hyphae: mycelium over root surfaces

Turfgrass Patch Diseases

- **Take-all** **Bentgrass**
  Gaeumannomyces graminis var. avenae

- **Bermudagrass Decline** **Bermudagrass**
  G. graminis var. graminis

Turfgrass Patch Diseases

- Necrotic Ring Spot Bentgrass Poa annua, P. trivialis

  Festuca rubra

  Leptosphaeria korrae

- Spring Dead Spot Bermudagrass

  Leptosphaeria narmari

Turfgrass Patch Diseases

- Summer Patch Fescues, Poa, Bentgrass

- Magnaporthe poae

Reducing Take-All and Other Patch Diseases

- Soil pH in the acid range (?)
- Potassium 200- 250 PPM USGA Greens
- Sulfur (sulfate as nutrient and to lower pH)
- Mn^{++} 35 or more parts per million

Reducing Take-All and Other Patch Diseases

- Ca as gypsum (calcium sulfate)
- Cu, Fe, and Zn
- Control nitrogen, use NH_4 or urea

Mineral Elements Affecting Take-all of Cereals

Increase Take-all	Reduce Take-all
Potassium nitrate	Potassium chloride
Phosphorus excess	Phosphorus sufficiency
Calcium carbonate (lime)	Sulfur
Magnesium carbonate	Magnesium chloride
Magnesium sulfate	Calcium chloride
Molybdenum	Manganese
	Iron, Zinc
	Copper chloride

Adapted from D. Huber, Purdue

Forms of Nitrogen
General Effects

Ammonium, Urea----------Acid Forming

Rhizosphere pH decrease

Modify Rhizosphere Microbes

Increase available Mn, Fe, Cu, Zn

Acidification decreases nitrification: NH_4 to NO_3

Disease Suppression is Simple Interactions are Complicated

Root Exudates

Rhizosphere Microbes

Plant Nutritional Status

Soil Type

Correlation of factors influencing the form on N in soil and severity of disease-Take all. Adapted from Huber , Purdue

Factor	Nitrification	Disease
Nitrate nitrogen	--	Increase
Ammoniacal nitrogen	--	Decrease
Liming	Increase	Increase
Acid Soils	Decrease	Decrease
Chloride	Decrease	Decrease

Take-all Patch, Gaeumannomyces

- No resistance
- Manganese is most important nutrient. Why?

1. Direct toxicity to fungus?
2. Increase in photosynthesis corresponding to greater carbon supply and more organic compounds in soil.? Rhizosphere microflora

Research has ruled out #1 and #2.

Take-all Patch, Gaeumannomyces

3. Increase synthesis of ligneous defense products in roots.

Manganese in Equilibrium in Soil and Availability

Acid pH in soil and rhizosphere = Mn^{++}

Alkaline pH in soil and rhizosphere = Mn^{+4}

Mn^{++} Available

Mn^{+4} Non-available

Manganese Influence on Root Lesions and Lignin in Wheat

Variable	Total Length of Ggt lesions (mm)	Lignin Content (Abs_{280}/root system)
Mn, mg/kg soil		
0	38	0.14
3	28	0.12
30	23	0.25
300	22	0.28

From "Biochemistry of Metal Micronutrients in the Rhizosphere" Chapter 10, Regel, Pedler, & Graham.

Root Lesions and Lignin Content in Root Tissues of Four Wheat Genotypes

Genotype	Total Length of Ggt Lesions (mm)	Lignin Content (Abs_{280}/root system)
Mn-inefficient		
Bayonet	30	0.14
Millewa	27	0.16
Mn-efficient		
Aroona	26	0.22
C8MM	23	0.27

Significance Turkey's 0.05; Adapted from "Biochemistry of Metal Micronutrients in the Rhizosphere" Chapt. 10, Rengel, Pedler, and Graham

Fungicides for Control of Take-all and Patch Diseases

Conditions: Soil Temperature at 2” 65 F for 6 days.

Fungicides: **Heritage** **Banner MAXX** **Bayleton**
Compass **Eagle** **Rubigan**
Sentinel

Benzimidazoles: Fungo, Cleary 3336

Application: 4-5 gallons per 1000 sq. ft.

Pythium Blight

- Pythium aphanidermatum (water mold)

Often Seen During:

- High humidity
- Hot weather
- Summer rainy season

Reducing Pythium Blight

- **High potassium:**

  250 PPM USGA Greens

  At lease 3% of cation saturation

- **Higher potassium for greens with higher clay content and organic matter content**

Reducing Pythium Blight

- Calcium-drainage and nutrition
- Copper 1-3 PPM in soil
- Control nitrogen

Dollar Spot

- Sclerotinia homoeocarpa (fungus)

Reducing Dollar Spot

- Maintain sufficient nitrogen
- Balance nitrogen with high potassium
- Collect clippings and reduce thatch
- Maintain calcium
- Gypsum and sulfur-water penetration, stress

Fusarium Blight

- Fusarium species (fungus)

Reducing Fusarium Blight

- Reduce stress (potassium, calcium)
- Maintain soil pH close to neutral (lime)
- Control nitrogen

Reducing Pythium and Phytophthora

- High potassium
- High calcium
- Good drainage-gypsum, sulfur
- Acivator 90 20 PPM kills zoospores

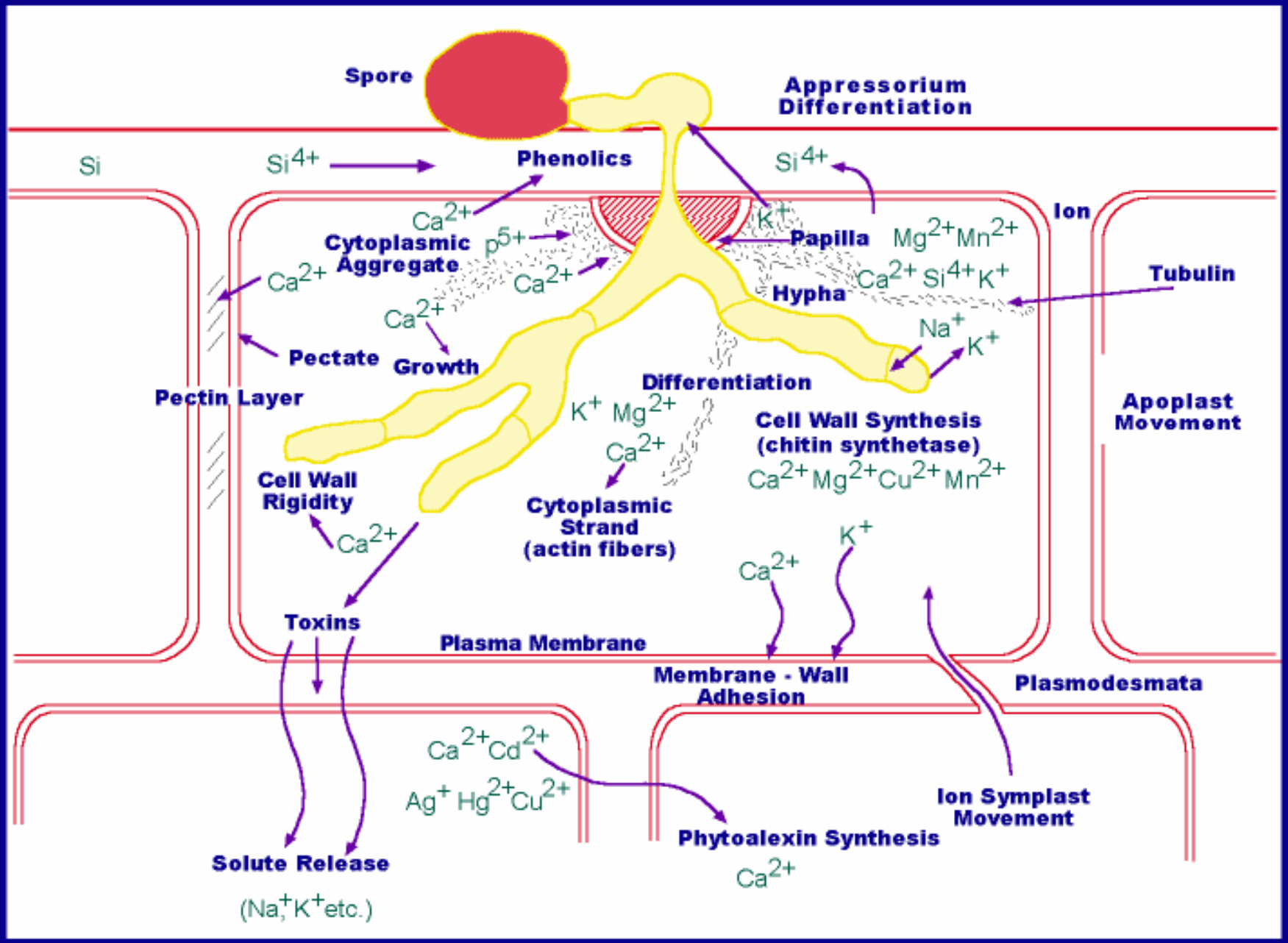
Free Calcium

Increases Plant Membrane Stability

Improves Soil Structure:
Water/Oxygen Distribution

Lime Increases Soil pH:

Stops or Reduces Spore Pathogen Attachment



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Tucson Cactus and Succulent Society

Thursday March 6, 2008 at 7 pm

"Grass Aloes and other botanical treats from the hills of eastern South Africa"

By Brian Kemble from the Ruth Bancroft Garden in Walnut Creek, California.

Brian Kemble is the curator at the **Ruth Bancroft Garden** in Walnut Creek, California. He has been working at this garden of succulents and other drought-tolerant plants since 1980. He has been a member of the Cactus & Succulent Society of America for over 30 years and has been a judge at many cactus & succulent shows. Over the years, he has made many trips to places such as Mexico , Madagascar and South Africa to see and photograph succulents in habitat. The genus Aloe has been a major focus for Brian and he is also vice-president of the **Institute for Aloe Studies**, based in Oakland, California.

Brian's program will cover his recent trip to South Africa, in November of 2007. He was fortunate to be able to get out in the field with Charles Craib, author of "Grass Aloes in the South African Veld". This book, published in 2005, is the only work devoted to this interesting group of diminutive Aloes. Seldom seen in cultivation, these plants grow in grasslands and can be very difficult to spot when not in flower. Along with the Aloes, Brian saw a variety of other succulents and bulbs.

This will be a very special program for anyone interested in the Aloes. We are really looking forward to having Brian as our special guest so please join us and bring a friend for this rare presentation.

Aloe ecklonis

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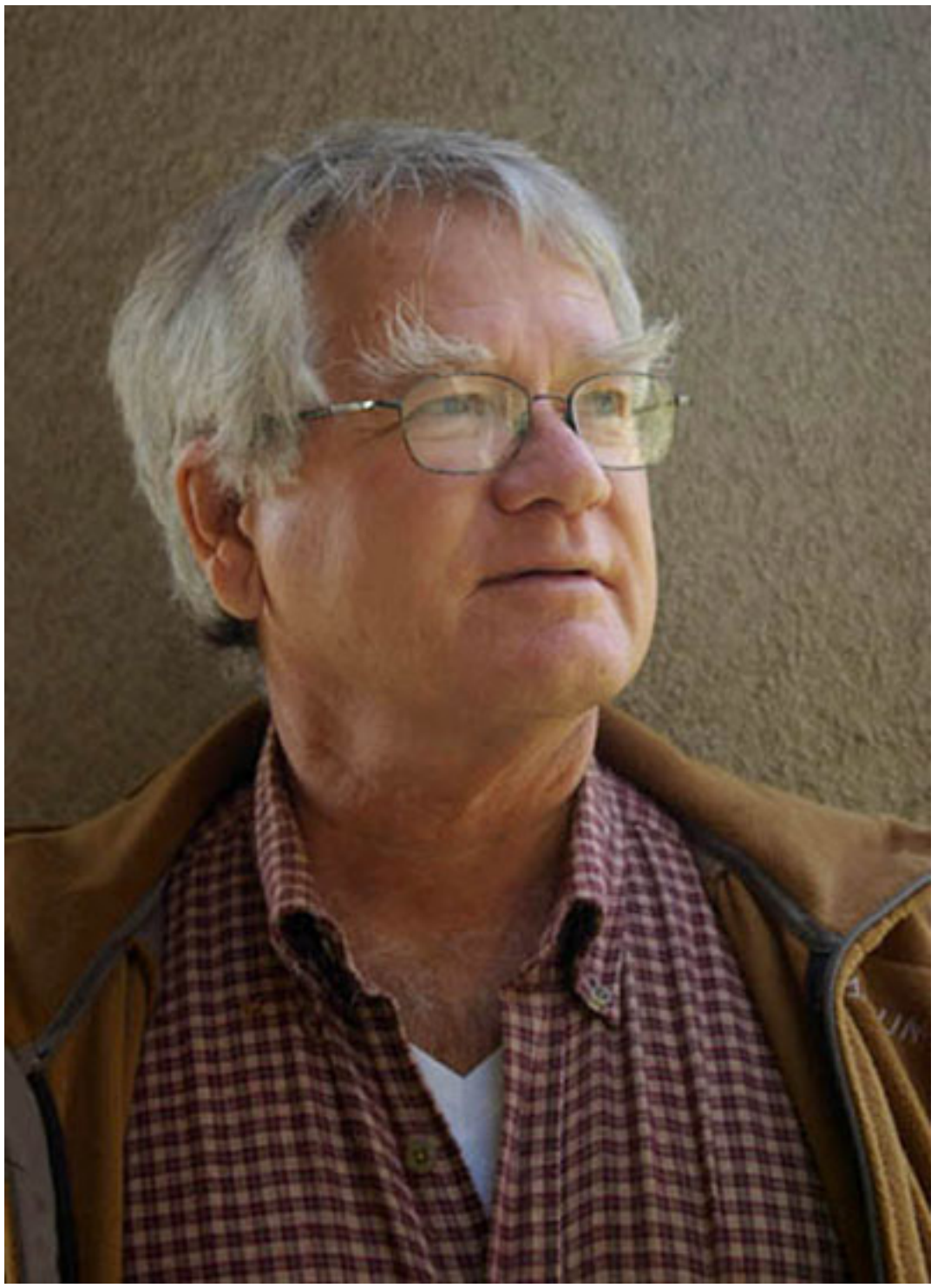
Tucson Cactus and Succulent Society

Thursday April 3, 2008 at 7 pm

Gary Lyons

Curator of the **Desert Garden at the Huntington Gardens**, San Marino, CA

"A Gardener in Search of a Cactus Garden"



Gary is a member of the World Conservation Union's Species Survival Commission and a fellow of the Linnean Society of London. He has also written many articles and books on desert plants.

This program is somewhat of a historical overview and retrospective of how Gary got into cacti. It is also a look at the people and events that have influenced his work, and an overview of the gardens with which he had a connection over the past fifty years.

Please join us for this great program and help the club welcome Gary back to Tucson.

Additionally:

David Yetman will be doing a book signing at the April 3rd meeting. He will be signing his new book "The great Cacti". David will also briefly talk about some very important conservation efforts. He will arrive at 6:30 for early bird book signings

Free Plants of The Month:

Echinocereus pectinatus variety rubrispina Red Spined Rainbow Cactus - Echinocereus - Hedgehogs

Hedgehogs are a popular group of cacti to grow either in pots or as landscape plants. The genus Echinocereus, being derived from Greek , echinos, hedgehog or sea urchin, referring to their spiny fruits. The genus is distributed widely from Oklahoma west to California and into Mexico including Baja. Most species are frost hardy, lending themselves well as landscape accents in southern Arizona. The bulk of the species flower in Spring or early Summer at higher elevations. Several species from Baja California actually wait until late summer or fall to bloom. Many species are commonly grown locally and will reward you with magnificent large showy flowers. Echinocereus will only flower once per year, but you may experience one to dozens of flowers depending on the size and species you grow. Another unusual flowering fact, watch where the flower bud emerges from, just above the aeroles, as to split from inside the stem of the cactus. Subsequent scarring remains where flowers had been borne. Some species of Echinocerus are single stemmed and others are low multi-stemmed. Some species perform better with morning sun and afternoon shade while others can be acclimated to full sun.

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Tucson Cactus and Succulent Society

There will be NO "first Thursday of the month" TCSS meeting in May, 2008.

Instead, on Friday evening May 9, 2008, TCSS members and guests are invited (**see registration forms below**) to come to the kick-off of the **Sonoran VII conference** featuring a plated dinner for all TCSS members and conference registrants ($10.00 each, free to conference registrants and $20 for extra guest tickets) with your choice of beef, chicken or vegetarian complete dinner and followed by **a very special presentation by Susan Carter Holmes**, botanist and taxonomist at the **Royal Botanic Gardens, Kew**. The evening ends with a chance to shop for books, plants, and pottery!

Dinner starts at 6 PM

Presentation by Susan Carter Holmes at 7.30 PM

Shopping for plants, pottery and books from 8.30 PM to 11 PM

The dinner location is:

Copper Room at Inn Suites Hotel
Tucson City Center, 475 N. Granada Avenue
Tucson, Arizona

Overview **Program Schedule** **Workshop Schedule**

Registration Form (.doc) **Registration Form (.rtf)**

Plant Show Rules (.doc) **Sales Flyer (8.5x11)** **Programs and Workshops Flyer (8.5x11)**

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Tucson Cactus and Succulent Society

Thursday June 5, 2008 at 7 pm

"Phytotourism in Yemen"

Presented by Dr. Robert Webb and Toni Yokum

Six weeks exploring Yemen on our own. Just Toni and I with various guides and drivers going where we wanted to go. While Socotra occupied 3 weeks of that time, we're going to talk about mainland Yemen. We'll discuss a wide variety of species there including Adenium, Euphorbias, Aloes, Commiphoras, yada yada yada and the culture, architecture, people, terrorists, etc. etc.

Bob Webb has collected succulent plants for about 20 years. For his day job, he is a hydrologist with the U.S. Geological Survey in Tucson; however, he has worked as a plant ecologist in the southwestern United States and Baja, California for nearly 30 years. He's been traveling to the Arabian Peninsula and Africa since the mid-1990s and has visited Oman, Kenya, Socotra, Yemen and South Africa in search of succulent plants.

Dr. Robert Webb has worked on land-use issues and landscape ecology of the southwestern United States and Baja California for more than 30 years. For the past 12 years, he has worked with Mexican government scientists on plant conservation issues in Baja California centering on cirio, cardon, and other charismatic species that are iconic to the peninsula. He has a Ph.D from the University of Arizona in Geosciences (1985) and has worked for the National Research Program of the U.S. Geological Survey for nearly 20 years. Bob Webb and Toni Yokum are owners of Arid Lands Greenhouses at 3560 W. Bilby Road Tucson AZ 85746 Phone: (520) 883-9404.

This will be a very special program for anyone interested in remote areas of the world where many rarely seen succulents are found. We are really looking forward to having Bob as our special guest so please join us and bring a friend for this very special presentation.

"A foreigner (Bob Webb) pretends to be a Yemeni!"

Free Plants at the meeting

Mammillaria and Coryphantha (various species) Mammillaria and Coryphantha are native to Mexico and the southwestern US, typically characterized by a short squatty appearance with tubercles instead of ribs. They are suitable for pot culture or growing out in the ground as landscape plants or in rock gardens once of adequate size. Mammillaria typically enjoy filtered light in our growing conditions, while some Coryphantha often grow in full sun and have more dense spination. Some species are opportunistic and can bloom multiple times throughout the growing season when water is plentiful. Our local Mammillaria grahamii is well known for its candy-striped blossoms during the monsoon and thousands have been collected by the TCSS Cactus Rescue Program. For more information, refer to **www.mammillarias.net** and see many photos by our very own Norm Dennis!

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Tucson Cactus and Succulent Society

Thursday July 3, 2008 at 7 pm

"Cactus Travels From Across The Atlantic"

Presented by Stuart Riley

Stuart and Jane Riley will be returning to Tucson from their home in the United Kingdom to present another great presentation. As well as being keen cactus hobbyists, they have a cactus nursery in the UK and will be bringing a follow-up program to the one they gave in 2006 with more photos of collections, nurseries, shows and a few amusing stories from across the Atlantic with a bit of history thrown in too! This will be Stuart's first digital program and the first time any of the photos have been seen. Stuart and Jane have been spending their holidays in the United States since the early 1980s and always include Tucson on their travels.

Please plan to come in and welcome Stuart and Jane back to Tucson. Also be ready for a wonderful evening of fun and adventure from Europe!

Free Plants at the Meeting
Adenia Glauca

First described by Schinz in 1892, belonging to the Passifloraceae family. This species is from southern Africa and Botswana region, The caudex can get up to one meter or more in diameter (over time, of course) and the branches reach for up to three meters. It prefers well draining soil, should be heavily watered in the summer and can dry out in winter. The plant should be kept out of strong sun and prefers filtered/patio light. The flower is green/crème in color. Best for pot culture, as it is frost tender and should be moved indoors, left dry and dormant in the winter. Showy, tropical leaves are outstanding during the growing season. Chris Monrad

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Thursday August 7, 2008 at 7 pm

"Exploring and Knowing the Plants of the Rio Grande Area of Texas"

Presented by Matthew B. Johnson

This presentation will focus on Matt's recent nine-day trip from Brownsville to El Paso where he identified cacti, trees, and other plants for some of his photographer friends. His program will include such species as Astrophytum asterias, Acanthocereus tetragonus, Echinocereus chisosensis and Grusonia densispina. Matt is very familiar with this fantasticarea of the country and knows the plants very well.

Matthew has a BS in Agriculture and a MS in Horticulture from the University of Arizona. He is currently a Research Specialist at the University of Arizona. Program Manager and Curator, **Desert Legume Program** (1989-present). The Desert Legume Program (DELEP) is a joint project of the **UA College of Agriculture and Life Sciences**, and the **Boyce Thompson Arboretum**. DELEP was established in 1988 to develop a comprehensive seed bank of wild species of legumes (Fabaceae) that are native to or adapted to arid and semi-arid regions, to preserve these seeds long-term, to provide seeds and information to individuals and organizations around the world, and to investigate potential uses for these plants. He has made extensive travels to study and photograph plants and plant habitats in southwestern United States and in arid regions of Mexico, Argentina, Australia, and South Africa. International travel has involved visits to 14 countries on six continents.

For those interested in cacti and other plants of the Texas Rio Grande area this will be a very special program you will not want to miss. We are really looking forward to having Matt as our special guest. Be sure to invite a friend and join us for this excellent program.

FREE PLANTS

Ferocactus hamatacanthus

Turk's Head Barrel / Texas Barrel

The Ferocactus is a popular group of cacti to grow either in pots or as landscape plants. The genus Ferocactus, being derived from Ferus, meaning wild or fierce and cactus referring to the very spiny character of the plants. The genus is distributed widely from southern Mexico, north to the Southwestern US and continuing westward to southern California and into Baja California. This species lends itself well as a landscape cactus for southern Arizona. It is both frost hardy and able to be acclimated to full sun. In the next year or so, your specimen will be large enough to flower. The Turk's Head Barrel will usually flower in July with large yellow flowers, they are diurnal and attract bees as pollinators. In about two months you will find a large ripe fruit containing hundreds of seed suitable for germinating next year. Plants will attain mature size at about 12"-14" wide and about 24" tall and are capable of flower each year. Some individuals will offset with multiple heads capable of also flowering. This species has a very dramatic long central spine which is curved at the end, so be careful when planting not to damage the beautiful long spines. The native range for theTurk's Head Barrel is southern New Mexico, west Texas bordering Mexico south to Brownsville and south into northeastern Mexico's Chihuahuan Desert and Tamaulipan Thorn Scrub.

Enjoy your plants!

Mark Sitter

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Tucson Cactus and Succulent Society

Thursday September 4, 2008 at 7 pm

"A Summer Succulent Sabbatical to South Africa and Namibia"

Presented by Ernesto Sandoval from the University of California, Davis

Ernesto Sandoval is a plant person. No, he doesn't sprout buds or need occasional watering, but he does kind of like the bone-warming heat of a greenhouse. For Sandoval, Director of the **UC Davis Botanical Conservatory**, raising and rearing flora and foliage is a deeply meaningful way of life. Simply, his passion is his profession.

"Plant people are nice people," says Sandoval. "There's something about working in a garden and nurturing plants and flowers that makes one more peaceful and calm."

The greening of Sandoval's life started early on. He grew up in the Los Angeles area and from the age of 10 worked for his dad's landscaping business and aptly-described as the "Mo', Blow and Go" style. From cutting countless lawns to cultivating saplings and shrubs in the yards of the San Fernando Valley, Sandoval earned both a pair of green-stained shoes and a practical botanical education. More formally, Sandoval obtained his bachelor's degree in botany from UC Davis in 1996.

I spent the first two months of 2008, January and February, in South Africa and spent most of my days in the field visiting Nature Reserves within the fynbos vegetation of the Cape Floristic Region where over 8,700 species of plants are to be found on 6% of South Africa's land area! The name fynbos is Afrikaans for fine bush and refers to the fine, needle-like leaves of many fynbos species. One 15km sq reserve has 1,600 species of plants!! Of course there will be more than just a few succulents that I discuss and I'll share some highlights from short trips to Namibia including Welwitschia and tree aloes.

Please join us for this very special presentation with Ernesto's excellent photography, lots of fun and some great stories!

FREE PLANT GIVEWAY

Adenium

The giveaway this month is 'Black Ruby', a clone of Adenium obesum selected in Florida. A. obesum is one of several species of the genus which occur in scattered locations from the Arabian peninsula and the island of Socotra down to southern Africa. All of the species contain attractive brightly colored flowers, and have interesting succulent stems. Inter-specific crossing is resulting in many spectacular new clones every year. Much of the impetus for variety development resulted from the ideas and clones developed by our club member Mark Dimmitt. Examples of some of his crosses and much more information is available at **http://adenium.tucsoncactus.org/**. Adeniums are cold-sensitive, so are best kept in containers to allow moving to a warm spot in the winter. A care-sheet for Adeniums is available in the **publications section** of the club's website. The Adeniums are being donated by Dave Palzkill.

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Tucson Cactus and Succulent Society

Thursday October 2, 2008 at 7 pm

Presentation by Susan T. Fisher

"Botanical Illustration - What Have You Done for Me Lately?"

"Botanical Illustration - What Have You Done for Me Lately?" is my way of putting a humorous spin on the history of botanical illustration; pointing out some of the common threads that weave this art form into the fabric of history - right into modern times where we continue to find its unique form of documentation useful and its aesthetics delightful.

Susan T. Fisher is the Director of the **Art Institute at the Arizona-Sonora Desert Museum**. She is the former Coordinator for the **Botanical Illustration Program at Denver Botanic Gardens** where she created the Certificate Program in Botanical Art and Illustration known throughout the United States. Susan is on the faculty of the **Art Institute and Filoli Gardens** in California. She conducts workshops throughout the United States. Her artwork is in many books, journals, and private collections. Susan is the Immediate past president of the **American Society of Botanical Artists**. Her BA degree includes three years of advanced study in art history at the **University of Bordeaux** in France. Susan's time is divided between her studios in Denver, Colorado and Tucson, Arizona.

Please join us for this very special presentation about an extremely historical artistic expression.

FREE PLANT GIVEWAY

Agave multifilifera
This is a medium size, generally non-offsetting plant, growing to about 24-36 inches tall by 24-48 inches across. The narrow leaves have nice white markings and thin, white threads along the edges. Plants are hardy to at least 15 degrees F, prefer a little afternoon shade, but will grow fine in full sun. They do require some water in the heat of summer to keep them from turning to crispy critters. They grow fine when planted in native soil; just make sure drainage is adequate.

Agave schidigera
This medium sized Agave will top out at about 24-30 inches tall and 36 inches across. The narrow, dark green leaves are decorated with white marks and thin white threads along the edges. Plants are hardy to at least 17 degrees F, prefer a bit of afternoon shade, but are fine in full sun as long as they get supplemental water in the summer. They grow fine when planted in native soil; just make sure drainage is adequate.

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Thursday November 6, 2008 at 7 pm

Presentation by Woody Minnich

"Brazil, Bahia to Minas Gerais, Cacti under the blanket"

Photo by Stephen Cooley

This presentation will feature the cacti, bromeliads, and other succulents from Bahia to Minas Gerais, a region known as the Brazilian Highlands. This is my second excursion into these areas and this time I was joined by Brazilian cactus expert, Marlon Machado. Our adventure was from Salvador to almost Belo Horizonte and our group was small, thus allowing us to explore new areas as well as visit many of the old, must see sights. We will see 22 species of Melocactus, all the Uebelmannias. many Discocatus, most of the Micranthocereus and Coleocephalocereus (Buiningia), many Pilosocereus as well as the rare Arrojadoas and the new Pierrebraunia. As is usual, I will feature some of the people and their culture, the towns and their architecture and some of the creatures that live with our favorite plants. We will learn the importance of the coastal winter fogs, the Blanket, and how it affects the overall cultivation of these wonderful and specialized genera.

Woody Minnich grew up in the desert of California and has been a cactus enthusiast his whole life. He has made over 100 trips to Mexico and South America studying various genera of cacti and succulents, and is considered an authority on a number of genera. He has given numerous lectures and presentations about cacti in habitat from his trips all over the world. Woody is an avid photographer and has had many of his pictures published in various books and periodicals. Since 1975, he has owned the nursery Cactus Data Plants where he has become a primary source for rare and well grown cacti and other succulents. He has been a show chairman for various cactus shows, creator of the Inter-City Show, and has become a leader in the artistic presentation of cacti and succulents (habitat staging). Woody is an Honorary Life member of numerous C&S clubs and has served as President, News Letter editor, Plant Culture chairman, Program Chairman as well as most other positions where there is something that needs to be done. He has been in the process of writing 3 books: Cacti of Baja California, Field Observations of the Genus Mammillaria, and Rare Cacti of Mexico. Hopefully some day, one or more of these texts will be in the hands of his fellow hobbyists. He is a retired high school graphics arts and art teacher of 32 years, Now, in retirement, his main focus is on doing serious field study and observation of the Cactaceae. He and his wife Kathy live in Edgewood New Mexico where he runs his nursery CDP.

Please be sure to attend our last presentation meeting for 2008. Woody will present a great program that you should not miss! He will also be bringing plants from his nursery in New Mexico and those plants will be for sale to anyone interested.

FREE PLANT GIVEWAY

Ferocactus latispinus - Crows Claw Barrel Barrel Cactus or Ferocactus are a dramatic group of plants that are excellent landscape plants. The genus is diverse and readily available at local nurseries. With some planning your landscape can have flowering Ferocactus 12 months out of the year. This month we are featuring the Crows Claw, which blooms in November and December with showy purple flowers, sometimes white, pink or even yellow flowering forms can be found. The species is an excellent landscape plant and can be acclimated to full sun and is hardy to cold in our region. Thorough regular watering will keep the plants well hydrated and able to grow into stunning thick spined specimens. In March the pollinated flowers will develop maroon fruits which will add interest to your landscape. They are native to Mexico from Mexico City Northwards.

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