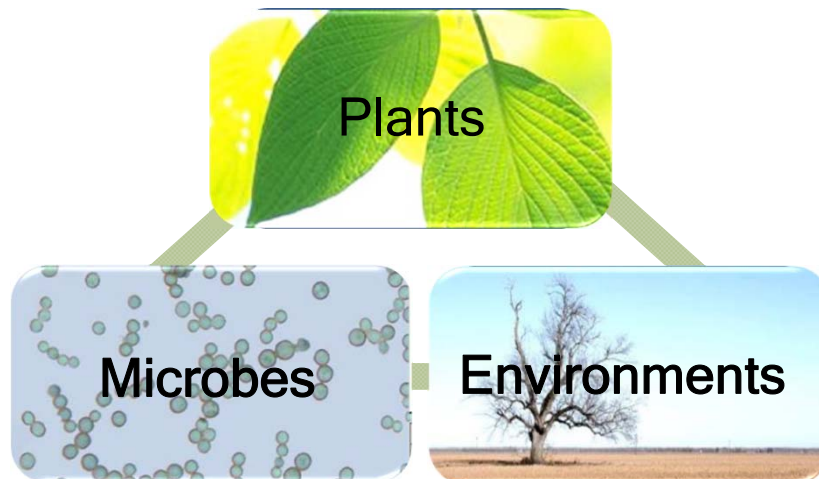


The School of Plant Sciences



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***We work on...***

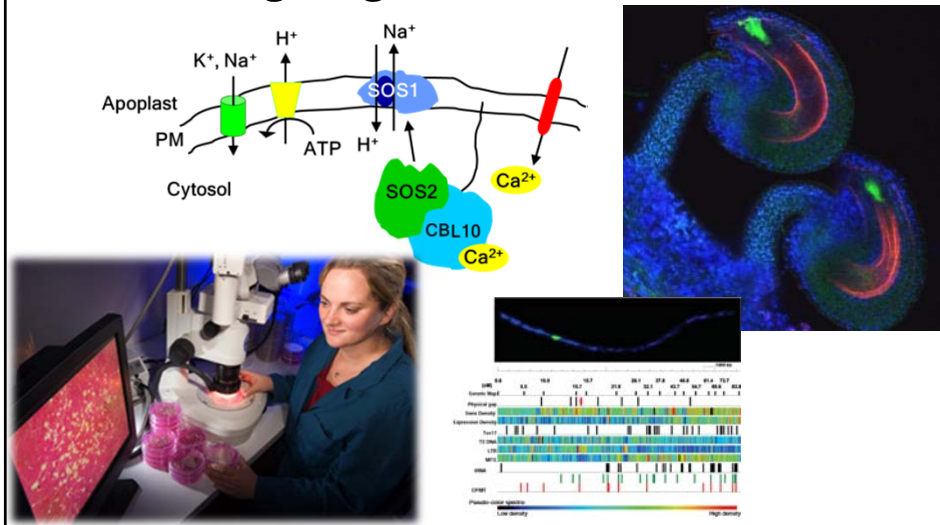


# Various production systems



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### *From cutting-edge sciences...*



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***...to innovative applications!***

Urban agriculture



Phenotyping in fields

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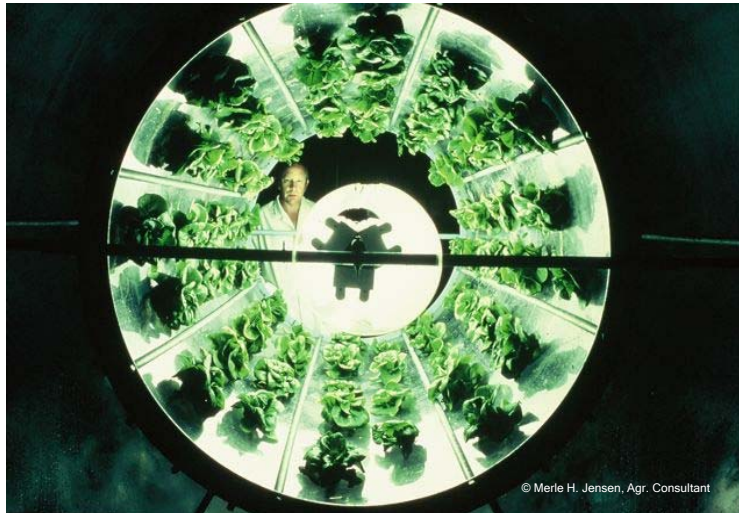
***...in various crops for food, feed  
& quality life!***





## The School of Plant Sciences

***...beyond your imagination!!***



## Undergraduate Education



## School of Plant Sciences

College of Agriculture and Life Sciences

**Majors and Minors in:**  
**Plant Sciences**  
**Sustainable Plant Systems**



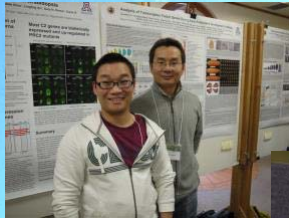
## Graduate Programs



## School of Plant Sciences

College of Agriculture and Life Sciences

**MS and Ph.D. in Plant Sciences and Plant Pathology**



**7,212,010,600**

US Census Bureau  
2/9/2014 8:55PM



**The 9 billion-people question**  
A special report on feeding the world | February 26th 2011

## Grand Challenge Question


**How do we grow enough food to feed the world in < 40 years?**

New varieties are needed with 2-3X yield  
**BUT** require less water, fertilizer, pesticides & land

**“Green Super Crops”**

Slide by Rod Wing

### Diversity in wild rice species



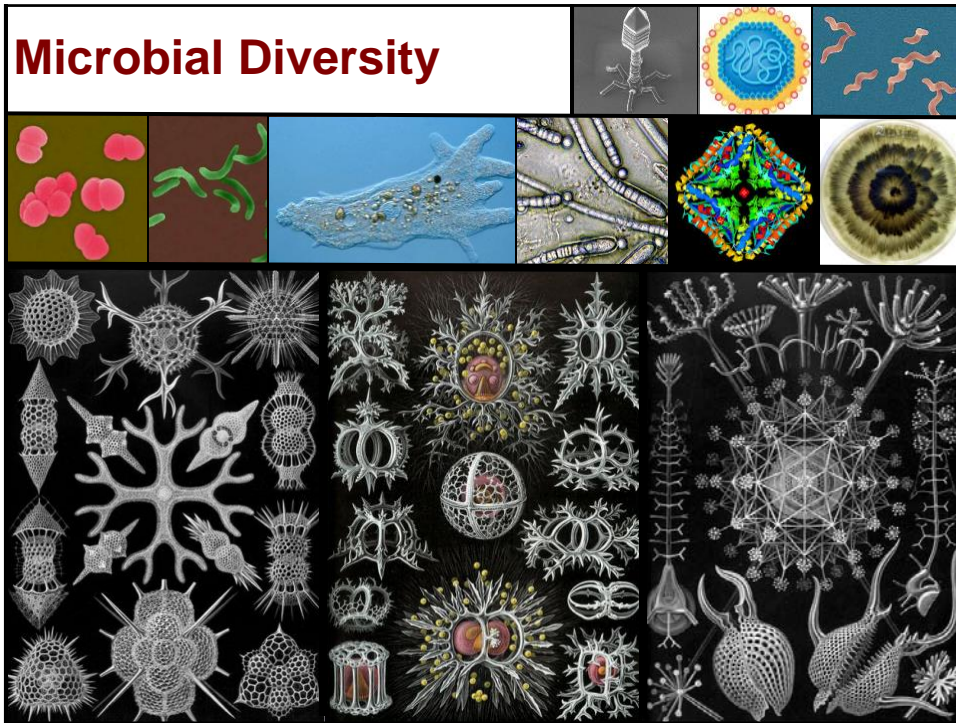
O. sativa	O. glaberrima	O. rufipogon	O. punctata	O. minuta	O. officinalis	O. alta	O. australiensis	O. brachyantha	O. granulata	O. ridleyi	O. coarctata
(AA)	(AA)	(AA)	(BB)	(BBCC)	(CC)	(CCDD)	(EE)	(FF)	(GG)	(HHJJ)	(HHKK)

**Traditional crop improvement (breeding) may have overlooked important key genes to develop ‘Green Super Crop’**

After slide provided by Rod Wing

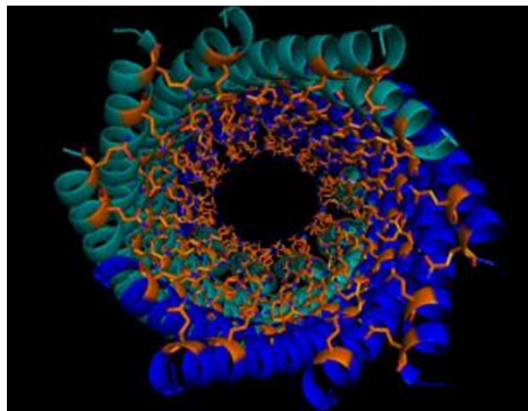
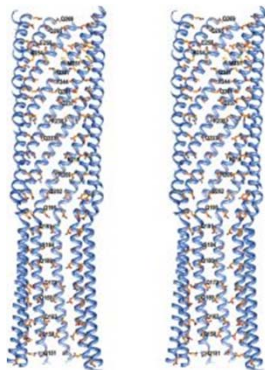
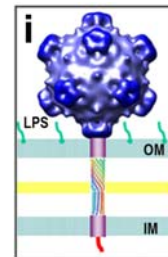


## Microbial Diversity



## Virus Structure and Morphogenesis

Dr. Bentley Fane and his research team recently solved the first atomic structure of a virally encoded, DNA translocating conduit.



## Growing Gourmet Mushrooms that Recycle Waste



**Dr. Barry Pryor** is developing systems for recycling landscape and consumer waste products as substrates for growing gourmet and medicinal mushrooms.

## New Arid Land Animal Feed Crop

By 2050 global needs are 70% more food and 235% more animal production requiring animal feed production to double.

**Dr. Eliot Herman** has used biotechnology to restructure a Camelina from being an oil-dominant to a protein-dominant seed with a 30% protein and 18% oil composition similar to soybean.

*Camelina is productive on marginal lands and water. In Arizona it may be feasible to have two crops per Winter that together could rival the per acre Midwest soybean protein production.*



Over-Winter Test Crop

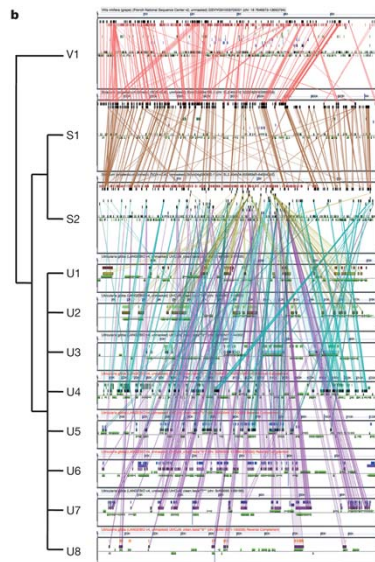


## Plant-based Therapeutic

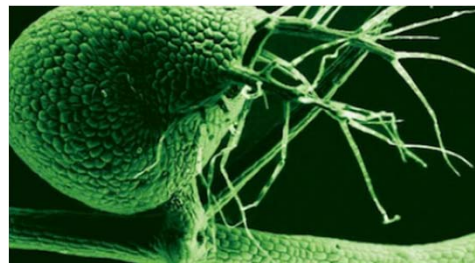
**Drs. Eliot Herman and Monica Schmidt** work on developing a novel approach to prevent death in premature infants through addition a therapeutic protein to soybeans.



## Comparative Genomics



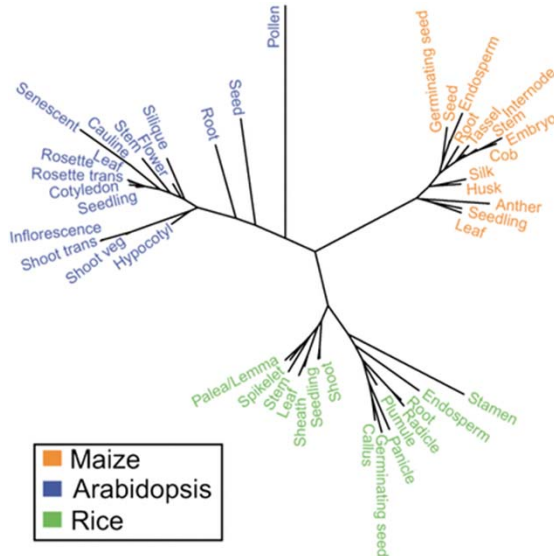
**Dr. Eric Lyons** developed a comparative genomics software system GoGe and uses for revealing revolution history of a carnivorous baladderwort plant.



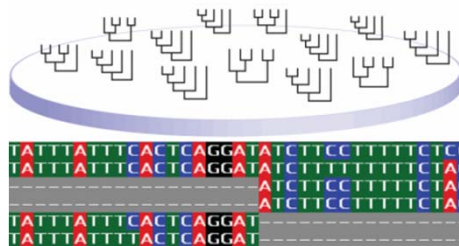
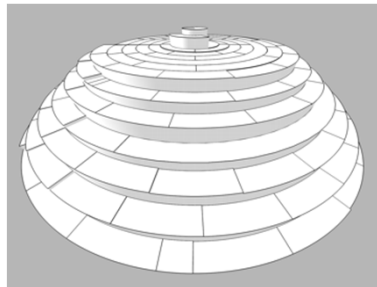
## Bioinformatics – Gene Expression in Angiosperm Organ Evolution

**Dr. Xiangfeng (Bryan) Wang**

analyzed transcriptome data of maize, rice and Arabidopsis to find gene expression divergence across organs.



## Terraces in Phylogenetic Tree Space



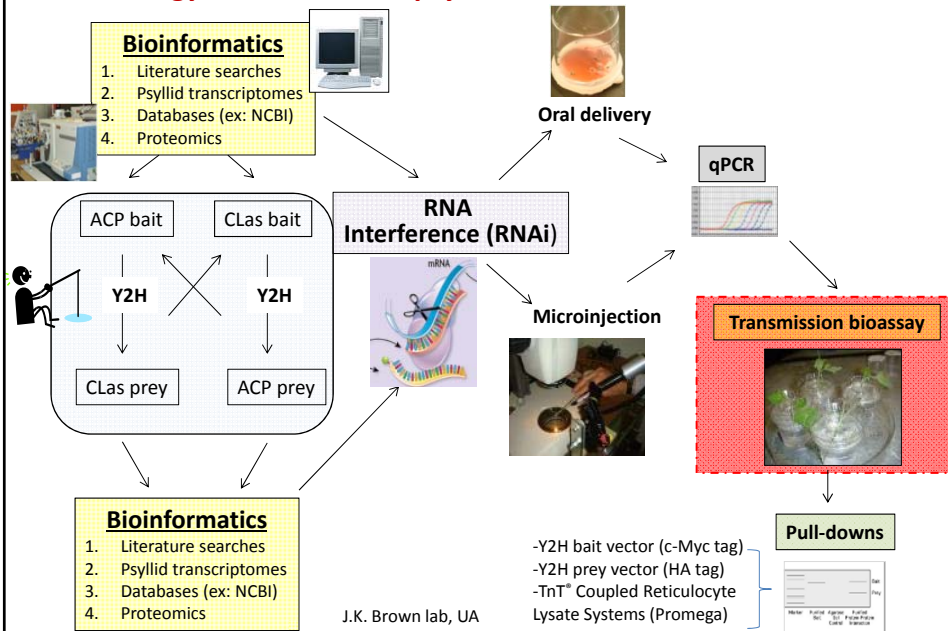
**Dr. Michelle McMahon** works on computational analyses to assemble the tree of life and developed new algorithms to find evolutionary relatedness.

# Prevent Citrus Greening Disease

**Dr. July Brown** works on finding molecular effectors that mediate interactions between psyllids and a bacterium causing citrus greening disease.



## Pipeline for identifying effectors to implement an 'interference strategy': abatement of psyllid transmission of Liberibacter





## High Throughput Phenotyping



## The Arizona Phenotyping Network (AZPN) Yuma – Maricopa – Tucson

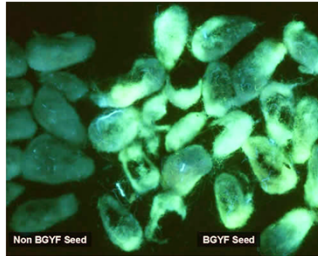


**Rod Wing – UA Plant Sciences/Arizona Genomics Institute**

**Matt Jenks – USDA/ARS Maricopa**







**Chieri Kubota – UA Plant Sciences/Controlled Environmental Agriculture**

## Reduce Aflatoxin in Crops

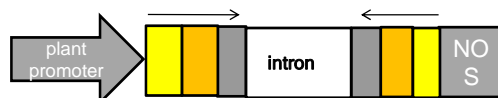


**Dr. Peter Cotty** works nationally and internationally on ways to reduce aflatoxins, toxic chemicals that certain fungi produce during crop infection.

## Developing Aflatoxin free Crops

	<b>Maize</b> 16 million tons		<b>Soybean</b> 2.3 million tons
	<b>Rice</b> 12 million tons		<b>Groundnut</b> 1.8 million tons
	<b>Copra</b> 3.7 million tons		<b>Sorghum &amp; Millet</b> 0.4 million tons

**Dr. Monica Schmidt** works on engineering the ability to suppress aflatoxin production in both corn kernels and peanut seeds



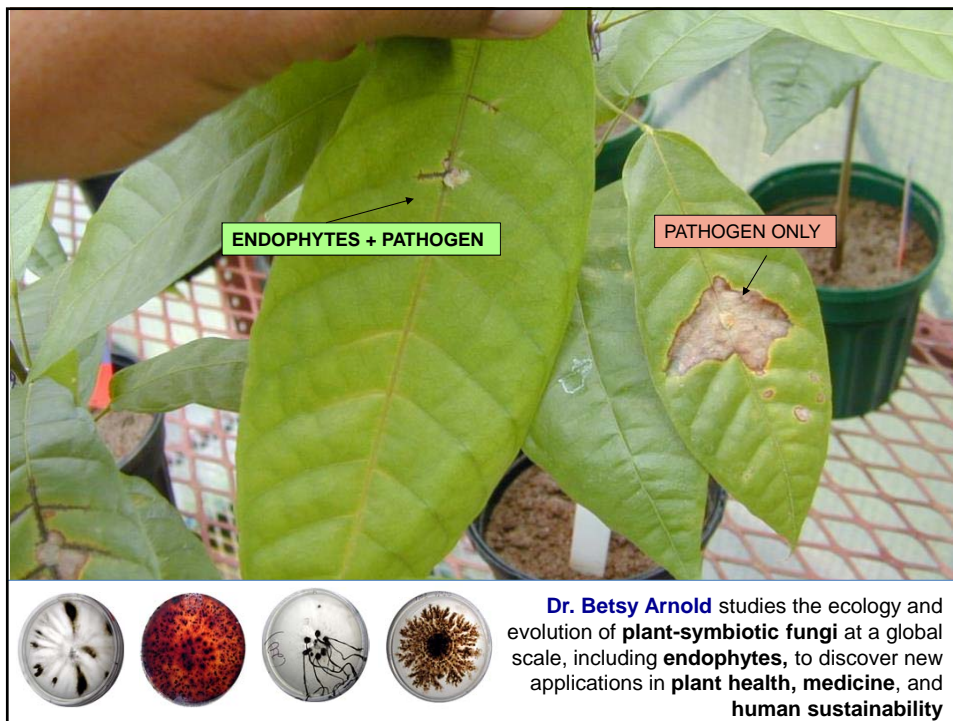
RNAi plant expression cassette targeting 3 sections of the polyketide synthase gene in *Aspergillus* - a initial step in the aflatoxin pathway

Grand Challenges | EXPLORATIONS

## Measuring Differences in Gene Expression in Different Plant Cells

### Dr. David Galbraith

is an expert in developing methods for analyzing the differences in gene expression within the many different cell types that make up plant organs. He is now applying these methods to probe the earliest events in the onset of pancreatic cancer.





## Growing Flavorful Strawberries in Arizona

**Dr. Chieri Kubota**

develops ways to grow high quality strawberry hydroponically in Arizona greenhouses for potential winter production.



## Establishing Guayule Production



**Dr. Dennis Ray** works on introducing guayule as alternative crop in Arizona. Ray lab contributes to breeding guayule and improving horticultural practices to improve yields.



## Plant and fungal diversity

The **UA Herbaria** identify plants and fungi for veterinarians, producers, gardeners, and enthusiasts.

**Dr. Michelle McMahon**  
and **Dr. Betsy Arnold**,  
Curators



## Turfgrass Science & Management

Career opportunities:

Plant stress physiologist.  
Irrigation and water management.  
Soils and nutrition specialist for turf.  
Golf Course Superintendent  
Sports Turf Manager  
General turf agronomist  
Product development, irrigation, fertilizer, cultivars.  
Sod production.  
Environmental fate and use of amenity grasses.  
Seeds specialist.  
Equipment engineering.

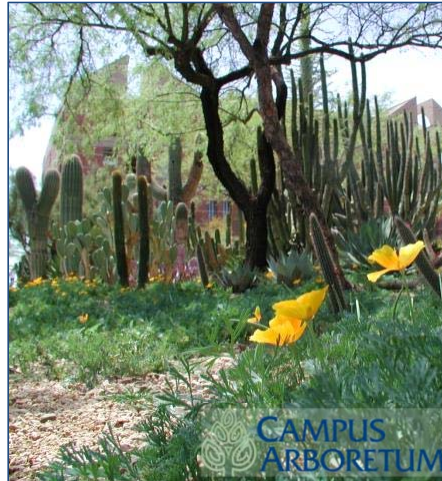






## Improving Landscape Management Through Science-Based Practices

**Dr. Tanya Quist** directs the University of Arizona Campus Arboretum in promoting conservation and stewardship of urban trees. The program provides training to students, landscape professionals and community leaders who support decisions relating to urban tree health and sustainable landscapes.



## Irrigation Requirements of Landscape Trees

September 2007



April 2010



Desert willow



Mesquite



Pistachio



Palo verde



June 2013

**Dr. Ursula Schuch** is investigating how much or how little irrigation landscape trees need to stay healthy and give us the shade we need in our desert environments.







# The School of Plant Sciences

**Translating  
basic plant and  
microbial  
science  
research to  
applications.**

