**School of Plant Sciences Responses to Dean Burgess’ Questionnaire**

1. **How are we unique in the college, on campus, in the State, in the world?**

**We are an important face of CALS, interacting with the public directly through our work in and links to cooperative extension, the University of Arizona Herbarium, the Robert L. Gilbertson Mycological Herbarium, the Campus Arboretum, Urban Horticulture, and other programs. We collaborate with high school teachers and conduct outreach to Native American nations, school children, and the public.**

**We directly impact the state’s agricultural production (including specialty plant production), environmental stewardship, natural resource conservation, urban horticulture, and economy. We have a direct link to Cooperative Extension faculty located in Arizona’s counties and collaborate with them to conduct locally relevant research and provide educational programing to rural Arizona. Through the Master Gardener, Turf, Urban Horticulture, and other programs we also impact Arizona’s urban populations. Our extension faculty are an integral component of the Arizona Pest Management Center and Crop Production Teams and help provide agronomic and pest management programing to Arizona farmers.**

**We are the only unit on campus studying plant function and the microbial communities that interact directly with plants at the molecular, whole plant, and population (natural and cultivated) levels. This broad spectrum of expertise and approaches distinguishes us from all other plant and microbial programs nationally and worldwide.**

1. **What should we be known for?**

**Having an integrated School with world-class faculty that contribute to the needs of our stakeholders, while also publishing basic research that provides the foundation for future discoveries and applications.**

**Program excellence in arid and semi-arid agricultural crop production and expertise in salinity, heat tolerance, and plant water use efficiency as they are impacted by global climate change.**

**Development and leveraging of world class genomic, computational, and bioinformatic resources (e.g., Arizona Genomics Institute, the iPlant Collaborative) for the analysis of crop plants and their associated microbes. Being at the forefront in the development of resources and cyberinfrastructure needed for global efforts to understand the available genetic diversity in natural populations and applying the resulting knowledge to the improvement of crop plants.**

**Expertise in the genetic and developmental characteristics of model experimental plants and related crop plants and their interacting microbes, with the ability to use this information to improve growth, development, and adaptation of crop plants in various environments.**

**CEAC – a unique merger of whole plant biology and engineering expertise for production of select high value commodities in controlled environments.**

**Broad, flexible and rigorous undergraduate and graduate educational programs that provide training for the next generation of plant and microbial biologists, and that we are recognized for the quality of our graduate and undergraduate programs and the success of the students who have been through them.**

**International collaborations with premiere agricultural institutions in emerging economic powers, such as the Huazhong Agricultural University in China.**

1. **What are we known for?**

**We are known for many of the items in number 2, particularly the genetics and genomics of crop plants, and we plan to continue to build upon our strengths and accomplishments in this area.**

**We can document successful applied research and extension/outreach programs. Specific examples include:**

* + **Produce safety (Fonseca, Nolte)**
  + **Turf research and education (Kopec, Pessarakli)**
  + **Weed management and precision agriculture, participation in the Arizona Pest Management Center (McCloskey, Olsen and Matheron)**
  + **Controlled Environment Agriculture (Rorabaugh, Kubota, Schuch and Giacomelli)**
  + **Nursery professionals education (Schuch)**
  + **Insect-plant interactions, virus-vector biology research and diagnostics in vegetable-cotton systems and ornamentals (Brown)**
  + **New Crops and Bioenergy production (Ottman, Wang, McCloskey and Ray)**
  + **Fruit crop production and physiology (Wright)**
  + **Alfalfa, Cotton, small grains and agronomic crop rotation management (Wang, Ottman)**
  + **Plant disease diagnosis and management of aflatoxin amelioration (Olsen, Cotty)**

**In addition to strengths in plant molecular biology and genomics, we have active and award-winning faculty in microbiology. We focus on viruses, bacteria, fungi, and nematodes, and provide unique expertise in their biology – yet our studies of microbial pathogenesis, genomics, and natural products transcend organismal boundaries. We have a special faculty presence/strength in mycology.**

**We have outstanding teachers and mentors among our faculty who are passionate about the integral nature of education in academic science.**

1. **How are we positioned compared with others "like us" that gives us a competitive advantage and allows us to capture value?**

**There are not many “like us” in the nation in terms of the diversity of our faculty. We have many research areas and disciplines in one unit (horticulture, agronomy/crops, turf, genomics, biotech, biology, pathology, and microbiology) and can form integrated groups of faculty to address important problems and opportunities.**

**We are known for excellence in genomics and are developing computational biology and bioinformatics to enhance fundamental studies of plant and microbial growth, their development and adaptation to the environment. Our geographic location in an arid region, and the significant effect that global warming is expected to have here, provide us with the opportunity to create niches of collaborative research that will allow us to tap into nationally and globally targeted funding opportunities.**

**We have strong and flexible extension programs directly linked to applied research that collaborate with and serve a diverse, vibrant agricultural industry that takes advantage of our climate to produce intensively managed, high quality, high yielding food and fiber crops. Our Extension programs can and do respond rapidly to the concerns of our stakeholders and the issues that they face.**

**As enumerated in the answer to question 1, we have excellent facilities and resources, located in a geographically and climatically unique, arid and semi-arid landscape: The Controlled Environment Agricultural Center, The Karsten Turfgrass Research Center, The Campus Arboretum, the Campus, Yuma, Maricopa and Safford Agricultural Centers.**

**Plant Science faculty collaborate with scientists and staff at the USDA Arid Lands Agricultural Research Center located at the Maricopa Agricultural Center and the USDA-NRCS Plant Materials Center in Tucson. Few, if any, other universities located in arid or semi-arid environments have the quality of facilities, research expertise or extension education programs that are characteristic of our School.**

**Several small grain plant breeding companies are located in the state due to our mild winter climate and Plant Sciences faculty gain access to plant materials and valuable information. Indeed, several national and international companies produce a large proportion of their cotton seed in the State, and Plant Sciences faculty benefit from contacts with these companies.**

**We are in close proximity to Mexico, many of our faculty have contacts and work in Mexico and we educate students from Mexico.**

1. **How are we doing right now?**

**We are working to be more than the sum of our parts by developing a shared vision of our future, and a strong supportive infrastructure. We hope to build on our strengths as our junior faculty develop their research programs and through collaborations (continuing and new) in the School, the University, nationally, and worldwide. In the medium to long term, we hope to build our strengths with faculty hires that will allow us to understand processes underlying plant biotic (microbe) and abiotic interactions and sustainable agriculture. Future faculty hires might include individuals with expertise in: 1) plant signaling and gene regulation of plant perception and response to microbes and the environment; 2) the use of genetic and genomic resources to improve disease resistance, drought tolerance and water use efficiency of crop plants; 3) how to exploit natural genetic variation to develop new crops and model plants for crop improvement; 4) understanding microbial populations that are beneficial or detrimental to the growth of crop plants.**

**As a group we feel that we will be able to leverage our scientific productivity in the form of IP/patents that benefit the individual investigator and the University with additional resources and expertise from the University in areas of technology transfer and business development and strategic planning. Through collaborations between basic and applied faculty, it should be possible to license some of our discoveries.**

**As we continue to take on significant teaching responsibilities in plant sciences, microbiology, molecular and cellular biology, and biochemistry courses, especially responsibilities in high enrollment courses, we hope to have increased support from CALS in the form of teaching assistantships and the administrative support required for managing and handling these courses.**

1. **What are we doing that is:**
2. **Essential and positive,**

**As a unit, we believe that nearly every activity in which we participate is geared towards the success of individual faculty members in research, teaching, extension, and outreach and that all of these activities contribute substantially to the strength of the unit , the College and the University. We are focusing our activities on:**

**(1) Maintaining facilities and resources that support stakeholder and societal needs:**

* + **The Campus, Maricopa, Safford and Yuma Agricultural Centers**
  + **The Controlled Environment Agriculture Center**
  + **The Campus Arboretum**
  + **The Gilbertson Mycological Herbarium**
  + **The UA Herbarium**
  + **The Karsten Turfgrass Research Center**

**(2) Growth of our undergraduate program by: a) a thorough program assessment; b) revision of our undergraduate curriculum; c) implementation of a faculty mentoring program for our undergraduate majors; d) participation in creative outreach activities (for example, Plant Science Family Night and the Tucson Math and Science Fun Fest).**

**(3) Development of new undergraduate courses for non-science students to draw more students into the plant sciences.**

**(4) Identification of stable sources of financial support for graduate students.**

**(5) Working to recruit and retain world class Faculty.**

**(6) Maintaining continuous funding for our research and extension programs by applying for and receiving individual investigator awards and collaborative multi-institutional awards (for example, plant and microbial genome grants) that involve teams within the School and institution.**

**(7) Supporting and enhancing a nationally/internationally known seminar program that allows interaction with leaders in the fields of plant and microbial biology.**

**(8) Generating a continuous record of high impact publications that define our specific fields of research.**

**(9) Outreach to our disciplines. Our faculty members are active in many extramural activities including organizing national and international meetings, influencing funding through participation in grant review panels and as program officers for federal agencies.**

1. **Essential and neither positive or negative,**

**Essential but negative,**

**Some reporting activities overload our understaffed PLS office.**

1. **Not essential and neither positive or negative,**
2. **Not essential and negative.**
3. **What deliverables must be maintained?**
   1. **Well educated undergraduate and graduate students.**
   2. **Contributions to the advancement of science and technology through publications and presentations at national and international conferences and extension meetings.**
   3. **A valuable impact on and support of agriculture in Arizona and other semi-arid and arid climates.**
   4. **Outreach and extension programs that support industries and other stakeholders (including educational training and off campus teaching programs).**
   5. **Growth in our undergraduate enrollment.**
   6. **Funding ways to support graduate student training.**
   7. **Retention of world class faculty.**
   8. **Our success with extramural research funding.**
   9. **Our seminar program.**
   10. **Outreach to our disciplines, community, and state**
4. **What deliverables must be enhanced?**

**Most of the deliverables described in item #7. Priority should be given to the growth of our undergraduate program, ways to increase funding for grad students (RAs and TAs), and expansion of our research funding and publishing. Additional effort should be placed on distance education programs and coursework offerings/educational opportunities that meet the needs of the stakeholders. We recognize that there is demand for training students who will work in industry and our curriculum should strive to provide courses that integrate science with practical details and applications. In this vein, we need to develop internship opportunities for our undergraduate students. We are developing ideas for creation of new undergrad majors that can be managed through our program solely, or in collaboration with other units in CALS. For example, some faculty members have proposed establishment of a biotechnology degree program with three emphases (General Biotechnology, Plant Biotechnology, and Microbial Biotechnology) and perhaps expansion to Animal Biotechnology later.**

**9. What do we do that should be discontinued or modified?**

**We need to minimize faculty interactions that foster the perception of “Divisions” in the School. Rather, we need to enhance communication and research collaborations within the School. This might be improved through research retreats, organized faculty research interactions, and the development of a School journal club.**

**10. What resources exist in our team, Unit, CALs, UA, the world at large that can help us?**

**We have great growth facilities (CEAC, growth chambers, > 2,000 acres of irrigated farm land, plant and mycological herbaria, molecular core facilities) and an enthusiastic, creative, and committed faculty and staff. We have a joint undergraduate degree program with SWES in crop science, and collaborations exist with other departments (e.g., the Arizona Biological and Biomedical Sciences graduate recruitment).**

**11. What are we passionate about?**

**We want to maintain our identity as a nationally and internationally recognized program in plant and microbial biology.**

**12. What are our positions versus our competitors that give us a (unfair) competitive advantage**

**and delivers value?**

**We appreciate the long term commitment on the part of the University, and CALS in particular, to maintain and support our unit and believe this support has and will continue to help us be successful in delivering world class research and funding.**