Bioagricultural Sciences and Pest Management - Bachelor of Science

Department: The BSPM includes researchers who study plant pathology, entomology, weed science, and abiotic plant stress. These plant stresses result in annual crop losses of approximately 40% of what is produced annually. Invasive plants, pathogens, and arthropods transported through global trade also cause significant disruptions to natural systems worldwide, affecting important factors such as forest health, water quality, and soil preservation. Currently, the BSPM department does not offer an undergrad major, so students at CSU do not have a comprehensive undergrad program in how these biotic stresses impact agricultural and natural systems.

Type of Degree: Bachelor of Science

Name: We are still gathering feedback from faculty and stakeholders on the name. It will be one of the following:

1. Sustainable Plant Health
2. Agricultural Biology
3. Plant and Ecosystem Health
4. Agroecology

Learning Goals: Our major will focus on plant and ecosystem health in agricultural and natural ecosystems and will provide the following:

Technical competency: Integrate skills and knowledge to solve problems related to plants, insects, and microbes.

Agricultural Literacy: Formulate coherent, objective, and balanced arguments regarding management of biological problems.

Critical Thinking: Describe, assess, analyze, and synthesize knowledge from across the curriculum to create solutions for pests and beneficial species.

Leadership: Promote and practice inclusion to form effective teams that solve complex problems.

Communication: Communicate effectively with broad and diverse audiences regarding sustainable management.

Evidence of Need/Demand:

1. No CSU majors prepares undergrads with a comprehensive understanding of how biotic stress (weeds, microbes, arthropods). As a result employers in this area do not look to CSU for students.

2. Biotic stresses on agricultural and natural ecosystems continue to increase due to global trade and climate change.

3. Employment in areas related to plant health in industry, non-governmental organizations, academia, and government will remain strong since weeds, microbes, and arthropods will continue to cause increasingly complex problems affecting food security, safety, and quality.

4. Surveys of employers in agricultural industries consistently show that employers seek broadly trained students who understand systems rather than students with narrow training in specific disciplines. Our major will provide a systems-based approach to managing the health of agricultural and natural ecosystem.

5. To our knowledge, only one other Land Grant University (Mexico State University) offers a similar degree program. Their program currently enrolls ~50 students and is growing, even though overall enrollment in their university and college is shrinking.

6. Undergrad interest in biological sciences and food systems is strong. This major will allow us to attract students interested in ecosystems biology, agriculture, and food systems who might not otherwise attend CSU. Importantly,

similar programs do not exist at most land grant campuses, mainly because the disciplines required for it are usually split across multiple departments so coordination of such a major is difficult. Therefore, we can recruit nationally with this major and will have little competition from other land grant universities.

Fit with Mission of BSPM and CAS:

BSPM: Teaching excellence is one of the core values of the BSPM department. Despite not having an undergrad major, BSPM has strength in teaching and faculty in BSPM contribute to numerous other majors through teaching introductory and advanced courses in entomology, plant pathology, and weed science, as well as teaching in the LIFE courses. Development of a major will allow us to further develop excellence in teaching by aiding us in connecting concepts across the courses that we teach.

CAS: This major, with its system-based approach to management of the health of agricultural and natural ecosystems, fits well with the land grant mission of our college and university. Our college is becoming a leader in agribiome and agri-tech and our major will encompass both of these concepts. For example, plant pathology is essentially the study of how the microbiome impacts plant health and management of weeds involves biotechnology and many aspects of agricultural engineering, so includes agri-tech. CAS is also planning to increase in the number of undergrad majors and our program will aid in this goal as well.

Estimated Size after 5 years: ~80 students

Estimated Additional Resources: We have the resources to initiate this new major and can support growth of the major through 236 funds and our base budget.

Courses: The proposed major will require 4 new courses to synthesize the concepts introduced to the students and build cohorts. These courses include 1 credit seminars at freshman, sophomore, and junior levels and a 3 credit senior capstone. We have 22 faculty in our department and among our faculty, have the teaching resources to offer these additional courses.

We anticipate that additional sections will be required for two of our current courses (Plant Pathology and Weed Science). Expansion of the plant pathology course can be managed with existing resources. We've identified resources for an additional TA for the weed science course in the near term and if our major grows sufficiently, then 236 funds should be sufficient to cover the costs of this additional TA long term.

Facilities: Like many other departments, we find that scheduling space for classes is challenging. New teaching facilities are planned for CAS, which will aid us in increasing the size of current courses and in teaching the new seminar courses for this major.

Advising: CAS is hiring additional student success coordinators and during the initial phase of our major, college-level advisors will assist students in our undergrad major. Once we have enough students in the major, we will hire a departmental student success coordinator. The budget for this will be obtained from re-adjusting current departmental spending and from 236 funds.

Impact on other units: We do not anticipate that our major will be large enough to have a significant impact on other units that offer important introductory courses, such as Biology, Chemistry, and Math. We seek to bring in students who would not otherwise attend CSU, so do not anticipate that our major will draw significantly from other related majors at CSU.

Curriculum: The curriculum mirrors many biological sciences majors with regard to general requirements and it will prepare students for careers in agriculture and food systems industries and for graduate programs in the biological sciences. The main difference from related majors is that students will take courses in plant pathology, entomology, weed science, and integrated pest management that will provide them with a strong background in the biology, ecology, and management of microbes, arthropods, and plants that impact the health of agricultural and natural ecosystems. No other major at CSU offers this comprehensive view of management of biological systems for ecosystem health.