

# Department of Botany and Plant Pathology Undergraduate Program



Botany and Plant Pathology are concerned with the study of plants at all levels of biological organization, from molecular and cellular processes to the global ecosystem. This breadth of field reflects the wide range of issues and problems that confront plant biologists. In addition to addressing fundamental questions in plant biology, plant scientists in the 21st century will be called upon to provide information useful for producing food, fiber, and medicine for an increasing population, and for increasing our understanding of the diversity of plant and ecological systems and their interactions with humans. Students studying botany and plant pathology at OSU receive the basic science background necessary for such contributions, and may choose to focus in a particular area within plant science.

The undergraduate program in the Department of Botany and Plant Pathology is designed for students who wish to receive a B.S. degree in Botany and for students pursuing degrees in other fields that require a knowledge of plant biology. For example, students who have an undergraduate major in biology or environmental science may wish to emphasize botany courses in their upper division course work, or add a botany minor.

Completion of the undergraduate curriculum in botany can qualify students for graduate work in various areas of plant biology and plant pathology, and for positions in state and federal agencies and industries concerned with plants and their products.

Prospective botany majors should obtain a strong background in the biological and physical sciences at the high school level. Specifically recommended are a minimum of three years of high school mathematics, including algebra, geometry, and some exposure to trigonometry; one year of physics; and courses designed to develop computer and writing skills. Students without an adequate background in mathematics and science may make up these deficiencies early in their college careers.



The required curriculum meets the course requirements of the University and provides opportunity for specialized study in one or more principal areas of plant science. The undergraduate major, in regular consultation with a faculty advisor, prepares an academic program which meets University requirements, provides adequate scientific background, and fulfills individual goals and interests.

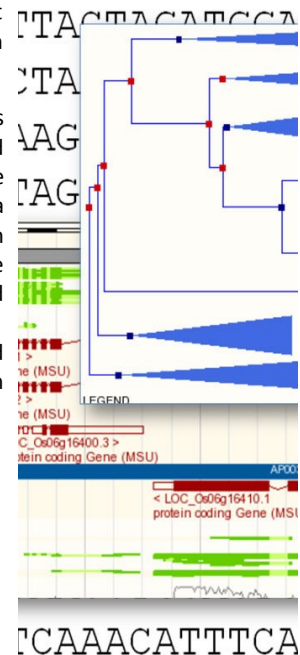
Required courses are listed according to a suggested schedule. The order in which particular courses are taken may vary in individual cases.



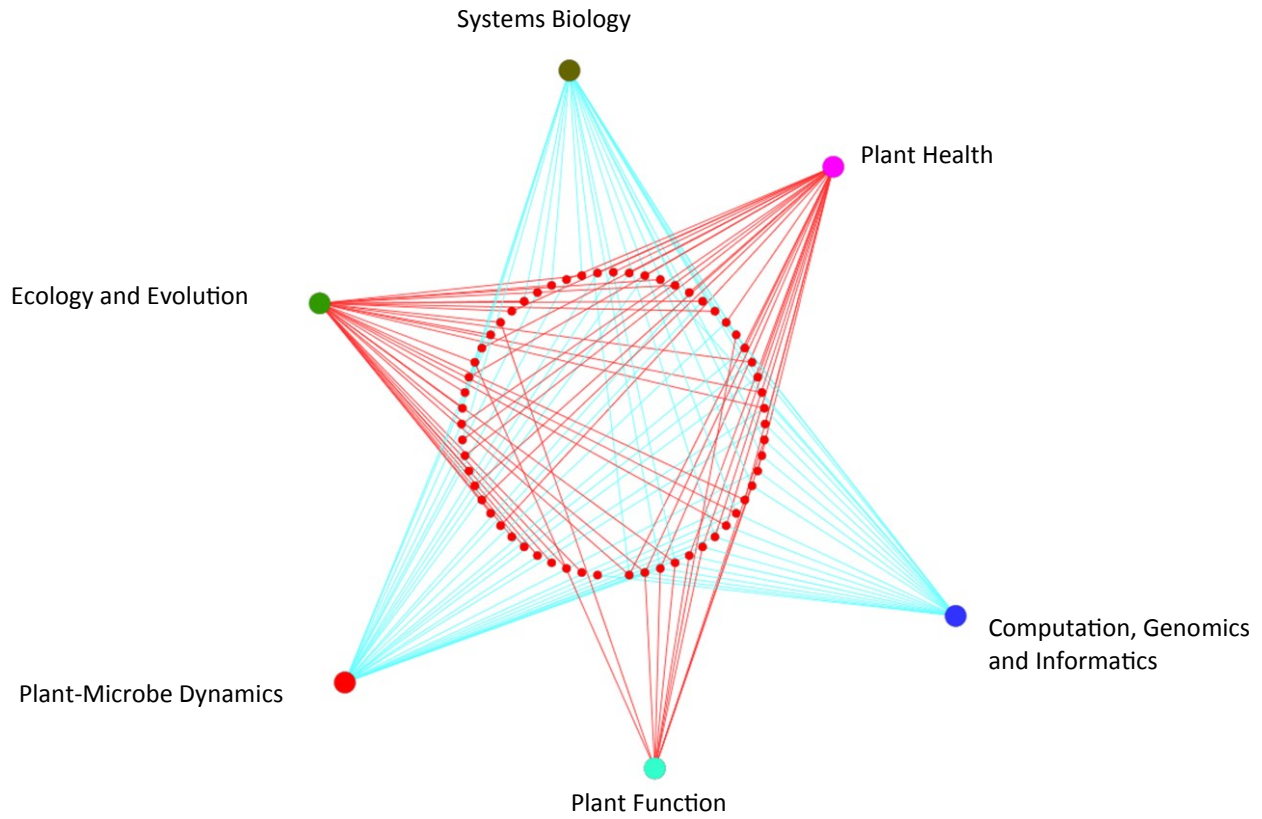
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Oregon State UNIVERSITY **OSU**



# Make Connections



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undergrad-bpp-club](http://bpp.oregonstate.edu/undergrad-bpp-club)



## B.S. DEGREE IN BOTANY

### Freshman Year

BI 211, BI 212, BI 213. Principles of Biology (4,4,4)

CH 121, CH 122, CH 123 (5,5,5); or CH 231, CH 232, CH 233. \*General Chemistry (4,4,4) and CH 261, CH 262, CH 263. \*Laboratory for Chemistry 231, 232, 233 (1,1,1)

Mathematics courses - 8 credits minimum from

MTH 111. College Algebra (4)

MTH 112. Elementary Functions (4)

MTH 231. Elements of Discrete Math (4)

MTH 241. Calculus for Management and Social Science (4)

MTH 245. Mathematics for Management, Life, and Social Sciences (4)

MTH 251. Differential Calculus (4)

MTH 252. Integral Calculus (4)

WR 121. English Composition (3)

Approved Speech (COMM) course (3)

Perspectives courses (6)

### Sophomore Year

BI 314. Cell and Molecular Biology (4)

BOT 220. Introduction to Plant Biology (4)

BOT 321. Plant Systematics (4)

CH 331, CH 332. Organic Chemistry (4,4)

HHS 231. Lifetime Fitness for Health (2)

HHS 241—HHS 248 Lifetime Fitness (various activities) (1) or any PAC course (1-2)

Additional approved writing (WRII) course (3)

Perspectives courses (6)

Additional Electives (9-10)

### Junior Year

BB 350. Elementary Biochemistry (4) or BB 450 and BB 451. General Biochemistry (4,3)

BI 311. Genetics (4) or PBG 430 and 431 Plant Genetics (3,1)

BOT 313. Plant Structure (4)

BOT 341. Plant Ecology (4)

ST 351. Intro to Statistical Methods (4)

Perspectives courses (6)

Synthesis courses (6)

Additional Electives including Botany area of concentration credits (10-13)

### Senior Year

BOT 331. Plant Physiology (4)

BOT 332. Laboratory Techniques in Plant Biology (3)

Non-vascular plants course:

BOT 461. Mycology (4)

or BOT 465. Lichenology (4)

or BOT 466. Bryology (4)

Additional Quantitative Skills Courses (minimum of two courses)

PH 201. General physics (5)

PH 265. Scientific Computing (3)

CS 161. Introduction to Computer Science (4)

CS 162. Introduction to Computer Science II (4)

ST 352. Introduction to Statistical Methods (4)

ST 411. Methods of Data Analysis (4)



others by approval of advisor

*Select one Writing Intensive Course from below:*

BB/BI 317. Scientific Theory and Practice (3)

BI 371. Ecological Methods (3)

BOT 323. Flowering Plants of the World (3)

CSS 325. Ag/Env Predicaments: Case Studies

HSTS 415. Theory of Evolution and Foundation of Modern Biology (4)

HSTS 419. Studies in Scientific Controversy: Methods and Practices (4)

HSTS 425. History of the Life Sciences (4)

MB 311. ^Molecular Biology Laboratory (3)

Additional upper-division biological science courses other than BOT courses (4)

Perspectives courses (6)

Additional electives including Botany area of concentration (11-14)

### **Botany Area of Concentration Requirements**

#### **Ecology, Evolution and Conservation (13)**

BOT 442. Plant Population Ecology (3)

BOT 488. Environmental Physiology of Plants (3)

FW 320. Population Dynamics (3)

BI 445. Evolution (3)

#### **Molecular, Cellular and Genomic (13)**

BB 451. General Biochemistry (3)

BB 494. Biochemistry Lab (3) or BOT 480. Photosynthesis and Photobiology (3)

BI 445. Evolution (3)

BOT 475. Comparative Genomics (4)

#### **Plant Pathology (13)**

BOT 350. Introductory Plant Pathology (4)

ENT 311. Introduction to Insect Pest Management (4)

MB 302. General Microbiology (3)

MB 303. General Microbiology Laboratory (2)

**TOTAL (180 credits)**

### **BOTANY MINOR**

Students interested in a minor in Botany must complete the following 27 credits:

BI 311. Genetics (4) or HORT/PBG 430. Plant Genetics (3)

BOT 321. Plant Systematics (4)

BOT 331. Plant Physiology (4)

BOT 341. Plant Ecology (4)

Additional 11-12 credits hours of upper division BOT courses.

[Excluding BOT 101 but may include BOT 401, BOT 405, BOT 407, BOT 410]

TOTAL (27 credits)

The minor requirements listed above are subject to the following constraints: Courses required for a major and taken in the major department may not count toward a minor. An individual course may not count toward more than one minor. At least 12 credits of the minor must be upper division.

## BOTANY OPTIONS

Undergraduate majors in botany may elect to complete one of the botany options listed below. Students selecting an option must complete the basic requirements for a B.S. in botany and 21 credits of additional course work as specified for the particular option. Options are not required. Options provided an additional transcript-visible credential for students who complete the required coursework. The particular course work selected to fulfill an option must meet the requirements listed here and be approved by the student's academic advisor.

### PLANT ECOLOGY AND SYSTEMATICS OPTION (21)

### PLANT MOLECULAR GENETICS AND BIOTECHNOLOGY OPTION (21)

### FUNGAL BIOLOGY OPTION (21)

### BOTANICAL RESEARCH OPTION (21)

## COURSES

### Lower Division Courses

- BOT 101. BOTANY: A HUMAN CONCERN (4). Introductory botany for non-majors emphasizing the role of plants in the environment, agriculture and society. Includes molecular approaches to the study of plant function and genetic engineering. Lec/lab. (Bacc Core Course). *Cannot be used for Botany majors or minors.*
- BOT 220. INTRODUCTION TO PLANT BIOLOGY (4). Introduction to plant biology including an overview of major groups of plants, plant cells and cell types, plant anatomy and architecture, physiology and function, and ecology and the roles of plants in the environment. Laboratory exercises build on lecture themes and provide hands-on learning experiences including field trips. Lec/lab. PREREQS: BOT 101 or co-enrollment in BI 101 or BI 211 or one term of college-level biology.

### Upper Division Courses

- BOT 313. PLANT STRUCTURE (4). The structural components of vascular plants and how plant structure relates to function, development, environment, evolution, and human use of plants. Field trip. Lec/lab. PREREQS: BI 213 or BI 213H
- BOT 321. PLANT SYSTEMATICS (4). Vascular plant classification, diversity and evolutionary relationships. Lab emphasizes the collection and identification of ferns, gymnosperms and flowering plants of Oregon. Field trips. Lec/lab. PREREQS: BI 213 or BI 213H
- BOT 322. ECONOMIC AND ETHNOBOTANY: ROLE OF PLANTS IN HUMAN CULTURE (3). Economic and cultural (ethnobotanical) uses of plants and fungi by humans, including domesticated cultivated plants as well as wild-growing plants, and uses of plants and fungi by indigenous cultures. Ecampus course only.
- BOT 323. FLOWERING PLANTS OF THE WORLD. (3). Global perspective of plant biodiversity with a focus on evolutionary origins, classification, and evolutionary relationships of the major groups of plants. Development and application of scientific writing and utilization of online information resources in plant evolutionary biology. (Writing Intensive Course) PREREQS: One year of college biology or departmental approval required.
- BOT 324. FUNGI IN SOCIETY (3). Explores the diverse roles played by fungi in relation to human civilization and the natural environment. (Bacc Core Course) PREREQS: One course in biological sciences.
- BOT 331. PLANT PHYSIOLOGY (4). Survey of physiological processes in plants, including photosynthesis and plant metabolism, mineral nutrition and ion uptake processes, plant/cell water relations, regulation of plant growth and development, and transpiration and translocation. Lec/rec. PREREQS: (BI 213 or BI 213H) and (CH 123 or CH 223)

- BOT 332. LABORATORY TECHNIQUES IN PLANT BIOLOGY (3) Laboratory experiences in the manipulation and observation of physiological processes in plant systems. Analysis and interpretation of physiological data generated in experimentation with plant systems. Training in basic laboratory skills, including the principles and procedures involved in the use of common items of laboratory instrumentation. Lab. PREREQ: BOT 331 or BI 314 or equivalent.
- BOT 341. PLANT ECOLOGY (4). Study of higher plants in relation to their environment. The relationship of plant physiology and reproduction to environmental factors; competition and other species interactions; the structure, dynamics and analysis of vegetation. Field trips. Lec/lab. PREREQS: BI 213 or BI 213H. BOT 321 is recommended.
- BOT 350. INTRODUCTORY PLANT PATHOLOGY (4). Symptoms, causal agents, diagnosis, and prevention of plant diseases, with emphasis on fungi, bacteria, nematode, and virus pathogens. Lec/lab. PREREQS: BI 213 or BI 213H
- BOT 401. RESEARCH (1-16).
- BOT 403. THESIS (1-16).
- BOT 405. READING AND CONFERENCE (1-16).
- BOT 407. SEMINAR (1). Section 1: Departmental seminar. Section 2: Lichen and Bryophyte Research (1). Weekly one-hour meetings for reporting and discussion of active research projects, discussion of proposal research, review and discussion of recent literature, and mini-workshops on particular problems. Normally graded P/N. This course is repeatable for a maximum of 16 credits.
- BOT 407H. SEMINAR (1) Section 1: Departmental seminar. Section 3: Lichens and Bryophytes Research (1). Weekly one-hour meetings for reporting and discussion of active research projects, discussion of proposal research, review and discussion of recent literature, and mini-workshops on particular problems. Normally graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
- BOT 408. WORKSHOP (1-16).
- BOT 410. INTERNSHIP (1-16). PREREQ: Consent of Instructor.
- BOT 414/BOT 514. AGROSTOLOGY (4). Classification and identification of grasses, with emphasis on the modern system of grass classification; laboratory practice in keying grass specimens to genus and species. Lec/lab. PREREQ: Bot 321.
- BOT 415/BOT 515. FOREST INSECT AND DISEASE MANAGEMENT (5). Effects of insects and diseases on forest ecosystems. Recognition of important groups, prediction of pest responses to environmental changes, and management strategies for protection of forest resources. Field trips. Lec/lab/rec. CROSSLISTED as FS 415/FS 515. PREREQS: BI 213 or BI 213H
- BOT 416/BOT 516. AQUATIC BOTANY (4). Taxonomy and ecology of aquatic vegetation, emphasizing freshwater and marine algae and the submergent vascular plants. Morphology, physiology, and classification of the algae; morphological and physiological adaptations of aquatic vascular plants; and primary production in aquatic ecosystems. Laboratory practice in the identification of local taxa. Field trips. Lec/lab. PREREQS: BI 213 or BI 213H
- BOT 425/BOT 525. FLORA OF THE PACIFIC NORTHWEST (3). Vascular plant identification, terminology, and diagnostic characteristics of plant families. Lab emphasizes the use of keys for identification to the species level and ability to recognize by sight those plant families found in the Pacific Northwest. Field trips. Lec/lab. PREREQS: BOT 321 or equivalent.
- BOT 435/BOT 535. POLLINATION BIOLOGY (4). Explores the special adaptations of flowering plants and insect pollinators. Lectures discuss the co-evolution of pollinators and flowering plants and specialized morphology of pollinators. Labs include the identification of pollinators, field surveys and an exercise that will create a

management/restoration plan. Lec/lab. PREREQS: BOT 321 or equivalent or instructor consent.

BOT 440. FIELD METHODS IN PLANT ECOLOGY (4). Concepts and tools for describing, monitoring, and experimenting on vegetation. Combines Web-based material, field experience at the student's location, and student projects. PREREQS: Course in ecology and a course in statistics.

BOT 442/BOT 542. PLANT POPULATION ECOLOGY (3). Ecological aspects of plant form and reproduction; demography and population modeling; species interactions, including competition, mutualism, and herbivory. Lec/lab. PREREQ: BOT 341 or equivalent.

BOT 461/BOT 561. MYCOLOGY (5). A broad taxonomic survey of the fungi. Topics include life histories, systematics, ecology, genetics, and ethnomycology. Participation on field trips and the submission of a specimen collection are required. Lec/lab. PREREQS: BI 213 or BI 213H.

BOT 465/BOT 565. LICHENOLOGY (4). Biology of lichens includes structure; life histories; classification; and ecology. Offered alternate years. PREREQS: (BI 213 or BI 213H) and two botany courses.

BOT 466/BOT 566. BRYOLOGY (4) Biology of bryophytes includes structure; life histories; classification; and ecology. Offered alternate years. PREREQS: (BI 213 or BI 213H) and two botany courses.

BOT 475/BOT 575. COMPARATIVE GENOMICS (4). Principles of comparative genomics. Methods for genome assembly and annotation. Genomic approaches for the study of structural change, whole genome duplication, gene family evolution, gene networks, gene regulation and epigenetics. Lab topics include the analysis of next generation sequencing data and conducting comparative genomic analyses. Lec/lab. BOT 575 CROSSLISTED as MCB 575. PREREQS: ( BI 311 or CSS 430) and BI 314) and students will require a basic working knowledge of cell and molecular biology and genetics.

BOT 476/BOT 576. INTRODUCTION TO COMPUTING IN THE LIFE SCIENCES (3). Introduction to management of large datasets (e.g., nucleic acids, protein), computer programming languages, application of basic mathematical functions, and assembly of computational pipelines pertinent to life sciences. **PREREQS:** Cell and molecular biology or genetics, or by approval of instructor. Familiarity with text editing software and unix/linux operating system is advantageous. BOT 576 CROSSLISTED as MCB 576.

BOT 480/BOT 580. PHOTOSYNTHESIS AND PHOTOBIOLOGY (3). Explores the diverse use of light in biological systems, with particular emphasis on photosynthesis. Lectures will discuss the nature of light, light in the natural environment, light absorption in biological systems, use of light energy for photosynthesis, communication, defense, motility, and vision, as well as deleterious effects of light and its use for global monitoring satellite systems. PREREQS: One course in plant physiology, ecology, or the equivalent, or by permission of instructor.

BOT 488/BOT 588. ENVIRONMENTAL PHYSIOLOGY OF PLANTS (3). Introduces students to mechanisms of plant responses to environmental change caused by humans, including atmospheric, nutrient, water, and global climate factors. Concepts are built around principles of plant environment relations. Lec/lab. PREREQ: One course in plant physiology or one course in ecology.

BOT 499/BOT 599. SPECIAL TOPICS (0-16).

BOT 499H. SPECIAL TOPICS (1-16) This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

## FACULTY

### Professors

Daniel J. Arp	Bruce P. McCune
Michael J. Behrenfeld	Peter B. McEvoy
<b>Lynda M. Ciuffetti (Head)</b>	Christopher C. Mundt
Valerian V. Dolja	Jennifer L. Parke (Research)
John E. Fowler	Jay W. Pscheidt
Niklaus J. Grunwald (Courtesy)	Gar W. Rothwell (Courtesy)
Gayle Hansen (Courtesy)	Luis A. Sayavedra-Soto (Research)
Russell E. Ingham	Joseph W. Spatafora
Kenneth B. Johnson	Ruth A. Stockey (Courtesy)
Aaron I. Liston	Jeffrey K. Stone (Research)
Joyce E. Loper (Associate Dean)	Brett Tyler
Robert R. Martin (Courtesy)	Thomas J. Wolpert

### Associate Professors

Jeffrey H. Chang	Allen J. Milligan (Research)
Michael Freitag (Adjunct)	Cynthia M. Ocomb
David H. Gent (Courtesy)	David A. Pyke (Courtesy)
Gayle Hansen (Courtesy Research)	Carol J. Rivin (Emeritus)
Pankaj Jaiswal	Luisa Santamaria
Thomas N. Kaye (Courtesy)	Virginia O. Stockwell (Research)
Mary E. Kentula (Courtesy)	Inga A. Zasada (Courtesy)
Walter F. Mahaffee (Courtesy)	

### Assistant Professors

Jeffrey C. Anderson	Christina Hagerty
Posy E. Busby	F. Andrew Jones
Leonard B. Coop (Research)	Jared M. LeBoldus
Richard C. Cronn (Courtesy)	Hans Luh (Research)
Jeremiah K.S. Dung	Molly Megraw
Sergei A. Filichkin (Research)	Robert J. Meinke (Courtesy)
Kenneth E. Frost	Sushma Naithani (Research)
Fritzi Grevstad (Courtesy Research)	Achala Nepal KC
Aymeric J. Goyer (Research) Jason	Jay R. Reichman (Courtesy)
R. Graff (Research)	Jerry Weiland (Courtesy)
Linda Hardison (Research)	Toby K. Westberry (Research)

### Instructors

Marc J. Curtis  
Melanie A. Link-Pérez

### Senior Instructors

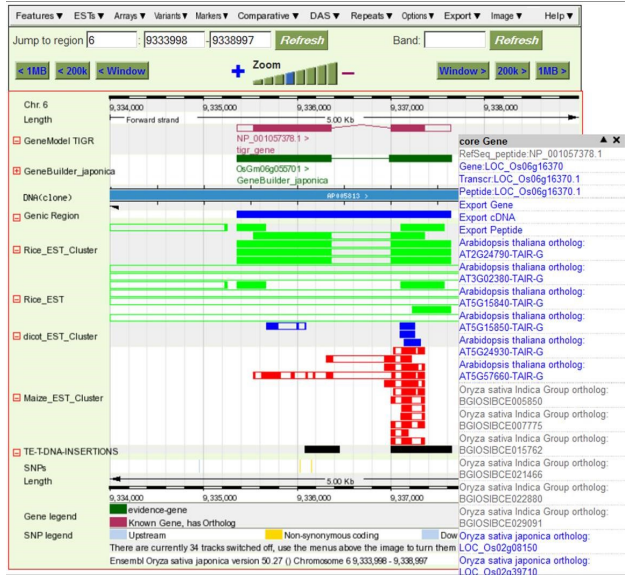
Richard R. Halse (Emeritus)  
Melodie L. Putnam





A century-old university with eleven colleges, **Oregon State University** enrolls approximately 30,058 undergraduate, graduate and first professional students. The 500 acre campus is noted for its gracious lawns, flowering shrubs, many trees, and diverse architectural styles.

A land-, sea-, sun-, and space-grant college, OSU supports a wealth of research facilities throughout the state and the Northwest, including the Marine Sciences Laboratories at Newport and Astoria, McDonald Research Forest, and various agricultural and scientific research stations. Research facilities available to students include the Agricultural Experiment Station, Center for Genome Research and Biocomputing, Institute for Water and Watersheds, Information Services, Northwest National Marine Renewable Energy Center, Northwest Alliance for Computational Science & Engineering, Environmental Health Sciences Center, Environmental Remote Sensing Applications Laboratory, Forage Seed and Cereal Research Unit, Forest Research Laboratory, Horticultural Crops Research Unit, Integrated Plant Protection Center, Radiation Center, National Clonal Germplasm Repository, Food Innovation Center, Linus Pauling Institute, Survey Research Center, Laboratory Animal Resources Center, and the Electron Microscope Facility.



**Corvallis**, in which Oregon State University is located, has a population of 56,535. It lies in the heart of the Willamette Valley, between the Cascade Mountains and the Coast Range, 80 miles south of Portland and 55 miles east of the Pacific coast. The climate is mild, with rainfall averaging about 40 inches annually. The surrounding area is one of extreme ecological diversity, including ocean beach, coniferous forest and high desert. Outdoor recreation is a favorite pastime of area residents and visitors. Major performing arts facilities are found in Portland to the north and in Eugene to the south.



Courtesy of F. Anike Camacho



**CORRESPONDENCE AND INFORMATION**

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**ADVISORS IN BOTANY AND PLANT PATHOLOGY**

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