

Strategic intent

*College of Agricultural Sciences Academic Programs, Oregon Agricultural Experiment Station,
OSU Extension Agricultural Sciences and Natural Resources Program
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The grand challenge

The grand challenge facing humanity is that of sustainably and securely providing food, fuel, fiber, and shelter, and ensuring the health of more than nine billion people by the year 2050. This must be done in the face of climate change, declining fossil energy supplies, and increasingly scarce land and water resources that threaten the integrity of our planet. Addressing this grand challenge requires an integrated framework for the College of Agricultural Sciences, which is integrally supported by the Oregon Agricultural Experiment Station, and Extension Agricultural Sciences and Natural Resources Extension Program. Such an integrated approach *supports the University's strategic plan and its associated agendas; ensures engagement, relevance, and impact with communities served, especially in the face of rapidly changing demographics of Oregon's students, stakeholders, and residents; and will facilitate greater integration of the Agricultural Experiment Station and Extension Agricultural Sciences and Natural Resources Extension Program with other colleges and OSU's core teaching mission.*

Uniquely advancing the University's strategic plan

The College of Agricultural Sciences, Agricultural Experiment Station, and Extension Agricultural Sciences and Natural Resources Extension Program are integral to Oregon State University's quest to be a top-tier 21st century Land Grant university. We are significant contributors to the University's Phase II Strategic Plan with its emphasis on three Signature Areas of Distinction: **Advancing the Science of Sustainable Earth Ecosystems (Healthy Planet); Improving Human Health and Wellness (Healthy People); and Promoting Economic Growth and Social Progress (Healthy Economy)**. With continuing transformation, the trajectory is one of even greater impact in these areas by contributing to the education of graduates competitive in the global economy, supporting a continuous search for and sharing of new knowledge and solutions to global challenges, and maintaining a rigorous emphasis on academic excellence.

University agendas

Teaching. Working together, the College of Agricultural Sciences, Agricultural Experiment Station and its partner colleges, and Extension Agricultural Sciences and Natural Resources Extension Program will provide unmatched experiential learning opportunities for students. While extending the outcomes of research discoveries to advance economic and social well being for Oregon and beyond, together we can help enable the University's vision that every undergraduate student have at least one experiential learning opportunity, and also offer outstanding experiences for high-achieving students in the form of undergraduate research, international experiences, internships, and service learning. Students thus will be better able to achieve Oregon State University's learning goals: competency and knowledge; critical thinking; collaboration; communication; social responsibility and sustainability; self awareness and life-long learning; and pluralism and cultural legacies. Engaging students in experiential learning will also help improve retention and graduation rates of undergraduate students as a means of achieving the

state's 40-40-20 goal.¹ We will provide all students an enabling education, foster leadership, and promote development of an outstanding workforce.

Research. Principles articulated in the recently developed research agenda for Oregon State University further frame our challenge: "... research must improve fundamental understanding, create solutions to global challenges, and address emerging opportunities while aligning with funding sources." The research agenda emphasizes *relevance, integration, collaboration, leadership, and access*. The College and the Agricultural Experiment Station and partner colleges are well positioned to play a core role in addressing the three fundamental, integrative guiding questions in the OSU research agenda:

- How do natural systems work, and how can we live sustainably within them?
- What factors and systems influence and promote health, wellness, and long-term quality of life?
- What fundamental understanding, discoveries, and solutions are needed to advance economic and social well being?

Outreach. OSU's developing Outreach and Engagement agenda builds on goals of access, partnerships, scholarship, integration, culture, and resources. Outreach and Engagement can also play an important role in achieving the state's 40-40-20 goal by creating peer-reviewed learning materials developed as noncredit, public issues education that can be used in credit-based courses at many levels. Increasingly, these teaching and learning tools embrace new information technology and broad electronic access for use as open educational resources. The Extension Agricultural Sciences and Natural Resources Extension Program is an integral component of OSU's long-term plan to communicate more effectively and interactively with our partners as we adopt new approaches to teaching and learning.

Mission

The College of Agricultural Sciences at Oregon State University is a principal source of knowledge relating to agricultural and food systems, environmental quality, natural resources, life sciences, and rural economies and communities. The College provides enabling education, fosters leadership, and promotes cultural awareness in all of its graduates. Its research programs create knowledge and innovations to solve problems, promote jobs, and support the economy. It is a source of information and expertise in integrating and applying knowledge with benefits that are felt in domestic and international settings.

Vision

The College of Agricultural Sciences at Oregon State University will be one of the preeminent colleges of food, agriculture, and natural resources in the nation, as a result of undertaking discovery with purpose, delivery of enabling educational programs, and positive impact on people, communities, and the economy. Thus, our vision is one of **preeminence, purpose, and impact**.

Values

The College of Agricultural Sciences is a trans-disciplinary, student-centered, research-intensive, engaged, stakeholder-driven education, outreach, and research enterprise that embraces an inclusive

¹ Senate Bill 253 revises the mission of higher education in the state to meet the goals of at least 40 percent of Oregonians having a bachelor's degree or higher, 40 percent with an associate's degree or post-secondary credential, and 20 percent with a high school diploma or equivalent as their highest level of education.

environment. The Experiment Station is the closely associated research entity that carries out its work in several OSU colleges. The Extension Agricultural Sciences and Natural Resources Program is the Outreach and Engagement arm of the College of Agricultural Sciences. Together, these organizations embrace responsiveness, credibility, partnership, cooperation, teamwork, coordination, inclusiveness, diversity, mutual respect, and accountability.

Preeminence, purpose, and impact

The heart of this plan resides in five focus areas that articulate core dimensions by which the College, the Agricultural Experiment Station and partner colleges, and the Extension Agricultural Sciences and Natural Resources Program will contribute to the University's Signature Areas. In so doing, we will continue to be among the top 10 such education and research entities in the nation—*preeminence*—while addressing the Land Grant commitment to *purpose* and *impact*.

The five broad focus areas embrace teaching, learning, creation and application of new knowledge, as well as outreach:

- **Sustainable food and agricultural systems;**
- **Environmental and human well-being;**
- **Plant sciences and systems biology;**
- **Natural resources stewardship;**
- **Bioeconomy, bioproducts, biomaterials, and bioenergy.**

As described in more detail below, these focus areas build on our core strengths and links to stakeholder needs, to help address the societal grand challenge of sustainably and securely providing food, fuel, fiber, and shelter, and ensuring the health of more than nine billion people by the year 2050. Our contributions will be our graduates, our research discoveries, and our engagement with policy makers and stakeholders. Under each area of emphasis, we will provide education, research, and outreach.

Sustainable food and agricultural systems

Human population growth and rapid economic development in China, India, Brazil, and other emerging countries, combined with the increasing need for sustainable approaches to grow food, poses a massive challenge for food systems. Substantial increases in yields with higher water, nutrient, and pest control efficiencies are necessary. Efficient systems for processing, transportation, and distribution of food are a corollary responsibility.

Strategies and actions

Education, research, and outreach will:

- Foster economically viable and environmentally sustainable livestock and crop production systems.
- Contribute to global solutions for food safety, equity, and availability through improved production, processing, transportation, and distribution.

Environmental and human well-being

Maintaining and enhancing the quality of life for an expanding human population requires a safe and nutritious food supply, and the clean water and air that healthy ecosystems provide. Continuing

development of technologies that protect human health and ecosystem services, and science that informs public policy for improving food systems and environmental quality are high priorities.

Strategies and actions

Education, research, and outreach will:

- Promote approaches to minimize human and environmental health risks from livestock and crop production.
- Inform public policy for improving food systems, environmental quality, and provision of ecosystem services.
- Provide engineering and ecological approaches to help protect and complement natural ecosystem processes.
- Apply green chemistry to develop technologies to protect human health and ecosystem services.

Plant sciences and systems biology

At the core of ensuring adequate food for a population of nine billion is the necessity for increased research and education in plant systems biology. This 'new biology' upon which progress in the plant sciences now depends, links biological scientists with physicists, computer scientists, mathematicians, and engineers who jointly develop revolutionary new approaches to gain understanding of systems from the cell to the developing plant and the ecosystems that they occupy.

Strategies and actions

Education, research, and outreach will:

- Utilize genomics, metabolomics, transcriptomics, and bioinformatics techniques to develop healthy foods, renewable fibers, and health-promoting phytochemicals.
- Employ the principles of new biology to develop new varieties of plants that require less water and nutrients, can grow in marginal soils, are more resistant to pests, and have traits that promote human and animal health and support the bioeconomy.

Natural resources stewardship

Oregon and the Pacific Northwest have exceptional natural resources that support both our economy and our quality of life. Balancing these competing pressures and addressing the impacts of climate change are critical to ensuring that current and future generations may utilize and enjoy the resources.

Strategies and actions

Education, research, and outreach will:

- Develop sustainable livestock and crop production systems that mitigates the carbon-nitrogen footprint and climate change and ensures stewardship of resources.
- Inform public policy for wise use and conservation of natural resources.
- Provide engineering and ecological approaches to help conserve and complement our natural soil and water resources.
- Enhance management of terrestrial and aquatic ecosystems for sustaining livestock, wildlife, and fisheries populations.

Bioeconomy, bioproducts, biomaterials, and bioenergy

Fossil fuels, the world's dominant energy source is a nonrenewable, fixed resource that is becoming increasingly scarce and expensive. At the same time, population growth and economic development in China, India, Brazil, and other emerging nations is driving a rapid increase in energy use. Growing plants to capture the sun's energy and biorefineries to convert plant material to bioproducts, biomaterials and bioenergy is the basis for a sustainable bioeconomy and provides long-term alternatives to help replace fossil fuels.

Strategies and actions

Education, research, and outreach will:

- Identify and enhance plants for efficient capture of the sun's energy and subsequent conversion into bioproducts, biomaterials, and bioenergy.
- Establish biorefineries to convert plant material to bioproducts, biomaterials, and bioenergy.
- Support a sustainable bioeconomy as a long-term alternative to fossil fuels-based petroleum economy.

Fundamental science, applied research and outreach, and education: Integral to all five focus areas

Each strategy requires integration of fundamental science, applied research and outreach, and education. Strength in fundamental sciences is central to the innovations that underly change with **impact** and attracts research support from federal and industrial partners. Applied research and outreach connect such innovation with **purpose** for economic and other social benefits. Education is both an investment in the next generation of science and the **impact** multiplier for contemporary discoveries. **Preeminence** is the outcome of excellence in the integration of fundamental science, applied research and outreach, and education.