

PLANT BREEDING (GRADUATE FIELD)

Program Website (<https://cals.cornell.edu/school-integrative-plant-science/school-sections/sips-plant-breeding-genetics-section/>)

Field Description

Now is an exciting time to study plant breeding and genetics. People worldwide are more interested than ever in their food, its textures, nutritional quality, flavors, and medicinal applications, the stability and diversity of both supply and demand, and the impact of food production, consumption and distribution on human health and on the environment. Low-cost DNA and RNA sequencing methods, high throughput chemical analyses, remote sensing, gene editing, imaging, and robotics have increased the type and the volume of data that we can bring to bear on these questions. Computing and statistical methods have developed apace to bring it all together and enable us to make predictions about future varieties.

Cornell's Field of Plant Breeding trains interdisciplinary scientists in the elaboration of new crop improvement breeding methods, the discovery of genetic mechanisms affecting economically important traits, and the creation of genetic stocks, germplasm, and crop varieties. We work across major crop categories such as cereals, forages, legumes, roots and tubers, diverse fruits and vegetables, cover crops, bioenergy crops, hemp, hops, and ornamental plants, seeking improvements in productivity, quality, disease resistance, abiotic stress tolerance, and ecosystem services. We apply techniques spanning classical field evaluations, often using remote sensing and robotics, to high-throughput "omics" data generation to computational pipelines, modeling, and prediction in these efforts. We promote collaborative and interactive work to improve shared learning and mutual support between fundamental, basic, translational and applied researchers. We are active in our pursuit of diversity, equity, and inclusion in plant breeding and recognize both past failings in our discipline and opportunities to reckon with this past. We are world leaders in innovative plant breeding research, teaching, extension to stakeholders, and science communication. We collaborate globally.

The Field of Plant Breeding welcomes applicants from around the world who are eager to be leaders in discovery and innovation and who seek to develop solutions to pressing problems and grand global challenges. We provide training that links current science with well-defined problems and methods to tackle them. Our alumni work at the cutting edge of their fields and are sought after in academia, government, and industry. We encourage prospective applicants to correspond directly with faculty members whose interests match their own. The list below outlines general topics of research and/or crops studied for each field member. Additional information, including more detailed descriptions of faculty research and courses, is available on the plant breeding website (<https://cals.cornell.edu/school-integrative-plant-science/school-sections/sips-plant-breeding-genetics-section/>).

Data and Statistics

- Research Master's Program Statistics (<https://gradschool.cornell.edu/about/program-metrics-assessments-and-outcomes/research-masters-program-statistics/?SelectGradField=58>)

- Doctoral Program Statistics (<https://gradschool.cornell.edu/about/program-metrics-assessments-and-outcomes/doctral-program-statistics/?SelectGradField=58>)

Field Manual

- Manual (<https://cals.cornell.edu/school-integrative-plant-science/degrees-programs/msphd-graduate-fields/msphd-field-plant-breeding/graduate-field-requirements-plant-breeding/>)

Subject and Degrees

Plant Breeding

- Plant Breeding (MS) (<https://catalog.cornell.edu/programs/plant-breeding-ms/>)
- Plant Breeding (PhD) (<https://catalog.cornell.edu/programs/plant-breeding-phd/>)

Concentrations by Subject

Plant Breeding

- plant breeding
- plant genetics

Faculty

Mark P Bridgen (<http://cals.cornell.edu/mark-p-bridgen/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding
- **Research Interests:** breeding and development of ornamental plants; plant propagation

Susan K Brown (<http://cals.cornell.edu/susan-k-brown/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** apple breeding and genetics

Edward S. Buckler (<http://cals.cornell.edu/edward-s-buckler/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** maize diversity and functional genomics

Walter S de Jong (<http://cals.cornell.edu/walter-s-de-jong/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** potato breeding; molecular genetics

Gennaro Fazio (<http://cals.cornell.edu/gennaro-fazio/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant genetics
- **Research Interests:** plant breeding; plant genetics

James Jeff Giovannoni (<http://cals.cornell.edu/James-Giovannoni/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** molecular and genetic mechanisms impacting fruit maturation and ripening

Michael Allen Gore (<http://cals.cornell.edu/michael-allen-gore/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** breeding for nutrition, high-throughput phenotyping

Phillip D Griffiths (<http://cals.cornell.edu/phillip-david-griffiths/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** vegetable breeding and genetics

Georg Jander (<http://cals.cornell.edu/georg-jander/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics

Jean-Luc Jannink (<http://cals.cornell.edu/jean-luc-jannink/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** cost-effective methods of using DNA markers in public section small grains breeding

Awais Khan (<http://cals.cornell.edu/awais-khan/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding
- **Research Interests:** plant breeding

Li Li (<http://cals.cornell.edu/li-li/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** molecular approaches for improving crop nutritional and health values

Jiping Liu (<http://cals.cornell.edu/jiping-liu/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** Plant mineral nutrition and resistance to soil-based abiotic stresses

Michael Mazourek (<http://cals.cornell.edu/michael-mazourek/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** breeding; genetics and biochemistry of vegetables

Gaurav Dilip Moghe (<http://www.moghelab.org/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** plant metabolism

Virginia Moore (<http://cals.cornell.edu/virginia-moore/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics

- **Research Interests:** Breeding for Sustainable Agriculture with emphasis on forage crop and forage breeding

Lukas A. Mueller (<http://solgenomics.net/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding
- **Research Interests:** implementation of Big Data to assist scientist and plant breeders

Rebecca Judith Nelson (<http://cals.cornell.edu/rebecca-judith-nelson/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant genetics
- **Research Interests:** disease resistance and management

Madeline Oravec (<http://cals.cornell.edu/madeline-oravec/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** Grapevine breeding and genetics

Wojtek Pawlowski (<http://cals.cornell.edu/wojtek-pawlowski/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** plant breeding; plant genetics

Kelly R Robbins (<http://cals.cornell.edu/kelly-r-robbins/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** quantitative genetics

Moira Sheehan (<http://cals.cornell.edu/moira-jane-sheehan/>)

- **Campus:** Ithaca - (Divisional Member)
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** Adoption of advanced technologies in specialty crops and livestock breeding.

Lawrence B. Smart (<http://cals.cornell.edu/lawrence-b-smart/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** willow breeding and genetics

Margaret Elizabeth Smith (<http://cals.cornell.edu/margaret-elizabeth-smith/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** maize breeding and genetics

Mark Earl Sorrells (<http://cals.cornell.edu/mark-earl-sorrells/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** plant molecular genetics and small grains breeding; comparative genomics

Hale Ann Tufan (<http://cals.cornell.edu/hale-ann-tufan/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** Dr. Tufan leads the gender initiative of the NextGEN cassava project, seeking to enhance links between women smallholders and plant breeders across five partner institutions, in Nigeria, Uganda and the US.

Joyce Van Eck (<http://cals.cornell.edu/joyce-van-eck/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** Plant transformation, genome editing

Gregory Martin Vogel (<http://cals.cornell.edu/greg-vogel/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** Vegetable breeding and genetics

Courtney A Weber (<http://cals.cornell.edu/courtney-weber/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** breeding and molecular genetics of small fruits, especially strawberries and raspberries

Kenong Xu (<http://cals.cornell.edu/kenong-xu/>)

- **Campus:** Ithaca
- **Concentrations:** *Plant Breeding*: plant breeding; plant genetics
- **Research Interests:** tree fruit genomics