Development of Gene Editing Methods to Retain Access to Foreign Markets for American Hops

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Hop biotech research at OSU

- Our research group consists of members of the Strauss, Gent, and Henning labs
- There has been active research on hop biotechnology at OSU since fall 2021because of USDA support

Strauss Lab

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Henning Lab

John Henning
PI

Continued funding for hop biotech through USDA TASC grant to Hop Research Council / OSU

- In conjunction with HRC, we have received funding through the Technical Assistance for Specialty Crops (TASC) program to continue hop biotech research
- Total amount awarded is >$2,000,000 over 5 years
- Two basic aims
  - Develop new methods to support hop gene editing research and their use as new breeding tools
  - Use gene editing to improve powdery mildew resistance—in the hope of reducing fungicide residue in hop, and thus potential trade barriers

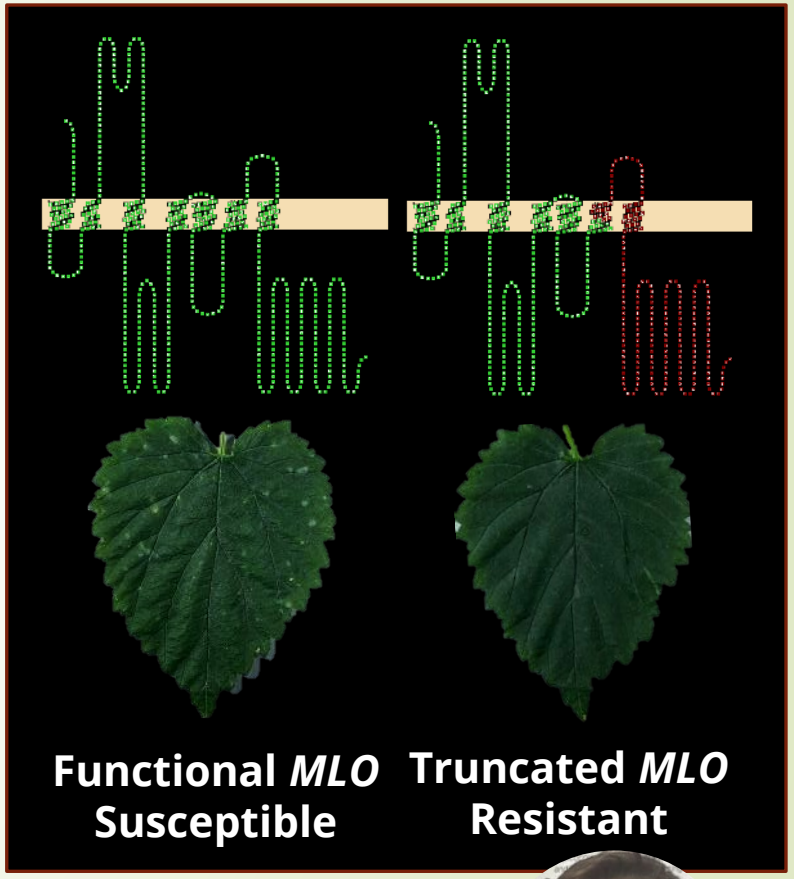
Rationale for the TASC project

- MRLs (minimum residue levels) set by foreign markets a potential barrier for US hop exports
- Increasingly restrictive MRLs could limit the variety of fungicide chemistries used to control powdery mildew, making the disease more likely to develop fungicide tolerances
- Durable genetics-based resistance to powdery mildew could reduce dependence on fungicides to control, reducing costs
- Some markets with strict MRL standards are open to gene-edited products—others *moving in* that direction
  - This project aims to lay groundwork ahead of anticipated changes in the global regulatory environment (which the TASC project is also actively monitoring)

We will seek to improve powdery mildew resistance by editing of MLO genes

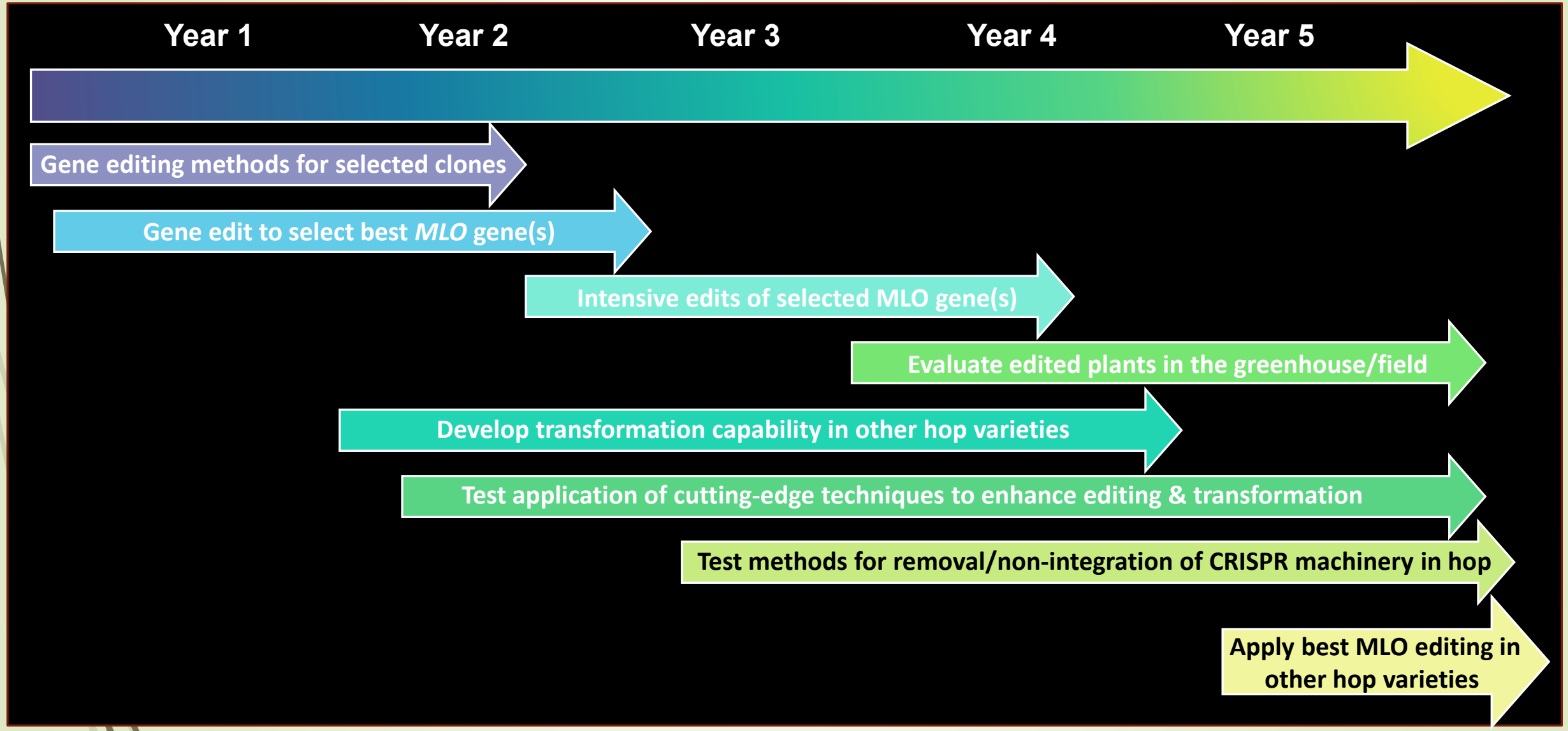
- Variants of particular *MLO* genes can provide mildew resistance in several crop species
  - Michele will tell you a lot more shortly!

- Gene editing with CRISPR could have two benefits
  - Identify native genes and markers associated with mildew susceptibility → supporting conventional hop breeding
  - Create plants with edited *MLO* variants that can be field-tested for disease resistance and possible yield penalties

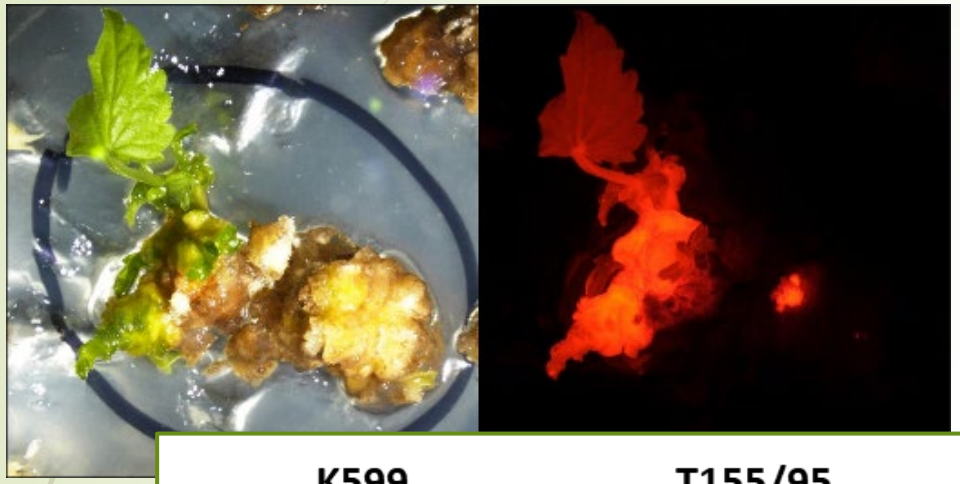


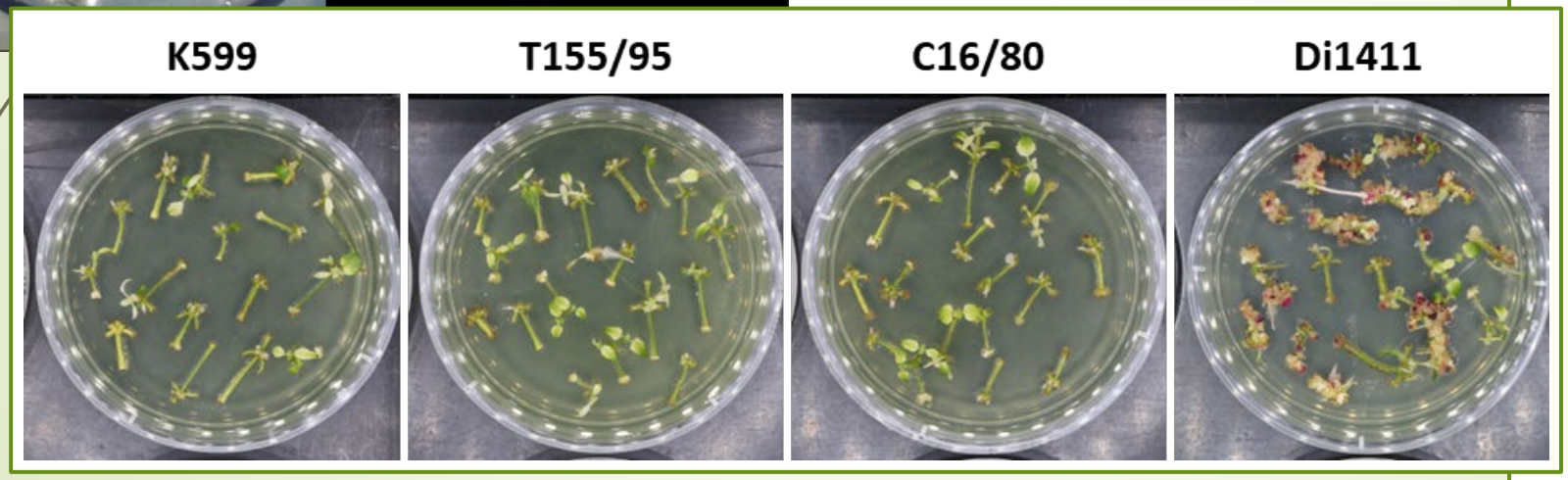
Michele Wiseman

Timeline for TASC project



Some successes – hop transformation, improved Agrobacterium wild strain ID & their domestication





Thank you