HAZELNUT BIOTECHNOLOGY RESEARCH PROGRAMS

Micropropagation and conservation of hazelnut

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POPULAR FERRERO PRODUCTS

FERRERO

OS&SBP

Hazelnuts are the heart of our products…

Ferrero Brantford Factory

- 89.000 m^2 production facility
- First Ferrero facility in North America
- Brantford plant was built in 2004 and began production in 2006
- In 2018 Brantford plant became the first outside of Europe to process cocoa beans

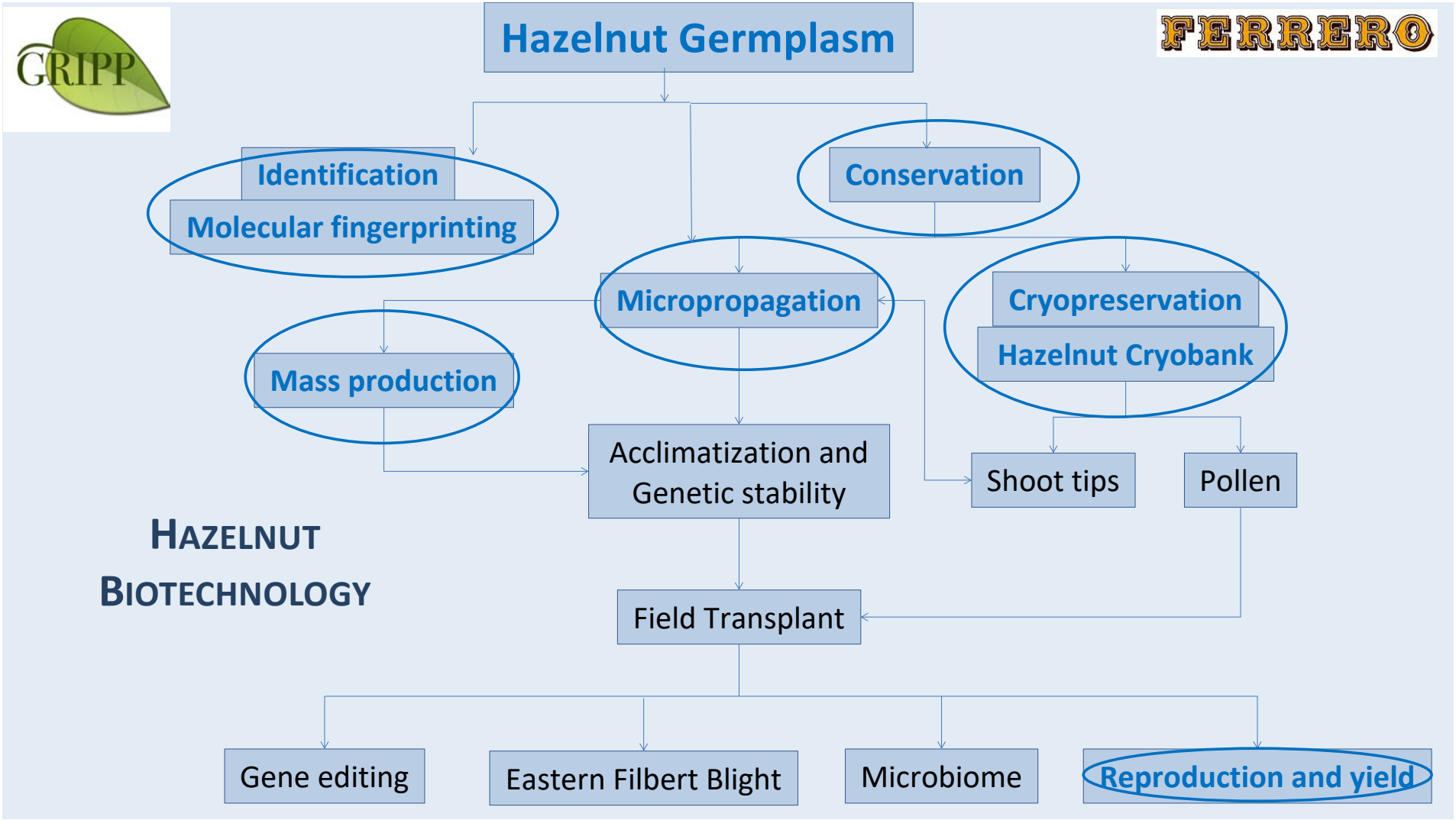
Brantford factory has 800 permanent employees and 500 temps

HAZELNUT BIOTECHNOLOGY RESEARCH PROGRAMS

On going projects at the University of Guelph (GRIPP)

- **Microhazels:** A novel Industry for Ontario (LAAIR, OMAFRA)
- **Cryo-banking: An Integrated Plant Protection System for Hazelnut** (NSERC CRD)
- **Introducing cold tolerance in hazelnut** (ON-RP3)
- **Hazelnut adaptability trials in Ontario** (OMAFRA TIER II)

Hazelnut plantation at Simcoe Research Station


GRIPP
Hazelnut Germplasm
FERRERO
Identification
Molecular fingerprinting
Conservation
Micropropagation
Cryopreservation
Hazelnut Cryobank
Mass production
Acclimatization and
Genetic stability
Shoot tips
Pollen
HAZELNUT
BIOTECHNOLOGY
Field Transplant
Gene editing
Eastern Filbert Blight
Microbiome
Reproduction and yield

MICROHAZELS: MASS PROPAGATION IN BIOREACTORS

- Liquid Growth medium
- Higher multiplication rate
- Large number of plants
- Normal plant growth
- Cost effective

Microhazel plants growing in Simcoe

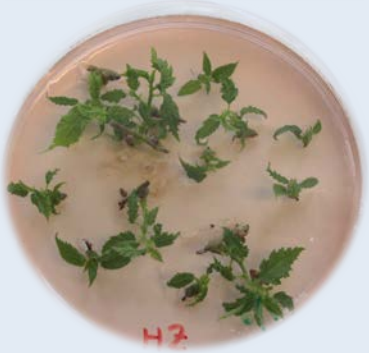
CRYO-BANKING HAZELNUT GERMPLASM: STORAGE AT – 196 ^{0}C

In vitro shoot apices are used for cryopreservation in liquid nitrogen





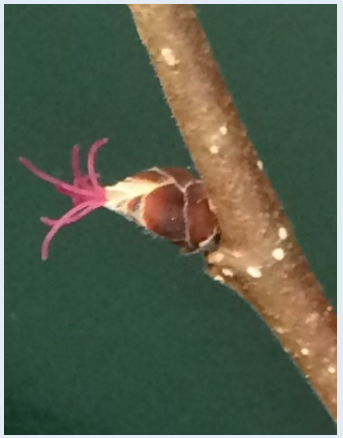




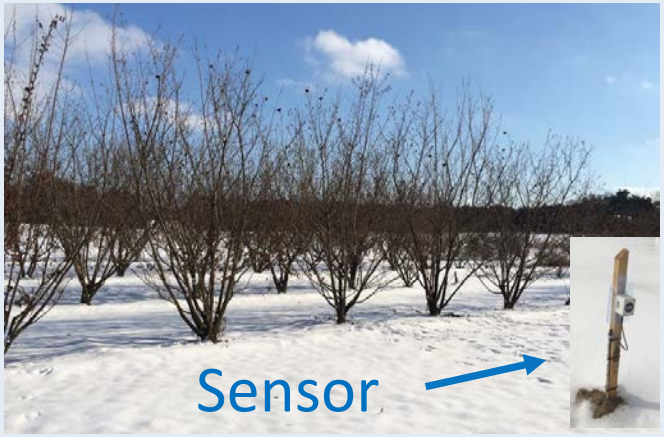
Liquid nitrogen -196°C Cryobank Plants recovered from frozen buds

Enabling cold adaptation of hazelnut

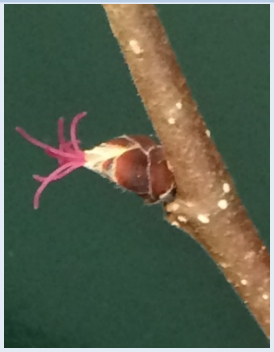
- Catkins are cold sensitive
- Below soil temperature is more important
- Snow blanket protects and allows water percolation
- Mulching mitigates cold stress

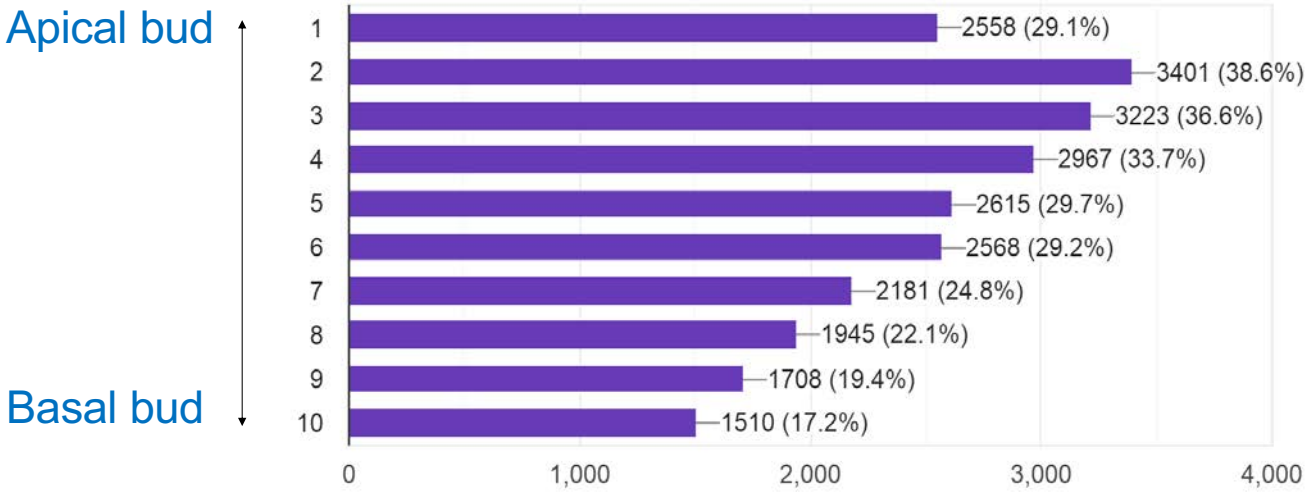


Cold protection kit



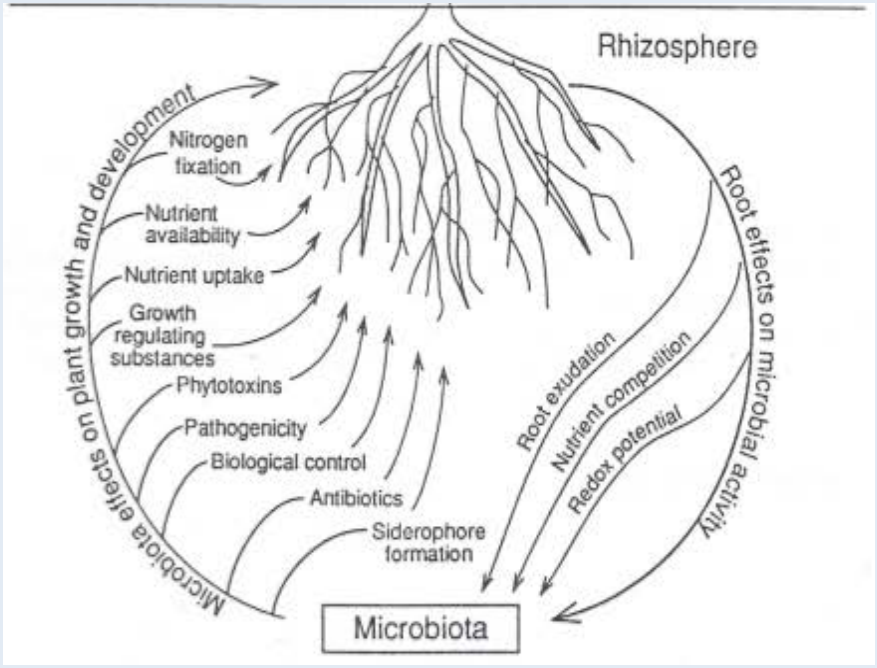
FEMALE BUDS CAN BE INCREASED FROM 29% TO 80%





Female to vegetative ratio **(total 8802 observation)**

MANAGING TEMPERATURE FLUCTUATIONS: HORTICULTURAL SOLUTIONS



Soil microbiome, nutrition, and ground temperature

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FERRERO

NSERC CRSNG

Ontario Ministry of Agriculture, Food and Rural Affairs

Ontario Centres of Excellence

GRIPP

UPPER CANADA Growers

Ontario Regional Priorities Partnership Program (ON-RP3)

GenomeCanada

Ontario Genomics

AAC agricultural adaptation council