

Joyce Van Eck (BTI)

Plant Biotechnology and Translational Research

Boyce Thompson Institute

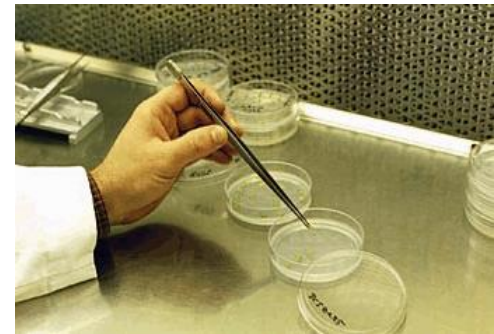
Mission: To advance and communicate scientific knowledge in plant biology to improve agriculture, protect the environment, and enhance human health



Center for Plant Biotechnology and Translational Research

MISSION

- Research impact through collaboration
- High quality events produced quickly and cost-effectively
- Technology improvement – enhancements in efficiency and capabilities



Scope and Customers

- Agrobacterium transformation service
- Transformation technology development
 - Improving speed and efficiency for current species
 - Developing new species
 - Developing new tools and capabilities
- Current service customers
 - BTI
 - Cornell
 - Others
- Consulting

Production Species

- *Brachypodium distachyon* (C3 monocot model)
- *Setaria viridis* (C4 monocot model)
- Tomato (Dicot crop)
- Potato (Dicot crop)
- *Nicotiana tabacum* (Tobacco, dicot model)
- *Nicotiana benthamiana* (Dicot model for gene silencing, plant-pathogen interactions)



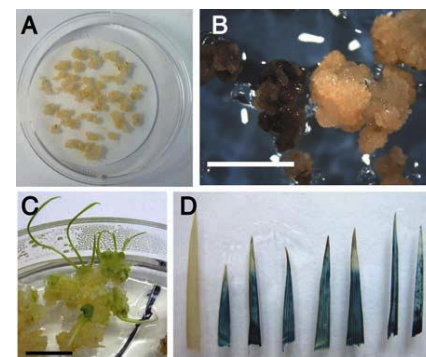
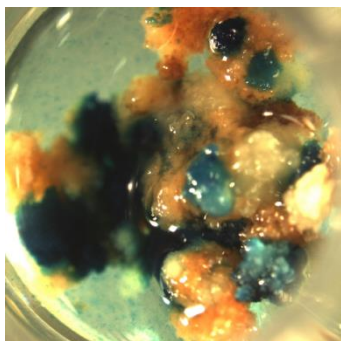
Transformation System Development/Improvement

Species

- *Setaria viridis* (C4 monocot model)
- Six species of *Asclepias* (milkweed – academic collaborator)
- Two species of *Solidago* (goldenrod – academic collaborator)
- *Taxus* (taxol production- academic collaborator)
- Grape - Concord, two model species
- Others, upon request

Technologies

- Selectable Markers
- Expression Elements
- Approaches
 - Overexpression
 - Gene suppression
 - Site-specific recombination



Transformation Service Fees (Non-subsidized)

Species	Cost (per construct)	Time from initiation
Tomato	\$1090	4 months
Potato	\$1125	4 months
<i>Nicotiana tabacum</i>	\$600	2 months
<i>Nicotiana benthamiana</i>	\$715	2.5 months
<i>Brachypodium distachyon</i>	\$1200	4 months
<i>Setaria viridis</i>	\$1200	4 months
Protocol development	\$115/hr	

Assumptions:

Generally 10 or more transformed events/construct

Transformed events are provided as independent regenerated seedlings

Construct DNA and molecular phenotyping of transformants are provided by the customer

Troubleshooting subject to additional charges

Outreach Focus: Monocot Models for Food, Feed, and Energy



	<i>Setaria viridis</i>	<i>Brachypodium distachyon</i>
Generation time	Under short days: 2 weeks to flowering; 6 weeks to seed	Depends on light regime; long days promote flowering: 2 mos to seed
Ease of growth	72-cell trays	72-cell trays
Transformability (current state)	Callus from dehulled mature seeds 5% Somewhat variable Hygromycin selection 4-6 months, depending on whether mature seed are available	Callus from immature embryos 20% Reproducible (depends on vector, GOI) Hygromycin selection 6-10 months, depending on whether plants available
Self-fertility	Yes	Yes
Genetic Crosses	Possible, but challenging	Harder than Setaria
Genome Size	515 Mb	355 Mb
Photosynthesis	C4	C3
Model for	Foxtail millet Switchgrass Miscanthus	Rye Wheat Barley

Personnel



- Joyce Van Eck, Ph.D.
 - BTI Project Lead and Facility Director
 - Tomato Genome Project Manager
 - 20 years experience in developing transformation systems
- Research Assistants
 - Tish Keen, AS (14 yrs): Tomato transformation and system improvement
 - Kerry Swartwood, BS (4 yrs): *Setaria* and rice transformation
 - Kaitlin Pidgeon, BS (1 yr): Grape, *Setaria*, cell line development
 - Christina Azodi, BS (1 yr): *Setaria* transformation and molecular biology
 - Weihua Wang, BS (New): Tomato, potato, *Brachypodium* transformation

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