Three Years in Field Plots of Transgenic American elm

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GENETIC TRANSFORMATION AND HYBRIDIZATION

Transgenic American elm shows reduced Dutch elm disease symptoms and normal mycorrhizal colonization

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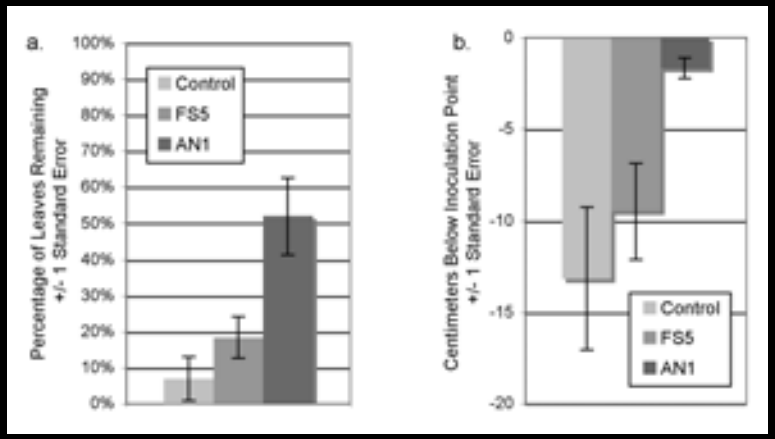
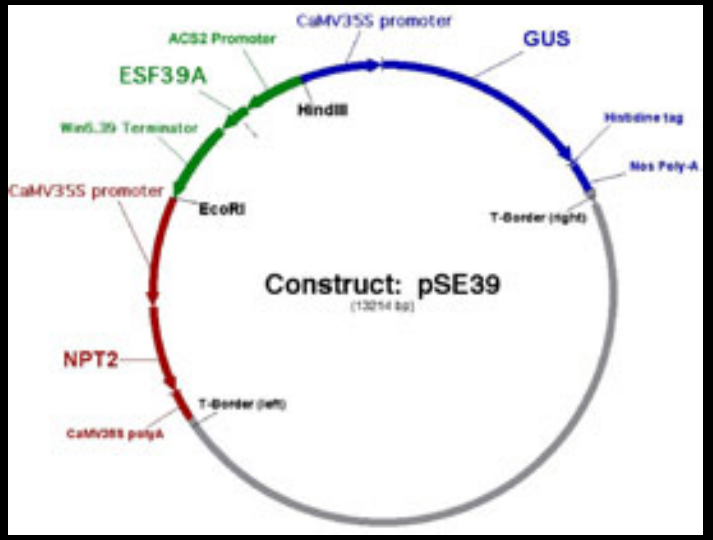


Transgene construct pSE39

- ESF39 antimicrobial peptide gene
  - Broad spectrum antifungal and antibacterial peptide with cellular export signal sequence
- ACS2 promoter
  - Vascular promoter from American chestnut
- NPT2 selection & GUS reporter genes



Will the public accept transgenic elms?

Outreach & Public Demonstration Plots

Moon Library Demonstration Plot
Transgenic American Elm

APHIS BRS notification #04-222-2n (for 4 trees)

Planted spring & fall 2005

Growth 2007:
Between
2.2 to 8.2 ft
AN1 event:
5.7 & 6.4 ft

August 2007

August 2006

Public acceptance has been good

Hundreds of students pass by daily

Necessary to grow American elms past juvenile resistance

Run field studies for 5 years or more

Field trials of Transgenic American elm

44 FS5 events & 44 controls

(seedling and TC trees as standard panel)

APHIS notification #04-222-01n (for 150 trees)

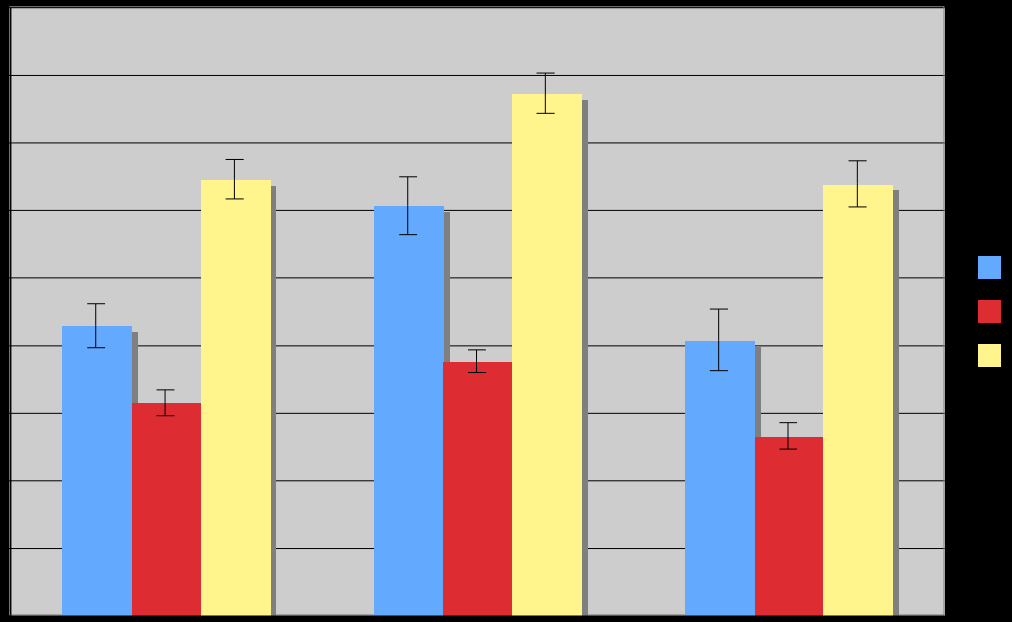
Planted 4/27/06, photo 11/23/07:

picture after 2 growing seasons

Grow in height of transgenic elm (FS5 event), wild-type seedling (WT), and two tissue culture lines (TC)

Percent increase from previous year

%



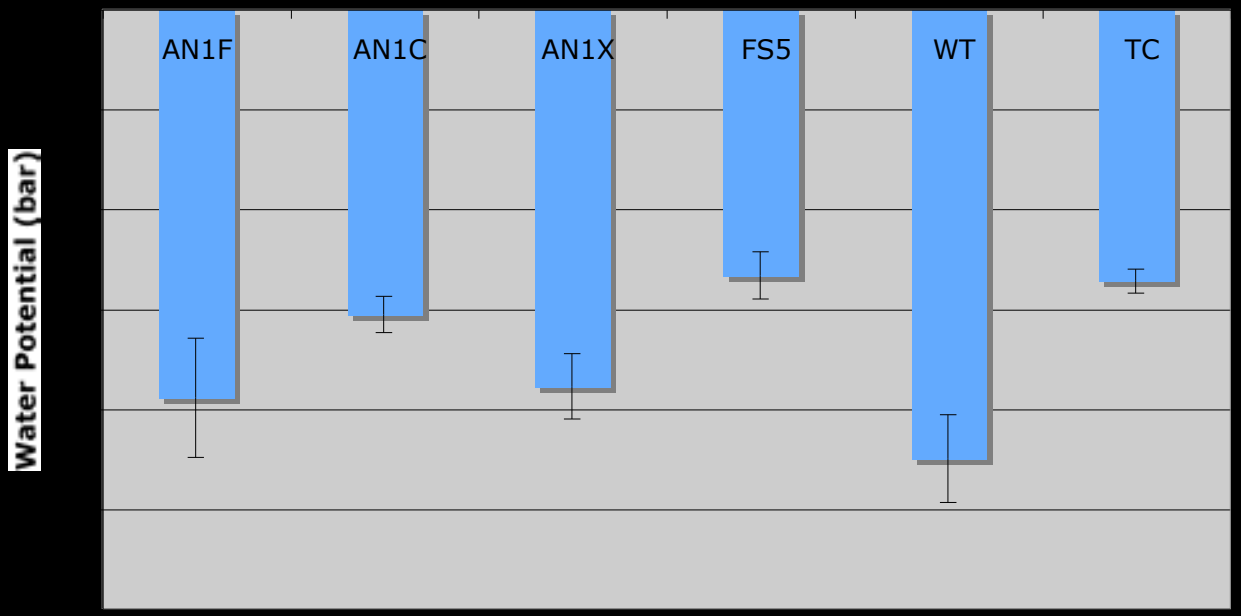
1st season: spring to fall 2006
2nd season: spring to fall 2007

(Nick Kaczmar, 2007)

Will the Antimicrobial peptide change the vascular tissues?

ACS2 is a vascular promoter

Water potential of 4 transgenic events, WT seedlings, and Tissue Culture plants



Xylem diameter measurements in progress

(Nick Kaczmar, 2007)

Will the antimicrobial peptide interfere with microbes in herbivorous insect guts and inhibit their growth?

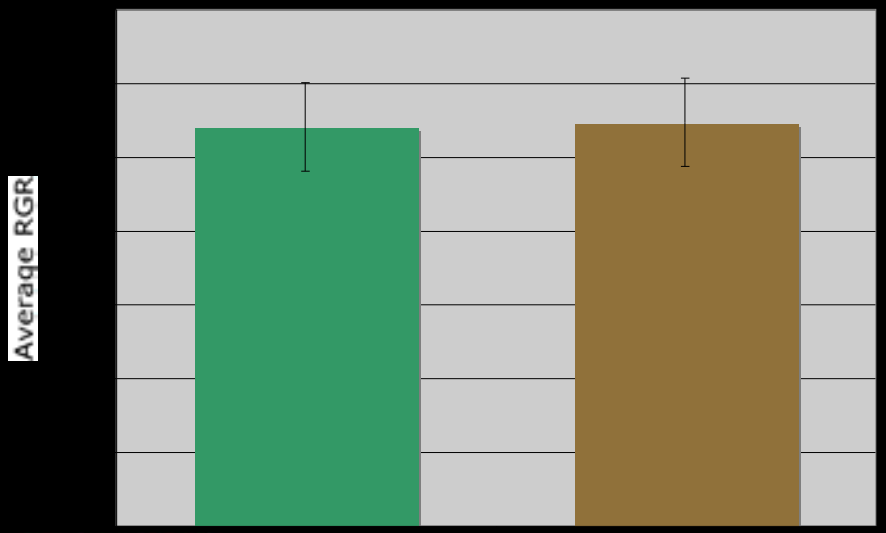
ESF39 is a broad spectrum antimicrobial peptide

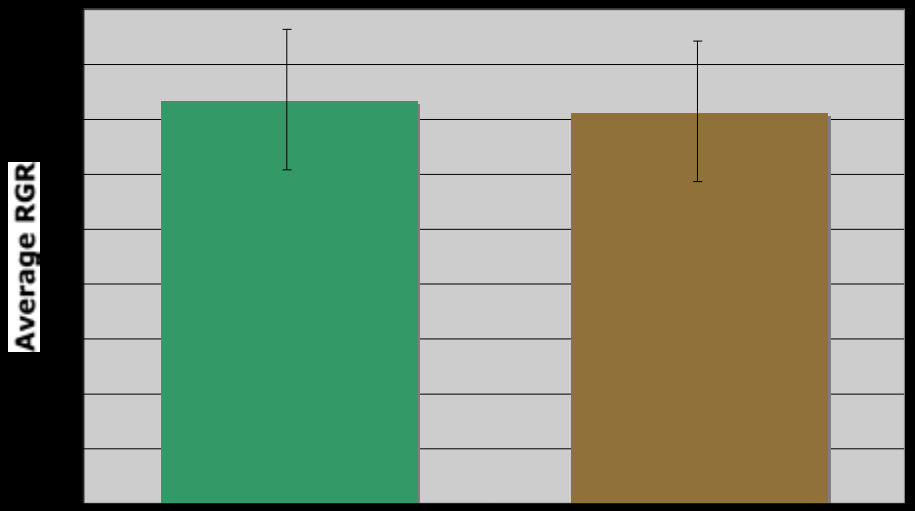
Preliminary Insect feeding studies on FS5 (T) and wild-type seedlings + tissue culture (WT)

Keith Post & Dylan Parry

RGR=relative growth rate,
RGR is the amount of growth relative to initial =
(LN(final dry mass)-LN(initial dry mass))/t

Field - no significant difference



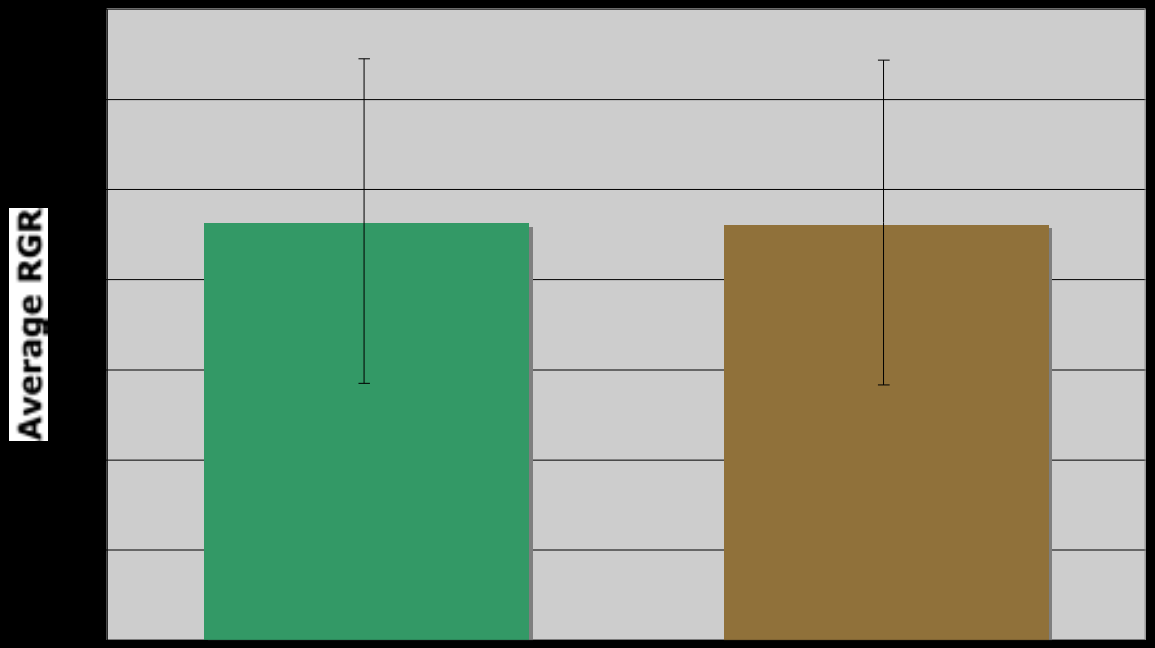


Lab - no significant difference

Preliminary Insect feeding studies on FS5 (T) and wild-type seedlings + tissue culture (WT)

Keith Post & Dylan Parry

RGR=relative growth rate,
RGR is the amount of growth relative to initial = (LN(final dry mass)-LN(initial dry mass))/t

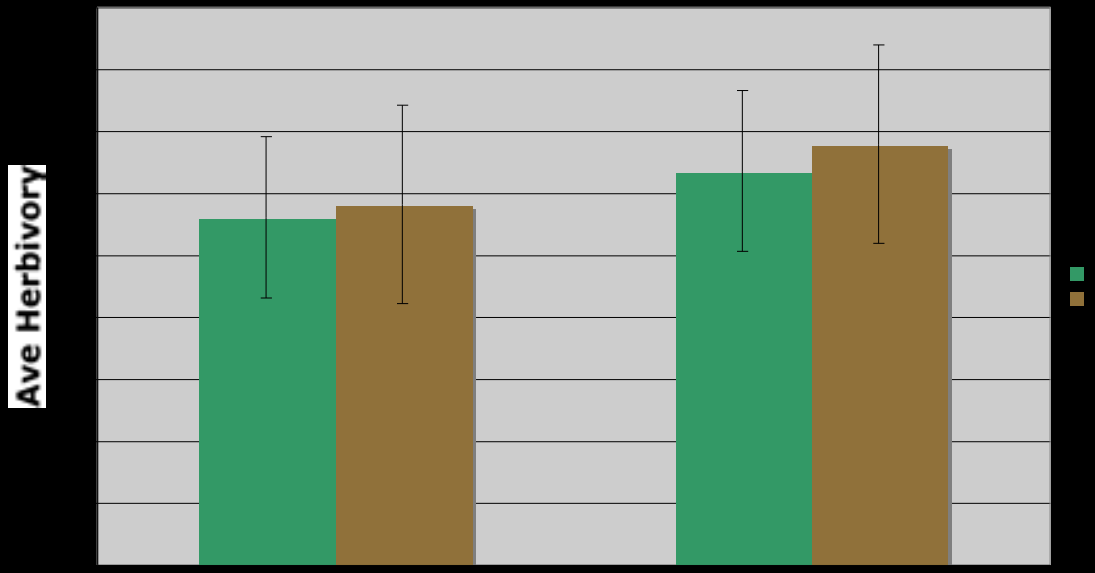


Again no significant difference

Preliminary Insect feeding studies on FS5 (T) and wild-type seedlings + tissue culture (WT)

Keith Post & Dylan Parry

Two branches, from trees at least 3 ft tall (with leading branch straightened up), were randomly selected from the midpoint of the tree. Five leaves, from positions three through seven, were observed for herbivory. The tip of the branch (=bud/first leaf) was counted as the starting point and considered position zero. Damage classes for each leaf were recorded according to the table below. The same two observers conducted each survey.



Summary

- Lab studies showed reduced DED symptoms in pSE39 transgenic American elms
- Initial field studies showed no difference in mychorrizal root colonization between transgenic and non-transgenic American elms
- No public relation problems have arose from demonstration plot
- Reduced growth rates were observed from trees derived from tissue culture, but not associated with transgenic trees
- Unable to detect significant differences in water potential
- No significant differences in insect herbivory
- DED resistance tests will begin next season
  - Elm yellows tests planned for the future

Questions?

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