

A Gem for the Queen of Forages: *RUBY* in Alfalfa

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Betalain

- ♦ Red food dye
- ♦ Bio-available Antioxidant
 - ♦ Inflammation (cellular level)
 - ♦ Anti-diabetic properties
 - ♦ Lowers cholesterol



Betalain

- Betacyanin and Anthocyanin are mutually exclusive
 - Tyrosine – betacyanin
 - Phenylalanine - anthocyanin
- Found only in Caryophyllales

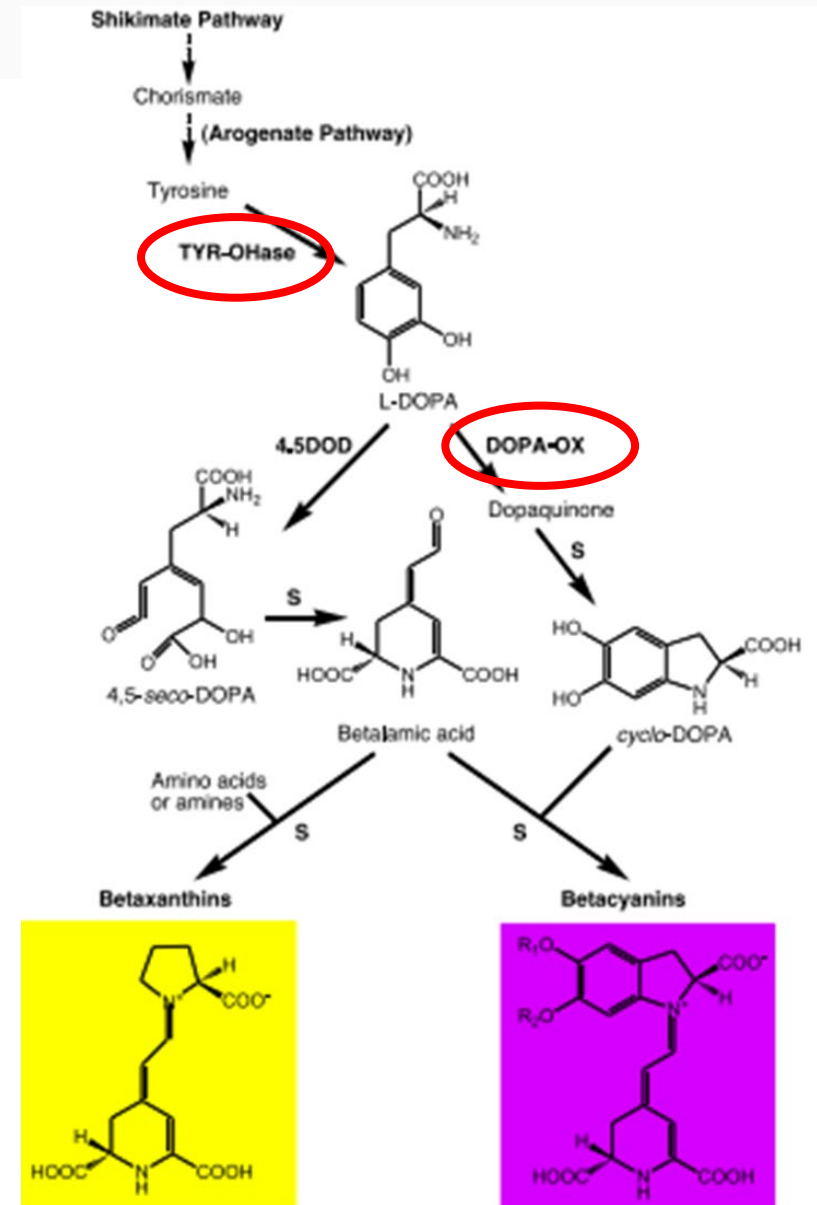


RESEARCH ARTICLE

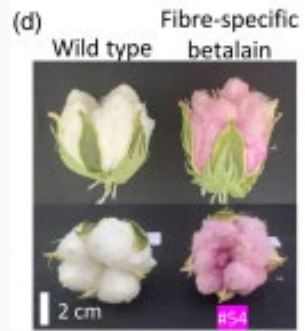
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Betalain production is possible in anthocyanin-producing plant species given the presence of DOPA-dioxygenase and L-DOPA

Nilangani N Harris^{1,4}, John Javellana¹, Kevin M Davies¹, David H Lewis¹, Paula E Jameson², Simon C Deroles¹, Kate E Calcott^{1,3}, Kevin S Gould³ and Kathy E Schwinn^{1*}

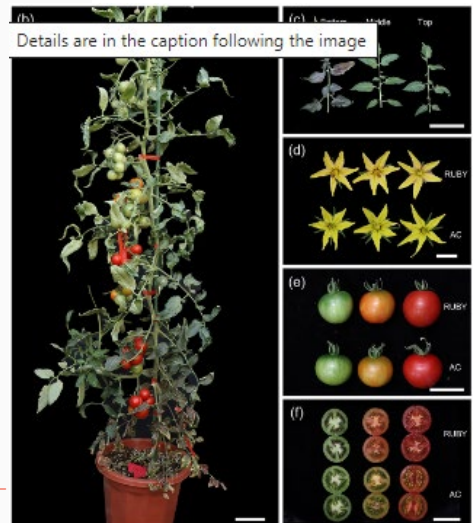


RUBY- Cotton

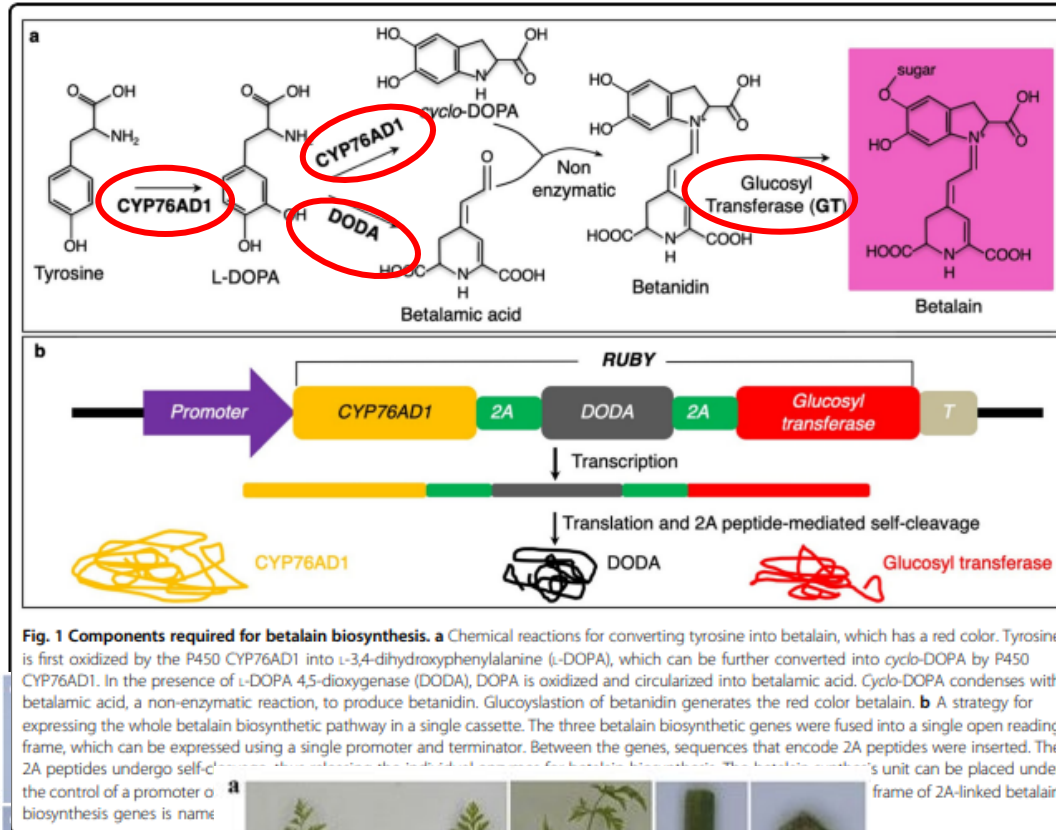


Li et al. 2023 Plant Biotech J.

Tomato



Wang et al. 2023 Plant Biotech J.



Deng et al. 2023 Hort. Research

20 Hort. Research

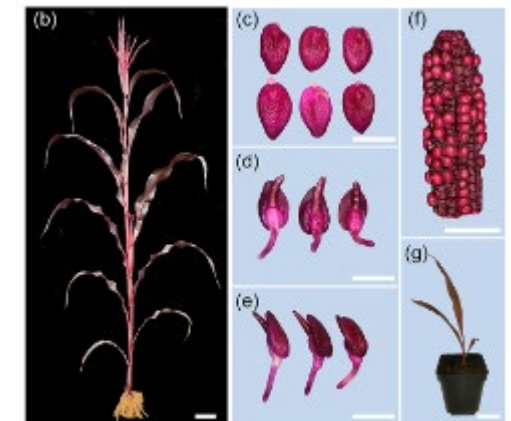
Carrot

Rice



Tain et al. 2020 New Phyto.

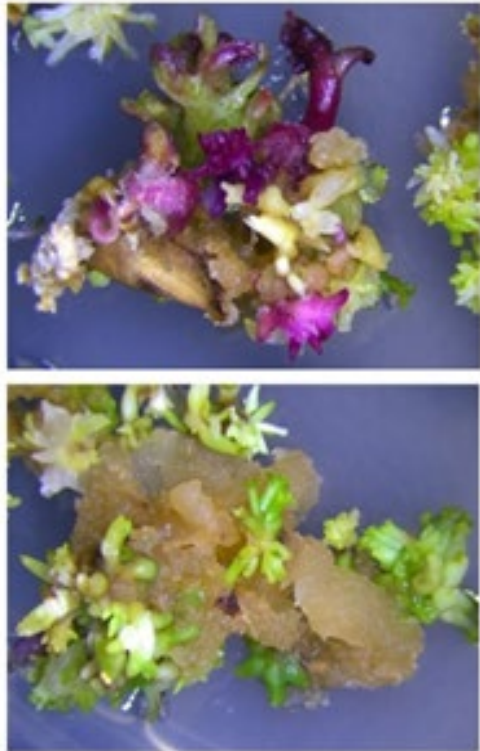
Corn



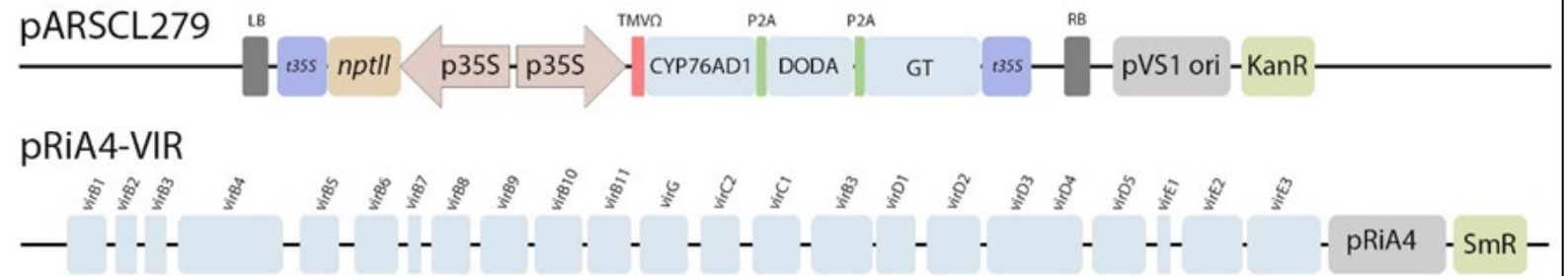
Wang et al. 2023 Plant Biotech J.

RUBY

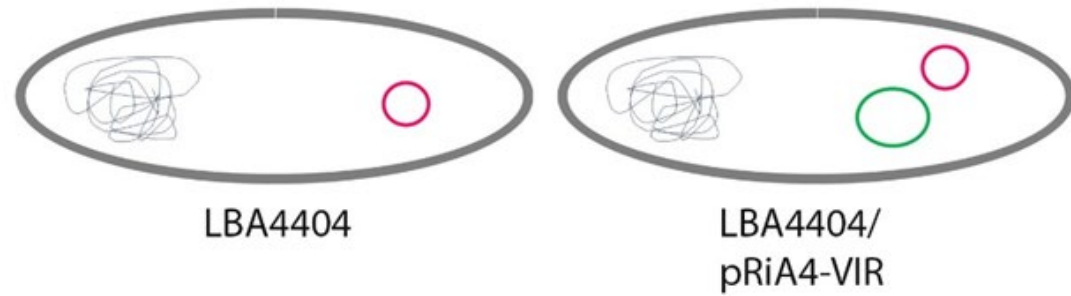
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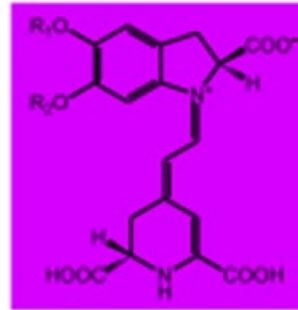
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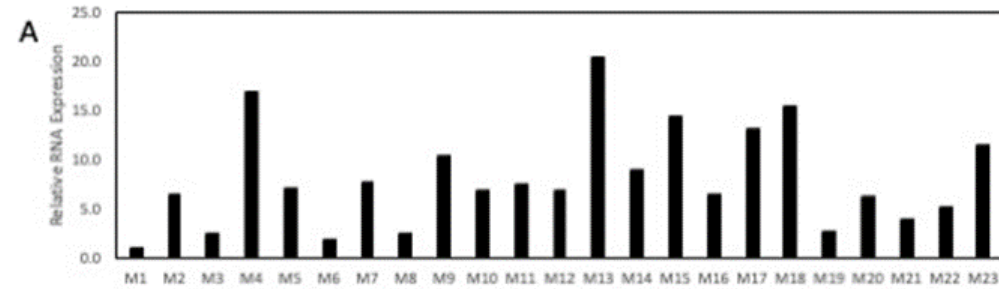
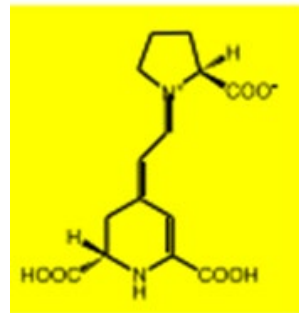
Expression vs Concentration



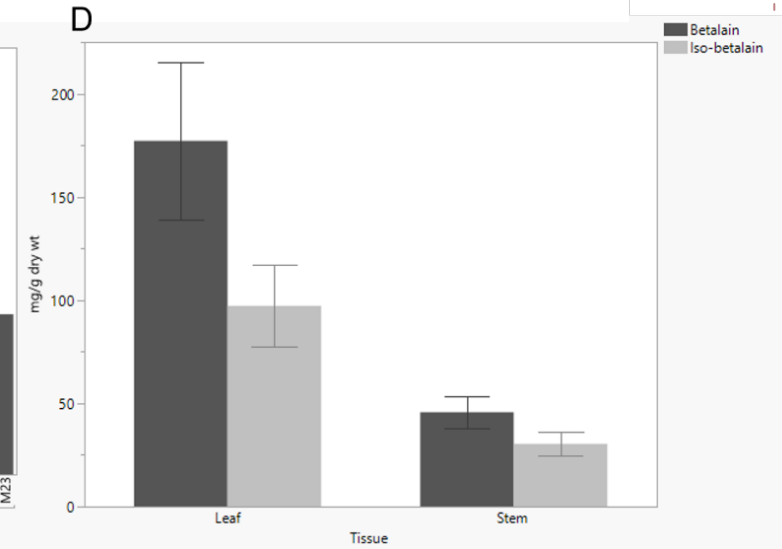
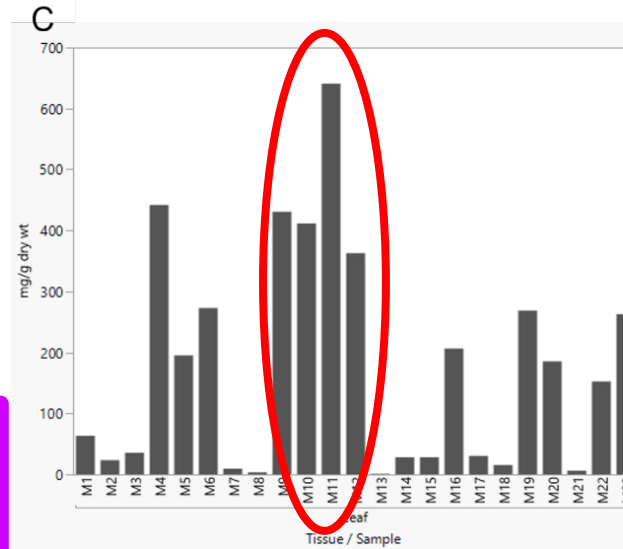
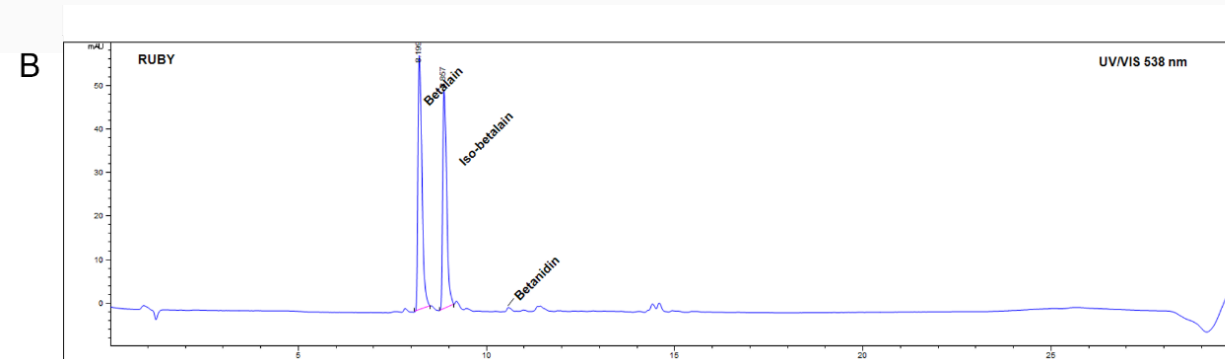
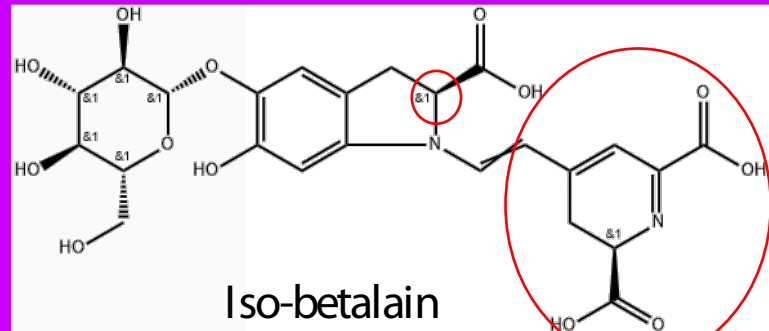
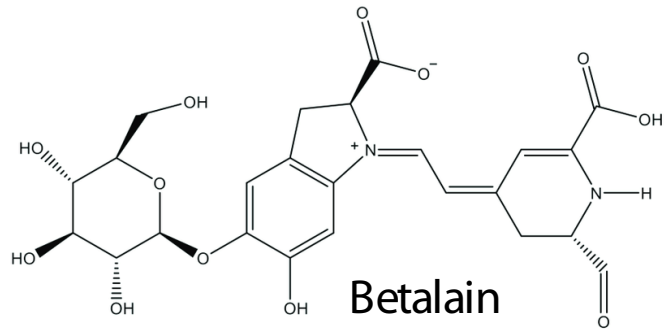
Betacyanins



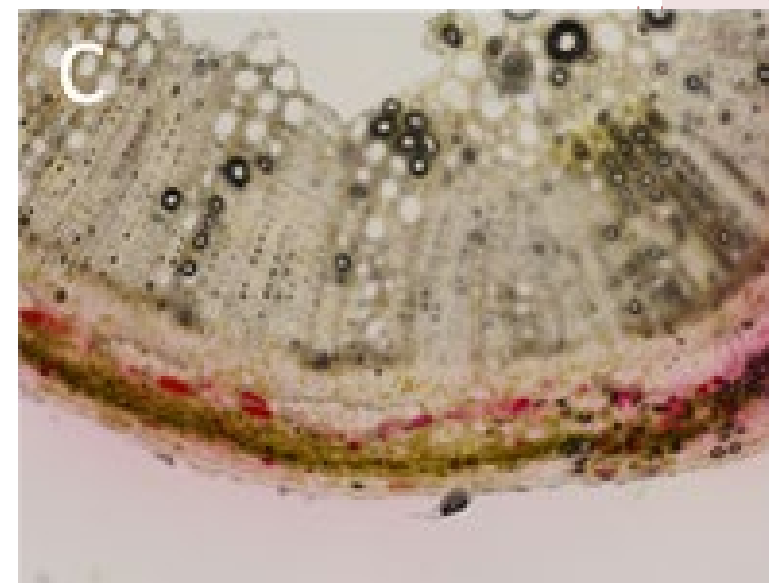
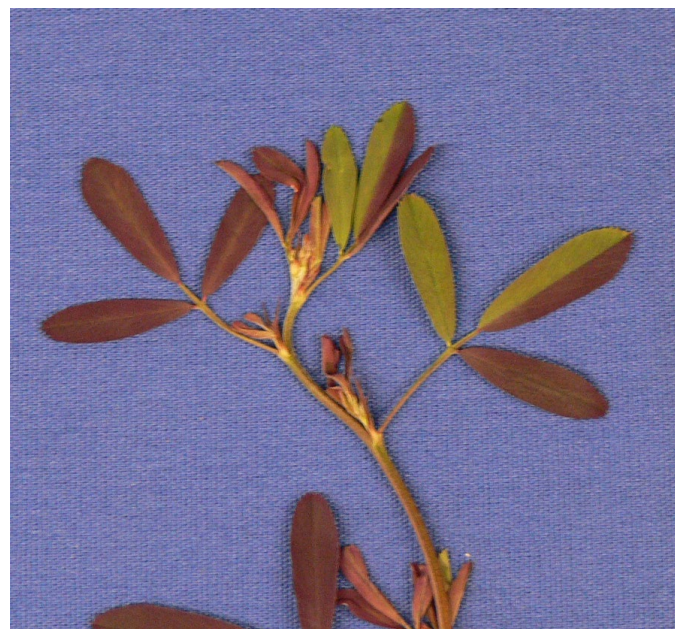
Betaxanthins



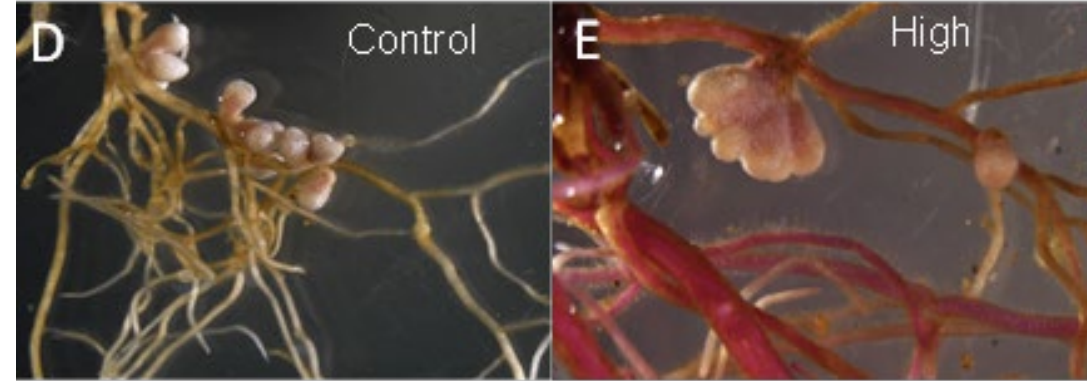
Betacyanin



Alfalfa's Gem



Alfalfa's Gem



Potential Uses

Scientific

- Marker
- Transgenic
- Field



Commercial

- Native source of Betalain
 - Dye
 - Bio-Available Antioxidant
 - Interaction with saponins
- Stress tolerance
 - Salt
 - Drought
- Reduction in enteric methane

Thank You

- Mindy Dornbusch (Samac Lab)
- Curtin Lab

