4-25-2019

2019 Pesticide Safety - Fruit Color Research

Giverson Mupambi

UMass Cranberry Station
Research & Extension

FRUIT COLOR RESEARCH

HISTORICAL BACKGROUND AND FUTURE PERSPECTIVES

Giverson Mupambi, Extension Assistant Professor

UMass Pesticide Safety Training 04-25-2019

UMass Cranberry Station
Research & Extension

Changing fruit color specifications

Depending on your handler:

- Optimum TAcy range
- min TAcy
- % uncolored allowance

Factors influencing fruit color

UMass Cranberry Station
Research & Extension

- Genetics: cultivar ability to synthesize anthocyanin
- Environmental: light and temperature
- Crop load

What can we do?

- No cultural practices to improve color

Lessons from the past

UMass Cranberry Station
Research & Extension

- Devlin (1967) evaluated 2 plant growth regulators (PGRs) and 2 pesticides to improve color on 'Early Black'

	Concentration	% ↑ anthocyanin**
Indole-3-acetic acid 2 WBH	10 ppm	37
	50 ppm	57
	100 ppm	50
Gibberellic acid*	100 ppm	-5
	300 ppm	-13
Silvex (preharvest)*	5 ppm	11
	10 ppm	11
	20 ppm	24
Malathion (preharvest)*	800 ppm	30
	1600 ppm	48

WBH~ weeks before harvest, *Timing not specified, ** Units not given

Lessons from the past

UMass Cranberry Station
Research & Extension

- PGRs can be inconsistent (Devlin et al. 1969)
- Timing of application every important
- Recommendation: 1600 ppm malathion, 2 weeks before harvest, within label restrictions

	Concentration	3 WBH	2 WBH	1 WBH
Indole-3-acetic acid	**30 ppm**	**-2.60%**	**0**	**0**
	50 ppm	**0**	**0**	**0**
Malathion	**800 ppm**	**24%**	**9%**	**6%**
	1600 ppm	**23%**	**22%**	**7%**
	2400 ppm	**25%**	**30%**	**8%**

WBH~ weeks before harvest, *mg anthocyanin / g cranberry

Lessons from the past

UMass Cranberry Station
Research & Extension

- Alar, Malathion and Ethrel on ‘Early Black’ (Eck, 1969)
- Cranberry industry avoided the Alar scare of 1989
- Cranberry of 1959

Control	0.154* a
Alar 2000 ppm	0.140 a
Alar 4000 ppm	0.149 a
Malathion 2.5 lb/acre	0.173 ab
Ethrel 6000 ppm	0.189 b

2 weeks before harvest, *mg Congo red / g fruit

Lessons from the past

UMass Cranberry Station
Research & Extension

- Ethrel on ‘Early Black’ (Devlin & Demoranville, 1970)

	Concentration	BB	FB	2 WBH
Ethrel	**100 mg/L**	**0**	**0**	**49%**
	500 mg/L	**0**	**0**	**65%**
	1000 mg /L	**0**	**0**	**64%**

WBH~ weeks before harvest
BB~Before bloom
FB~Full bloom
*mg anthocyanin / g cranberry

.

Lessons from the past

UMass Cranberry Station
Research & Extension

- Farag et al. 1992
- 'Searles', large scale study (12 x 50 m plots)

	1988
W	28.2 a*
E + T (0.5%)	30.2 a
T + EtOH	27.9 a
E+ T + EtOH (10%)	37.8 b

1 gallon Ethrel/acre
1-2 gallon Alcohol (Ethanol)/ acre
1 pint Tergitol/ acre
6lbs urea/acre

W=Water, E= Ethephon, T= Tergitol, EtOH = Ethanol
Sprayed 14 days before harvest
*TAcy mg / 100 g fresh weight

Future perspectives

UMass Cranberry Station
Research & Extension

- Natural formulations: PGRs & biostimulants
- Manipulating canopy to improve light penetration
- Ethylene based sprays → fruit firmness
- Pesticides → too close to harvest, residues!!

Future perspectives

UMass Cranberry Station
Research & Extension

frontiers in Plant Science

ORIGINAL RESEARCH
published: 26 March 2018
doi: 10.3389/fpls.2018.00323

Exogenous Abscisic Acid Promotes Anthocyanin Biosynthesis and Increased Expression of Flavonoid Synthesis Genes in *Vitis vinifera* × *Vitis labrusca* Table Grapes in a Subtropical Region

Renata Koyama[1], Sergio R. Roberto[1], Reginaldo T. de Souza[2], Wellington F. S. Borges[1], Mauri Anderson[3], Andrew L. Waterhouse[3], Dario Cantu[3], Matthew W. Fidelibus[3] and Barbara Blanco-Ulate[4]*

Figure 1. 'Crimson Seedless' grapes that received no PGRs for color improvement (left column), or increasing concentration of ABA (middle and right columns). *Photo by Cecilia Peppi, University of California.*

(Fidelibus and Vasquez, 2012)

ProTone®
PLANT GROWTH REGULATOR

- Right concentration
- Right timing

Future perspectives

UMass Cranberry Station
Research & Extension

- Manipulating the canopy to increase light penetration whilst still maintaining yield

Thank you

gmupambi@umass.edu, (508) 295-2212 ext. 24