Low-Cost Yield Monitoring System for Wild Blueberry
Fruit Yield Mapping

Nova Scotia Agricultural College
*University of Florida
WBB - Unique crop
Native - North America
Never cultivated
Deforested Farmland

Production cycle = 2 Years
Total area = 79,000 ha
Fruit yield = 82 million kg
Value = $352 million

Site-specific - Agrochemicals can:
✓ Increase input use efficiency and yield
✓ Increase horticultural profitability
✓ Decrease environmental pollution

Bare spots: 30%-50% of total field area
Grasses and Weeds

Wild Blueberry fields need to be managed site-specifically using VRT, Sensors, DGPS, Digital photography, Aerial images, GIS.....
Knowing where the wild blueberry plants are in a field would make production more environmentally safe and efficient: agrochemical additions only where needed

- feasibility testing of mapping wild blueberry yield with digital color photography
Adams Field-1

Map showing the distribution of plants and bare spots in the Adams Field-1 area.
Debert Field-2

- Plants
- Bare spots
- Sampling Points

- BB Plants
- Bare Spots

- 0 50 100 150 Meters
- N
- EW
- S

Map of Debert Field-2 showing plants, bare spots, and sampling points.
Hand Harvesting - Raking
Blueberry fruit pixels

Noise pixels

Image processing

Run erode/dilate

Blue pixels: 349663 = 6.3%
Green pixels: 5932 = 0.1%
Blue as percentage of blue+green: 98.3%
Noise pixels removed

% fruit pixels only

Blue pixels: 317565 =5.7%
Green pixels: 5922 =0.1%

Blue as percentage of blue+green: 98.3%
Adams Field: Blue Pixels (% of image) vs Fruit Yield (g/0.25^2)
Debert Field: Blue Pixels (% of image) and Fruit Yield

- Fruit yield (g/0.25^2)
- Bare Spots
- BB Plants

Blue Pixel (% of image)
Calibration: field 1, 16 August 2007

Y = 1968X
R² = 0.98
n = 30

Actual blueberry yield (kg/ha)

Blue pixels (% of image)
Calibration: field 2, 20 August 2007

Actual blueberry yield (kg/ha)

Blue pixels (% of image)

Y = 2090X

R² = 0.99

n = 30
Validation: field 2, 20 August 2007

\[ Y = 0.9364X \]

\[ R^2 = 0.99 \]

\[ n = 30 \]

1:1 line
Fruit Yield and Bare Spot Map

Raw Data

Bare Spot Map

Smooth Fruit Yield Map
Custom Software
Conclusions

- Automated yield monitoring system comprising of Digital Colour Camera, DGPS and Laptop computer will be developed

- System will be incorporated into harvester to monitor and map real-time blueberry fruit yield

- System will also be capable to detect/map bare spots/weed patches

- Information will be used for variable rate application of agrochemicals to improve fruit yield and quality, increase profitability, reduce environmental risks
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