# Processing Cucumber Variety & Downy Mildew Control Evaluation

## Ontario Crops Research Centre-Simcoe

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# 2022 Season Overview

Plant Agriculture

Cucumber Trials at Simcoe:

1. Conventional (seeds) machine harvest
2. Parthenocarpic hand pick
3. Parthenocarpic machine harvest
4. Downy mildew fungicide efficacy

Challenges:

- Weather – stretch of dry weather, stressed plants, irrigation helped, wind damage
- Cucumber beetles – bacterial wilt

# Research Trials

Plant Agriculture

Evaluations for all trials:

- Yield – fruit graded by size, counted and weighed
- Fresh internal quality – carpel & tip separation, placenta hollow
- Bitterness – taste test by same person
- Length Diameter ratios (LD)
- Brined quality – Industry evaluates in Sept/Oct

Fertility, weed control (herbicides/hoeing), fungicide program for DM/diseases, irrigation


Conventional (seeds)
Cucumber Machine Harvest

# Conventional Machine Harvest

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- Planted: June 8
- Target plant population: 55,000 plts/acre
  - 30" row spacing, 4" plant spacing
- Randomized complete block design, 4 replications
- Harvested at variety maturity, 10% 4 to oversize
  - Once-over harvest, removing all fruit from the plants down to a 1A grade size
- Evaluated 15 varieties – commercial & experimental
  - Commercial data only in presentation

# Conventional Machine Harvest

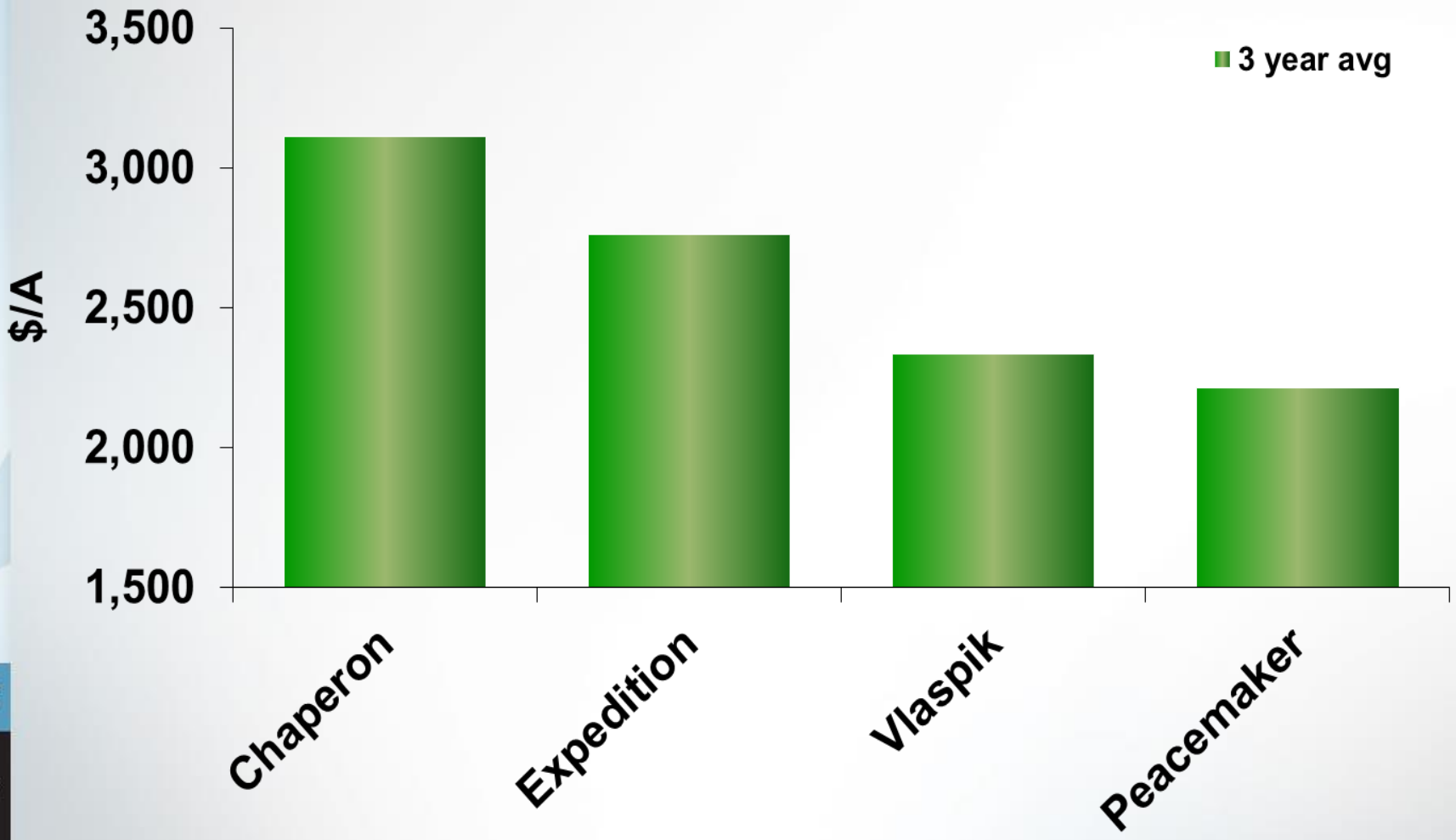
Plant Agriculture

| Variety | Source | t/acre | $/acre | fruit/ plant | days to harvest |
|---|---|---|---|---|---|
| Expedition | Seminis | 15.9 | 3,222 | 2.7 | 51 |
| Chaperon | Seminis | 15.8 | 3,221 | 3.3 | 51 |
| Peacemaker | Seminis | 16.0 | 2,653 | 2.2 | 56 |
| Journey | Seminis | 13.5 | 2,625 | 1.9 | 56 |
| Vlaspik | Seminis | 13.3 | 2,593 | 2.3 | 51 |

# Conventional Machine Harvest

Plant Agriculture

## 3 Year Yield Summary (Simcoe 2020-2022)



# Conventional Machine Harvest

Plant Agriculture

## Fruit LDs

| Variety | Source | 3A | 3B |
|---|---|---|---|
| Expedition | Seminis | 3.5 | 3.0 |
| Chaperon | Seminis | 3.6 | 2.9 |
| Peacemaker | Seminis | 3.2 | 3.1 |
| Journey | Seminis | 3.0 | 3.2 |
| Vlaspik | Seminis | 3.0 | 3.1 |

# Parthenocarpic (seedless) Cucumber Hand Harvest

# Parth Hand Harvest

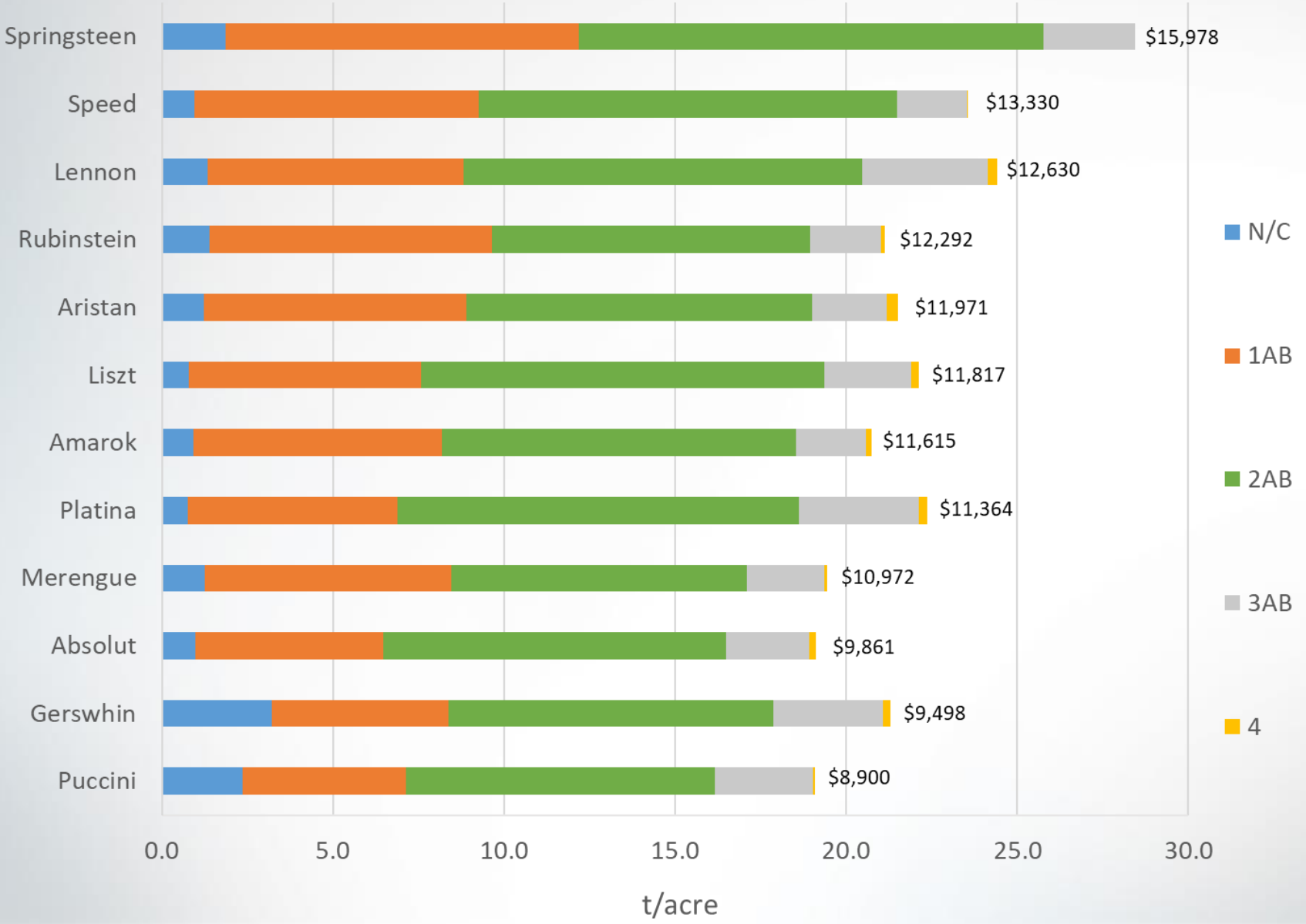
- Planted: June 2
- Target plant population: 18,000 plts/acre
  - 5 ft. row spacing, 6" plant spacing
- Randomized complete block design, 3 replications
- Harvested: July 15 – August 16, twice a week
  - Total of 10 harvests
- Evaluated 32 varieties – commercial and experimental

# Parth Hand Harvest

| Variety | Source | t/acre | $/acre | | fruit/plant |
|---|---|---|---|---|---|
| Springsteen | Rijk Zwaan | 28.4 | 15,978 | a | 41 |
| Speed | Nunhems | 23.6 | 13,330 | ab | 35 |
| Lennon | Rijk Zwaan | 24.4 | 12,630 | b | 33 |
| Rubinstein | Rijk Zwaan | 21.2 | 12,292 | bc | 33 |
| Aristan | Bejo | 21.5 | 11,971 | bcd | 32 |
| Liszt | Rijk Zwaan | 22.1 | 11,817 | bcd | 32 |
| Amarok | Bejo | 20.7 | 11,615 | b-e | 32 |
| Platina | Nunhems | 22.4 | 11,364 | b-e | 30 |
| Merengue | Seminis | 19.4 | 10,972 | b-e | 32 |
| Absolut | Bejo | 19.1 | 9,861 | cde | 27 |
| Gershwin | Rijk Zwaan | 21.3 | 9,498 | de | 30 |
| Puccini | Rijk Zwaan | 19.1 | 8,900 | e | 27 |

# Parth Hand Harvest

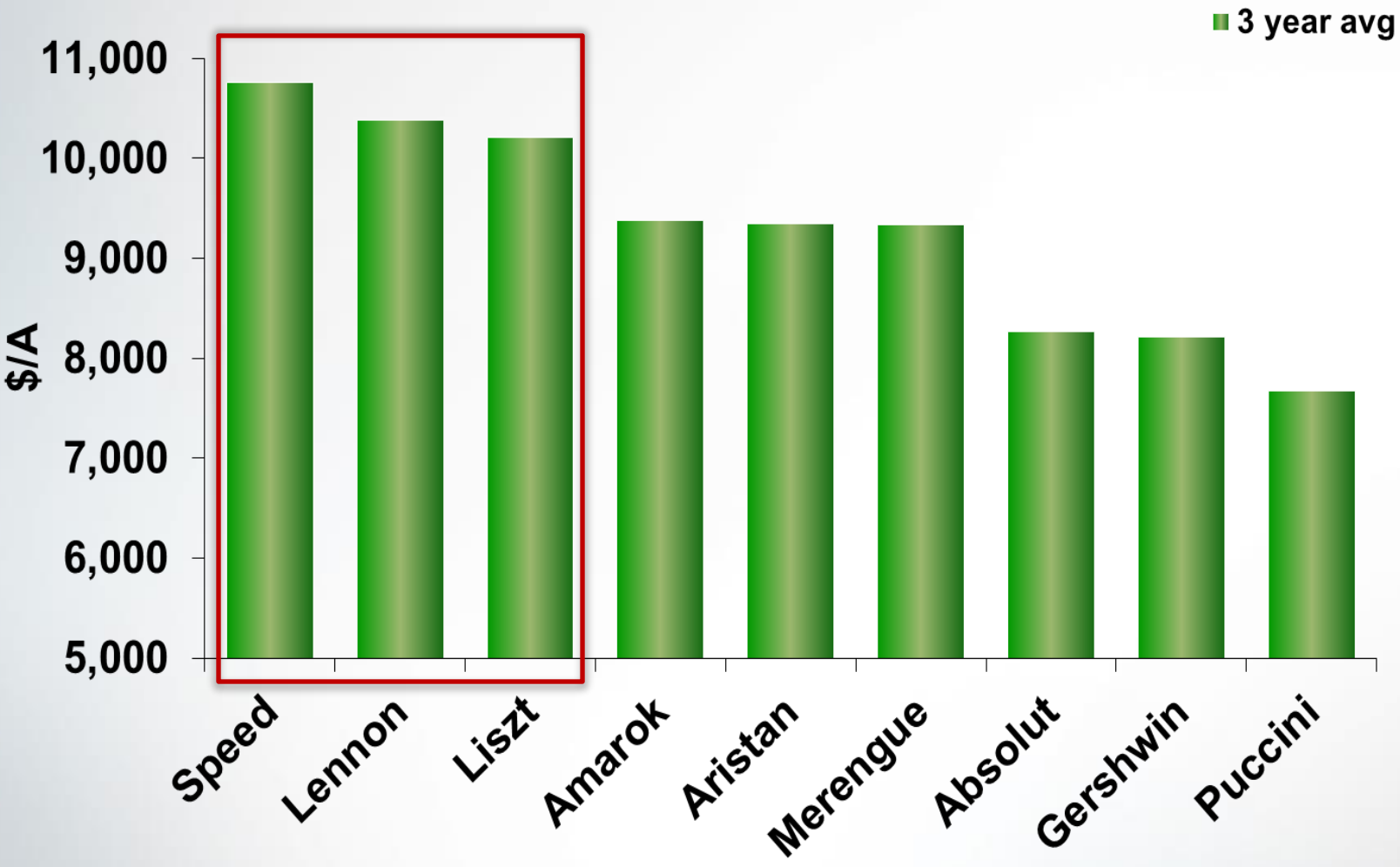
Plant Agriculture



# Parth Hand Harvest

Plant Agriculture

## 3 Year Yield Summary (Simcoe '19,'21,'22)



# Parth Hand Harvest

| Variety | Source | t/acre | $/acre | fruit/plant |
|---|---|---|---|---|
| Springsteen | Rijk Zwaan | 28.4 | 15,978 | 41 |
| MH 124 | Rijk Zwaan | 29.3 | 15,967 | 39 |
| MH 126 | Rijk Zwaan | 30.6 | 15,551 | 43 |
| FM 319 | Rijk Zwaan | 26.6 | 14,686 | 39 |
| Speed | Nunhems | 23.6 | 13,330 | 35 |
| RZ exp | Rijk Zwaan | 26.3 | 13,284 | 36 |
| NUN exp | Nunhems | 24.6 | 12,925 | 38 |
| Lennon | Rijk Zwaan | 24.4 | 12,630 | 33 |

# Parth Hand Harvest

Plant Agriculture

## Fruit LDs – Harvest #4

| Variety | Source | 2A | 2B | 3A |
|---|---|---|---|---|
| Springsteen | Rijk Zwaan | 3.7 | 3.5 | 3.2 |
| Speed | Nunhems | 3.6 | 3.1 | 2.9 |
| Lennon | Rijk Zwaan | 3.6 | 3.3 | 3.3 |
| Rubinstein | Rijk Zwaan | 3.7 | 3.7 | * |
| Aristan | Bejo | 3.5 | 3.5 | 3.1 |
| Liszt | Rijk Zwaan | 3.2 | 3.2 | 3.0 |
| Amarok | Bejo | 3.4 | 3.4 | 3.0 |
| Platina | Nunhems | 3.5 | 3.4 | 3.0 |
| Merengue | Seminis | 3.6 | 3.4 | 3.3 |
| Absolut | Bejo | 3.7 | 3.3 | * |
| Gershwin | Rijk Zwaan | 3.7 | 3.5 | 3.1 |
| Puccini | Rijk Zwaan | 3.4 | 3.3 | 3.1 |

* Insufficient sample size

# Parthenocarpic (seedless) Cucumber Machine Harvest

# Parth Machine Harvest

- Planted: June 22
- Target plant population: 28,000 plts/acre
  - 30" row spacing, 8" plant spacing
- Harvested at variety maturity
  - Target 3A,B sizes
  - Once-over harvest, removing all fruit from the plants down to a 1A grade size
- Evaluated 43 varieties – commercial and experimental

# Parth Machine Harvest

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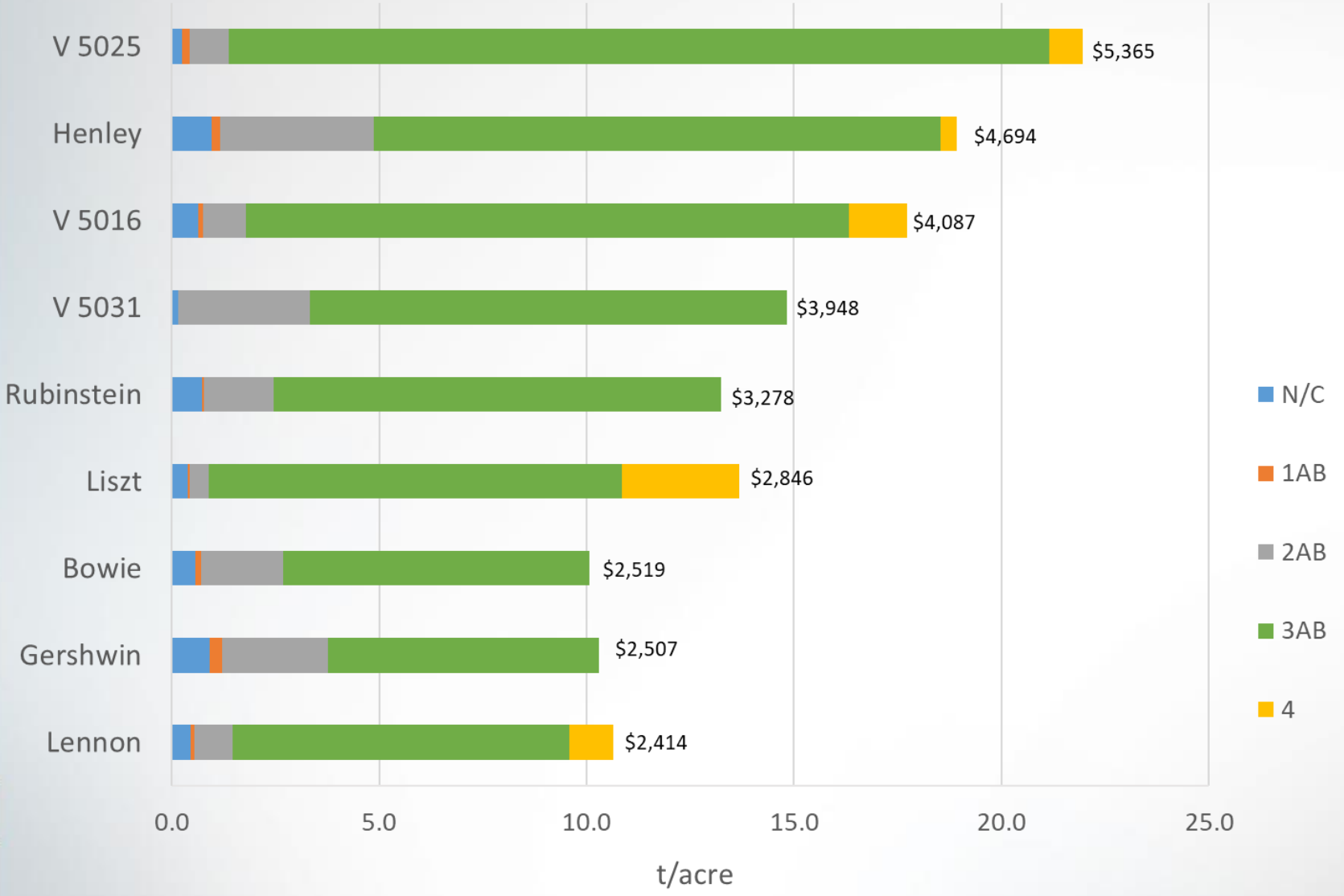
| Variety | Source | t/acre | | $/acre | | fruit/ plant | days to harvest |
|---|---|---|---|---|---|---|---|
| V 5025 | Nunhems | 22.0 | a | 5,365 | a | 5.0 | 49 |
| Henley | Rijk Zwaan | 18.9 | ab | 4,694 | ab | 5.4 | 44 |
| V 5016 | Nunhems | 17.7 | ab | 4,087 | ab | 3.4 | 47 |
| V 5031 | Nunhems | 14.8 | ab | 3,948 | ab | 4.5 | 47 |
| Rubinstein | Rijk Zwaan | 13.2 | ab | 3,278 | ab | 3.5 | 49 |
| Liszt | Rijk Zwaan | 13.7 | ab | 2,846 | b | 2.9 | 47 |
| Bowie | Rijk Zwaan | 10.1 | b | 2,519 | b | 3.2 | 49 |
| Gershwin | Rijk Zwaan | 10.3 | b | 2,507 | b | 5.4 | 47 |
| Lennon | Rijk Zwaan | 10.6 | b | 2,414 | b | 2.9 | 47 |

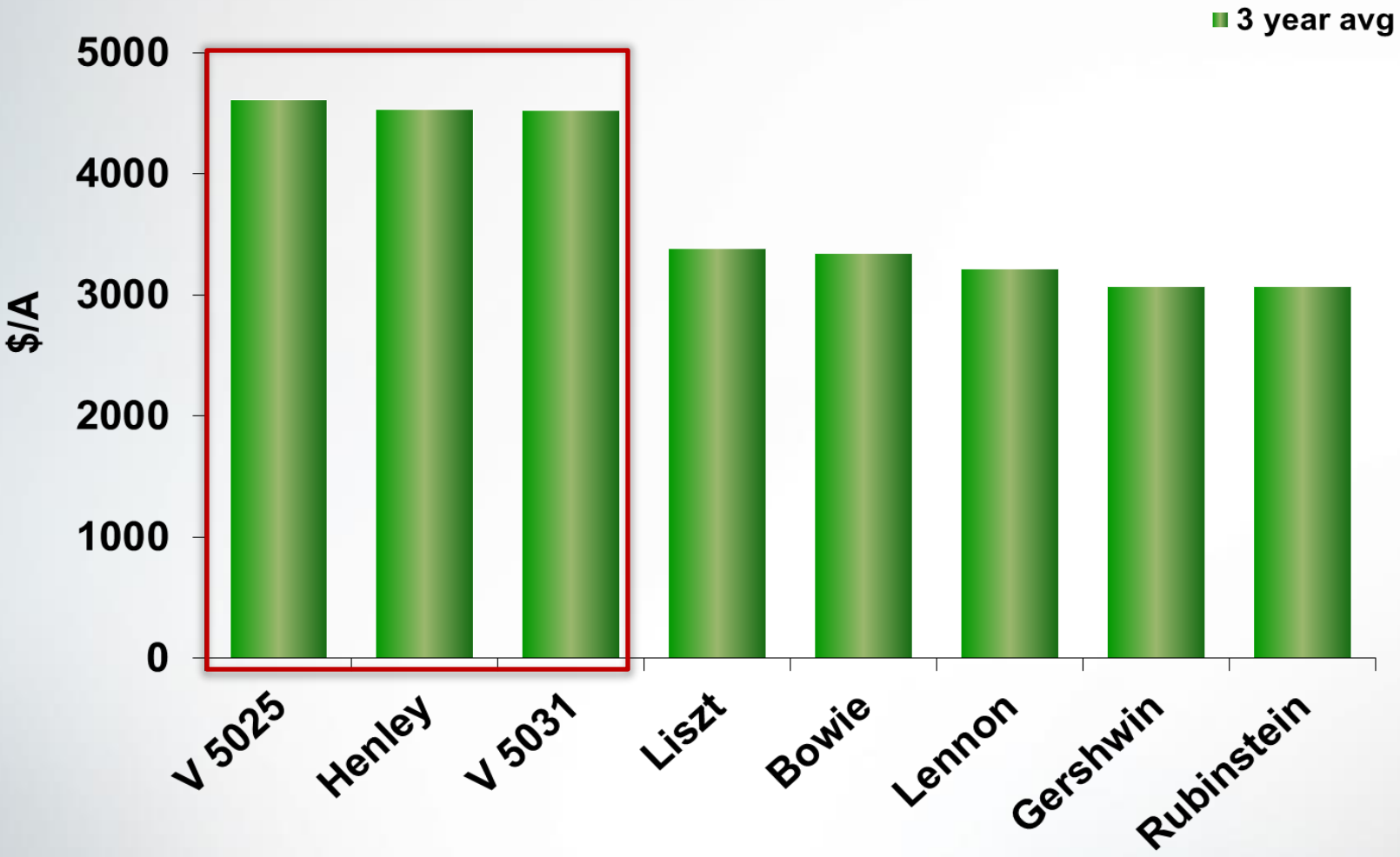
# Parth Machine Harvest



# Parth Machine Harvest

Plant Agriculture

## 3 Year Yield Summary (Simcoe 2020-2022)




Changing Lives Improving Life

University of Guelph

# Parth Machine Harvest

| Variety | Source | t/acre | $/acre | fruit/ plant | days to harvest |
|---|---|---|---|---|---|
| RZ exp1 | Rijk Zwaan | 27.0 | 6,679 | 5.4 | 49 |
| NUN exp1 | Nunhems | 23.8 | 5,905 | 4.8 | 49 |
| NUN 5062 | Nunhems | 23.6 | 5,736 | 5.2 | 51 |
| V 5025 | Nunhems | 22.0 | 5,365 | 5.0 | 49 |
| RZ exp2 | Rijk Zwaan | 19.6 | 4,813 | 4.6 | 47 |
| Henley | Rijk Zwaan | 18.9 | 4,694 | 5.4 | 44 |
| NUN 5050 | Nunhems | 19.4 | 4,484 | 3.7 | 49 |
| NUN 5063 | Nunhems | 17.5 | 4,271 | 3.6 | 51 |

# Parth Machine Harvest

Plant Agriculture

## Fruit LDs

| Variety | Source | 3A | 3B |
|---|---|---|---|
| V 5025 | Nunhems | 3.1 | 3.1 |
| Henley | Rijk Zwaan | 3.1 | 3.2 |
| V 5016 | Nunhems | 3.2 | 3.1 |
| V 5031 | Nunhems | 3.2 | 3.1 |
| Rubinstein | Rijk Zwaan | 2.9 | 2.8 |
| Liszt | Rijk Zwaan | 2.9 | 2.9 |
| Bowie | Rijk Zwaan | 2.9 | 3.0 |
| Gershwin | Rijk Zwaan | 3.0 | 3.0 |
| Lennon | Rijk Zwaan | 2.8 | 2.9 |


Cucumber Downy Mildew
Fungicide Efficacy

# Downy Mildew

Photos from:
www.omafra.gov.on.ca/IPM/english/cucurbits/diseases-and-disorders/index.html

# Downy Mildew - Cucumbers

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## Background

- Downy mildew control critical to cucumber production
- Effective products needed by Ontario industry – fungicide resistance is a concern
- Efficacy and crop safety required for MU registration
- Trials established in collaboration with:

  OMAFRA

  OPVG

  Ag Chemical Industry

  Ridgetown College

# Downy Mildew – Efficacy Trial

- Purpose: To determine which products are still effective
- Products are applied alone (not in a program)
  - NOT ever recommended for growers – poor resistance management
- BUT – tells us which fungicide are actually working

# Downy Mildew – Efficacy Trial

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- RCBD, 4 reps
- 'Vlaspik' and ‘Chaperon’ seeded July 4
  - DM-susceptible vs DM-tolerant
- Fungicide applications begin at 3-4 leaf stage
  - 7-day interval
  - 3 applications
- Once-over harvest on August 17
- Moderate disease pressure
  - Detected in area July 13
  - Detected in trial August 3

# Downy Mildew - Cucumbers

Plant Agriculture

## Fungicide Treatments

| Product | Active Ingredient(s) |
|---|---|
| Bravo ZN | chlorothalonil |
| Torrent | cyazofamid |
| Tattoo C | propamocarb + chlorothalonil |
| Zampro | ametoctradin + dimethomorph |
| Orondis Ultra alt.<br>Bravo | mandiaproamid + oxathiapiprolin<br>chlorothalonil |
| Allegro | fluazinam |
| Torrent alt.<br>Diplomat + Phostrol | cyazofamid<br>polyoxin d zinc salt + phosphates |
| Cueva | Copper octanoate |
| Cueva + Phostrol | Copper octanoate + phosphates |

# Downy Mildew - Cucumbers

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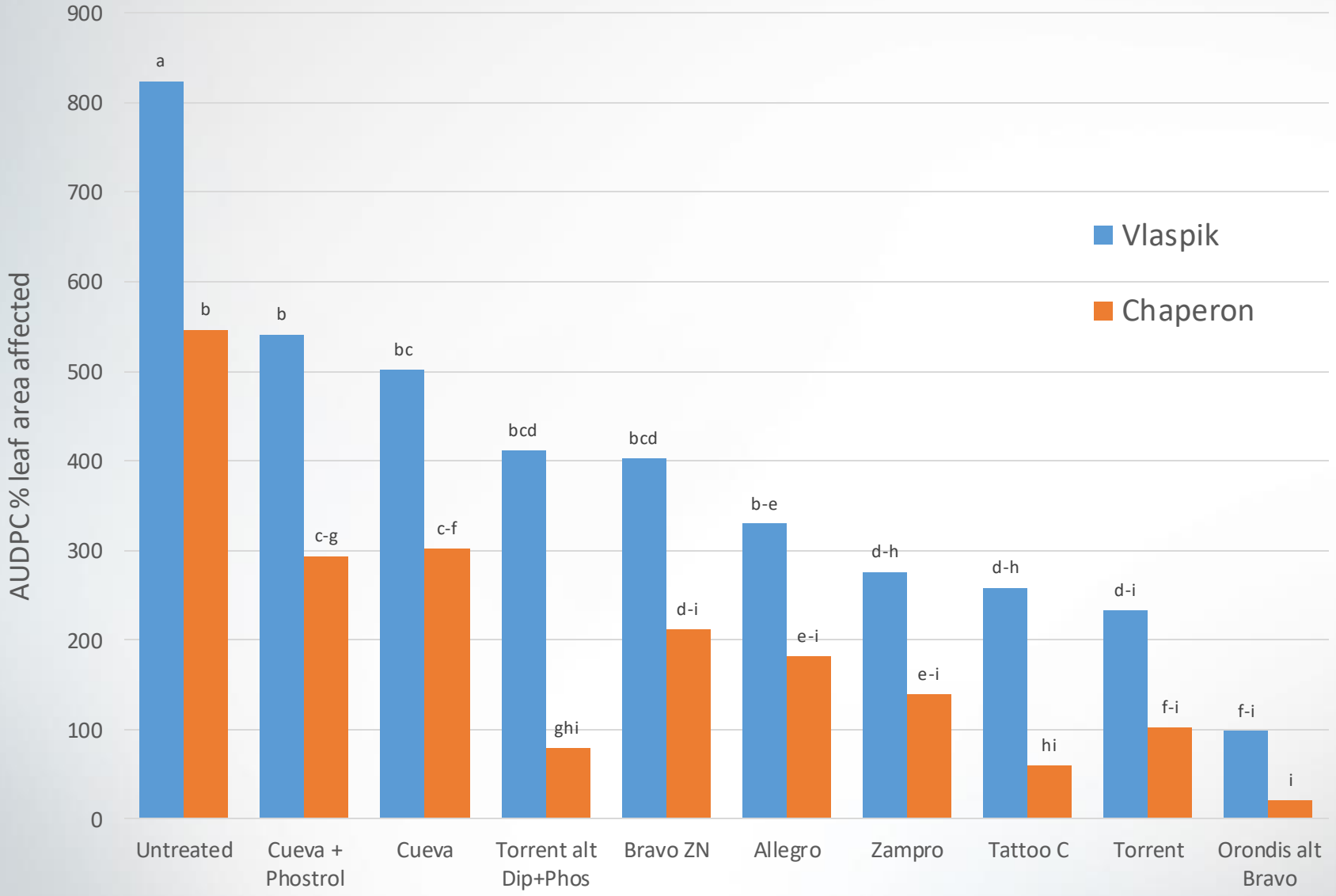
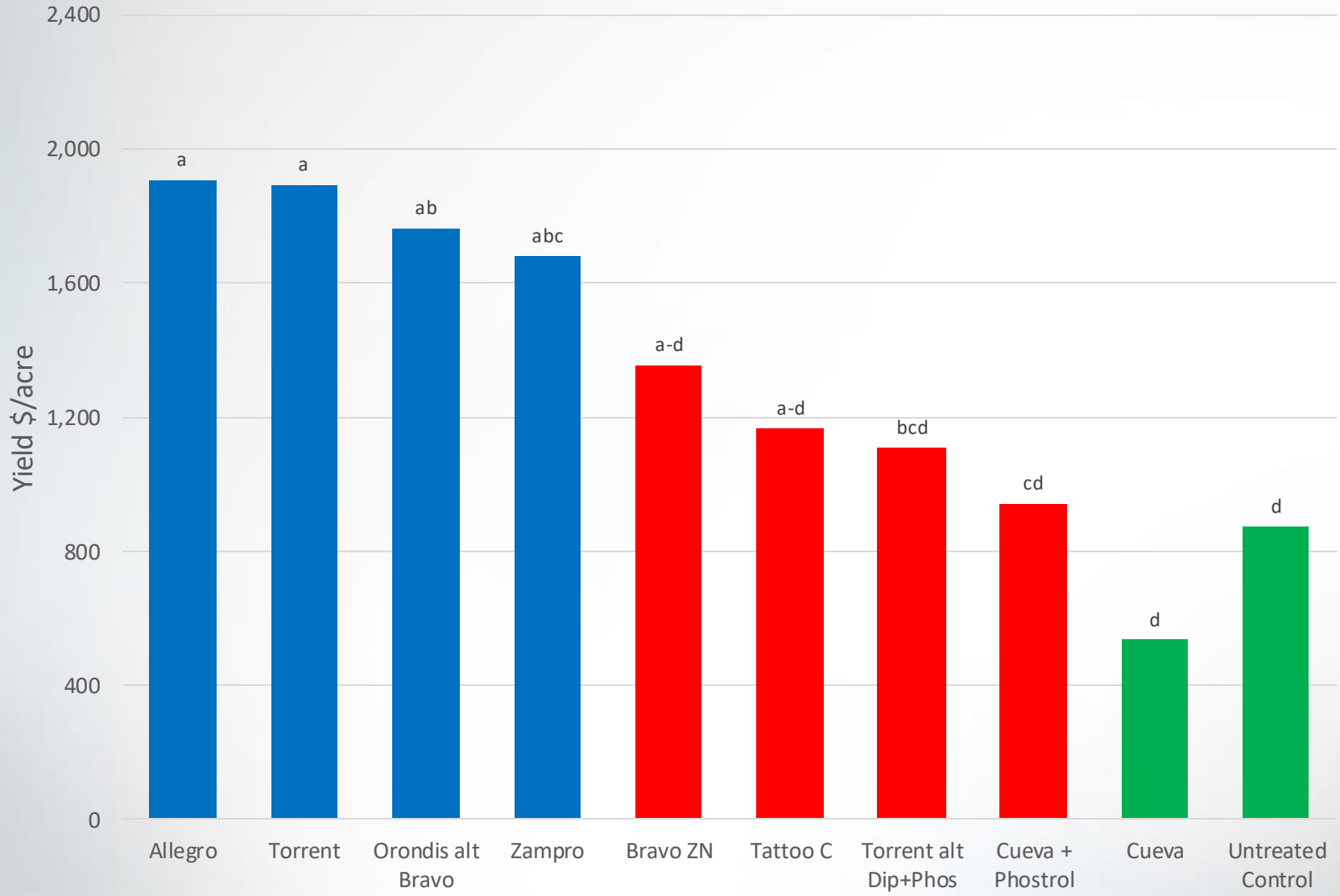
## Season-long total disease severity (AUDPC)



# Downy Mildew - Cucumbers

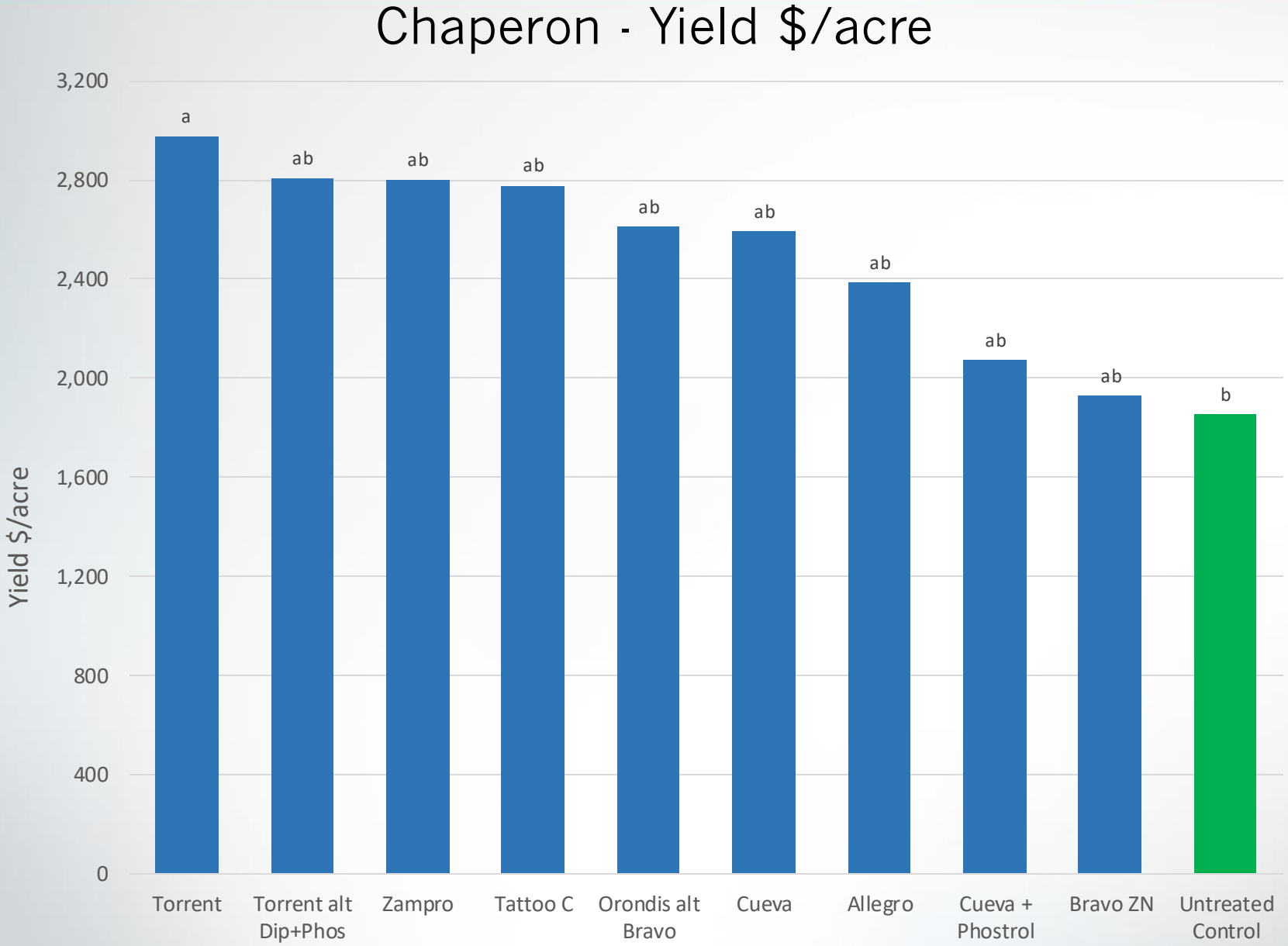
Plant Agriculture

## Vlaspik - Yield $/acre

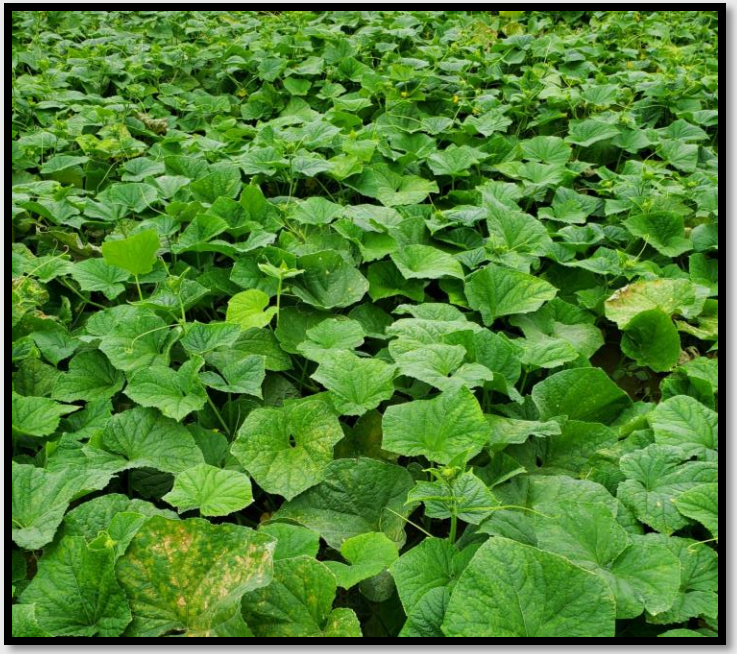


# Downy Mildew - Cucumbers

Plant Agriculture



| | Vlaspik | Chaperon |
| --- | --- | --- |
| Torrent |  |  |
| Tattoo C |  |  |

| | Vlaspik | Chaperon |
| --- | --- | --- |
| Torrent alt. Diplomat + Phostrol |  |  |
| Cueva |  |  |

| | Vlaspik | Chaperon |
| --- | --- | --- |
| Orondis alt. Bravo |  |  |
| Untreated |  |  |

Vlaspik

Chaperon

Orondis alt. Bravo

Untreated

# Downy Mildew - Cucumbers

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**Most Effective Treatments:**

Orondis Ultra

Torrent

Zampro

Tattoo C – inconsistent control

Allegro-30 day PHI

**Mixing Partners**

Bravo – max 2 application/year, 2 day PHI

Dithane – max 2 applications/year, 14 day PHI

# Acknowledgements

Ontario Processing Vegetable Growers (OPVG) – Cucumber Research Committee

Hartung Brothers Inc.

Bejo Seeds Harris Moran Nunhems, BASF

Rijk Zwaan Seminis, Bayer CropScience

Pickle Packers International

Canadian Agricultural Partnership (CAP)

Ontario Agri-Food Innovation Alliance

# Thank-you!

- Simcoe research station farm crew
- Summer research assistants


Questions?
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