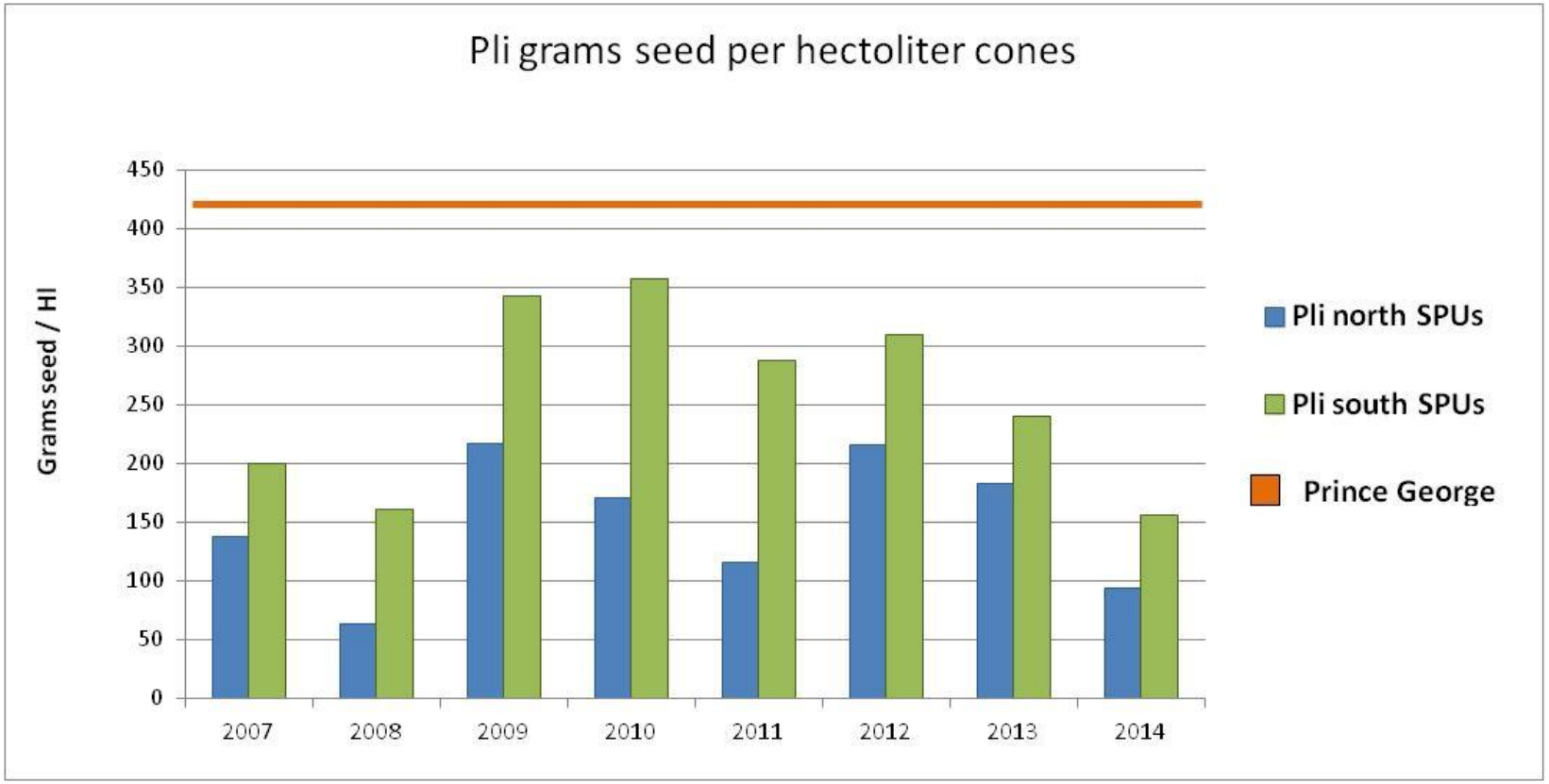
Matador and Delegate effects on seed production in lodgepole pine orchards: 2014 and 2015 results

Photo: Vicky Berger

Jack Woods
Ward Strong

Seed set has long been a problem in Pli orchards

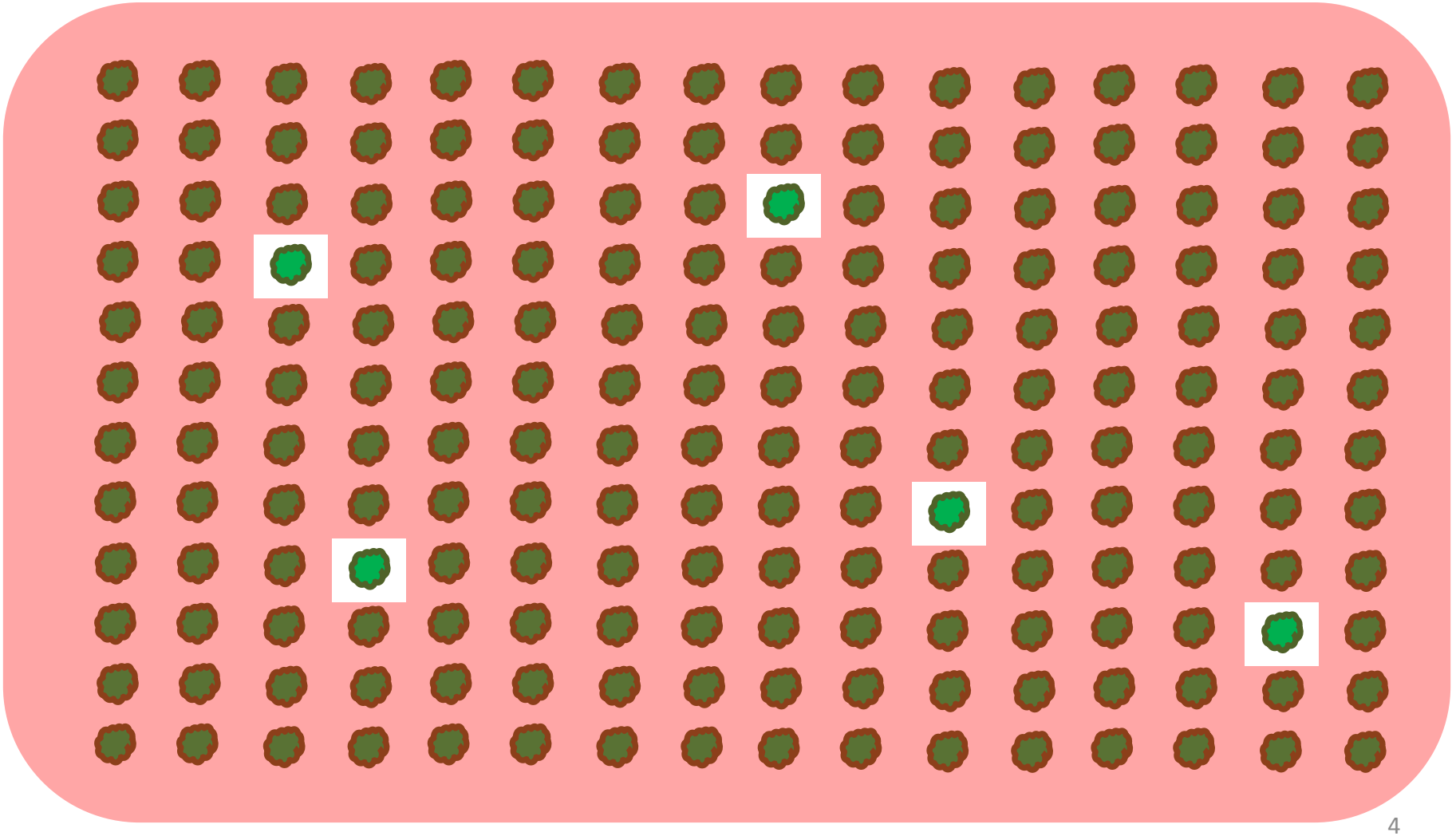


Data from 9 SelectSeed orchards
Prince George data from Webber, 2014
2014 data from non-sprayed control blocks for orchards included in Matador trial

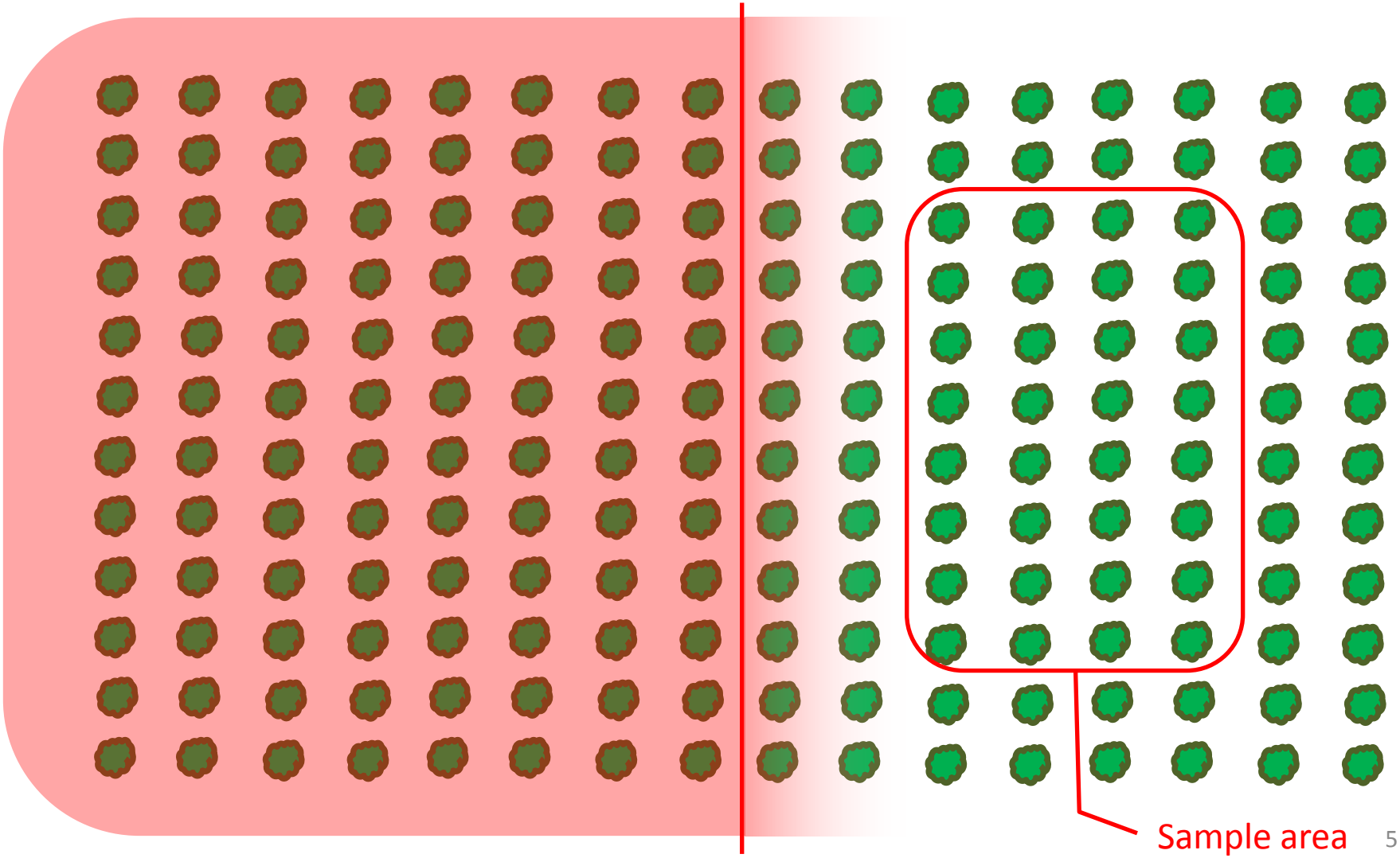
Trials to identify why low seedset exists

- Water relations
- Pollination / pollen droplets
- Fertilization
- High Okanagan temperatures
- Out-of-provenance seed orchards
- Timing of Harvest
- Lepto removal studies (bagging, pesticides)
- **Small-plot pesticide trials**
  - **Selected Matador to pursue further**

Single-tree pesticide trials have limited value because Lepto move



Large-plot trials will kill Lepto over larger areas and slow re-colonization



Trial objectives

2014

- Evaluate operational scale seed production with Matador
- Compare seed production in insect exclusion bags vs. Matador

2015

- Evaluate operational scale seed productino with Matador and Delegate
- Investigate FSPC loss from early July to late August (Time-of-Harvest)

Trial components and purpose

- Operational collections (2014 and 2015)
  - Treatment (spray)
  - Control (no spray)
- Small-lot collections (2014)
  - Selected 20 clones in each orchard
  - Compared bagged cones and not-bagged cones in spray and control blocks
- Time-of-harvest collections (2015)
  - Quantify FSPC decline in spray and control blocks (early July to late August)

The orchards

2014 (all Matador)

- Kettle River CP
- Sorrento BV
- PRT TO low
- Eaglerock TO high

2015

Matador

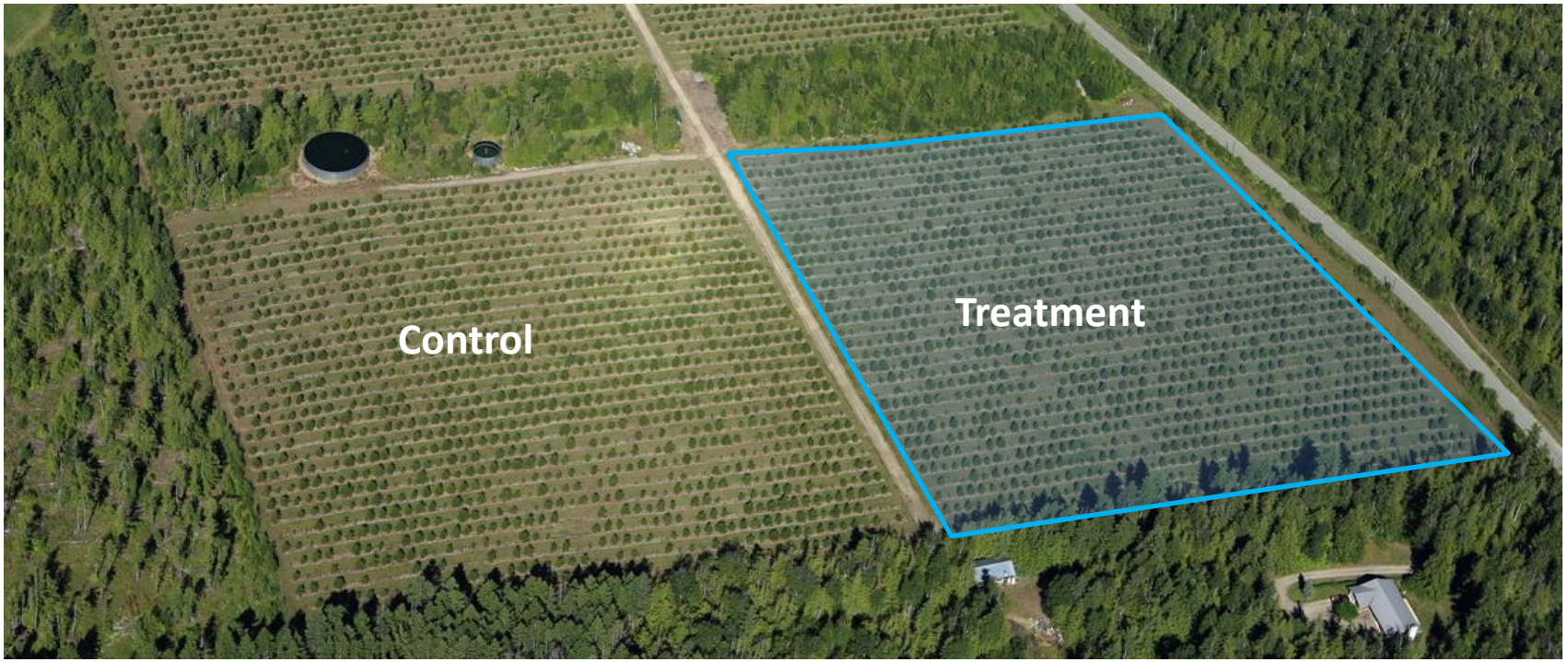
- Kettle River CP
- Sorrento BV
- PRT TO low
- Eaglerock TO high
- VSOC BV

Delegate

- Kettle River PG
- Sorrento CP
- PRT NE low
- VSOC PG

Orchards divided into treatment and control blocks

Sorrento – Bulkley Valley – Orchard 240



Treatments

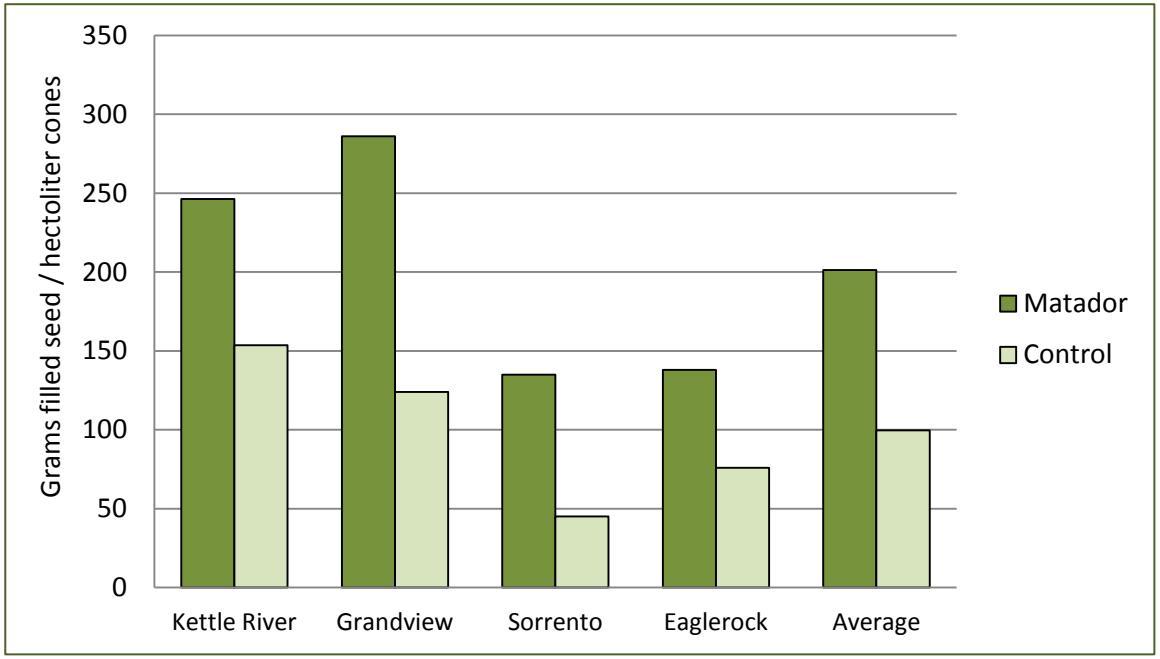
- Two or three air-blast spray applications
  - Mid May to early June
  - Late June to mid July

- 104 mls Matador per ha
  - $25 / ha / treatment (chemical only)

- 420 grams Delegate per ha
  - $63 / ha / treatment (chemical only)

2014 Seed production doubled in operational collections (lots of Lepto in 2014)

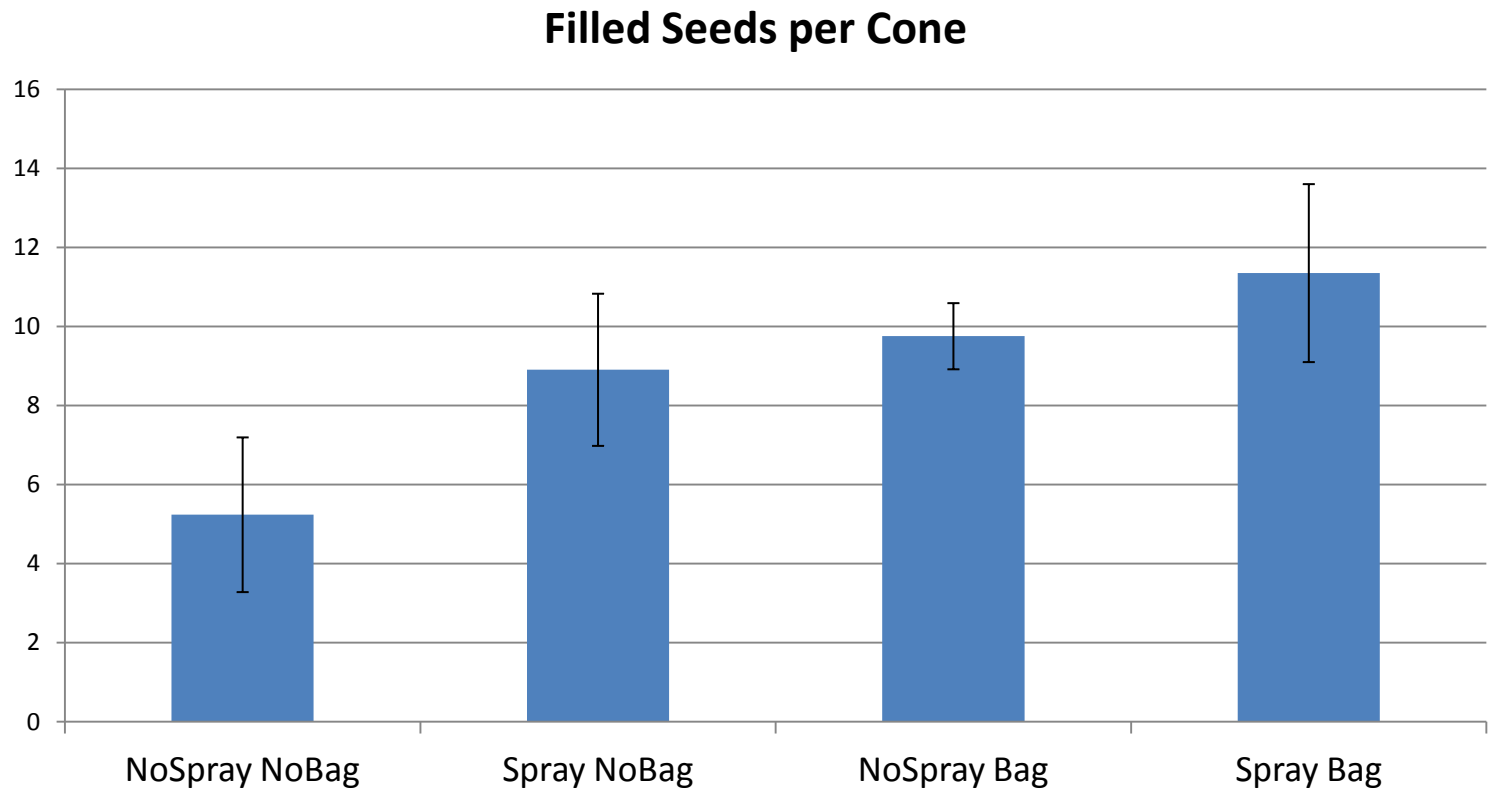
Grams seed per hectoliter of cones



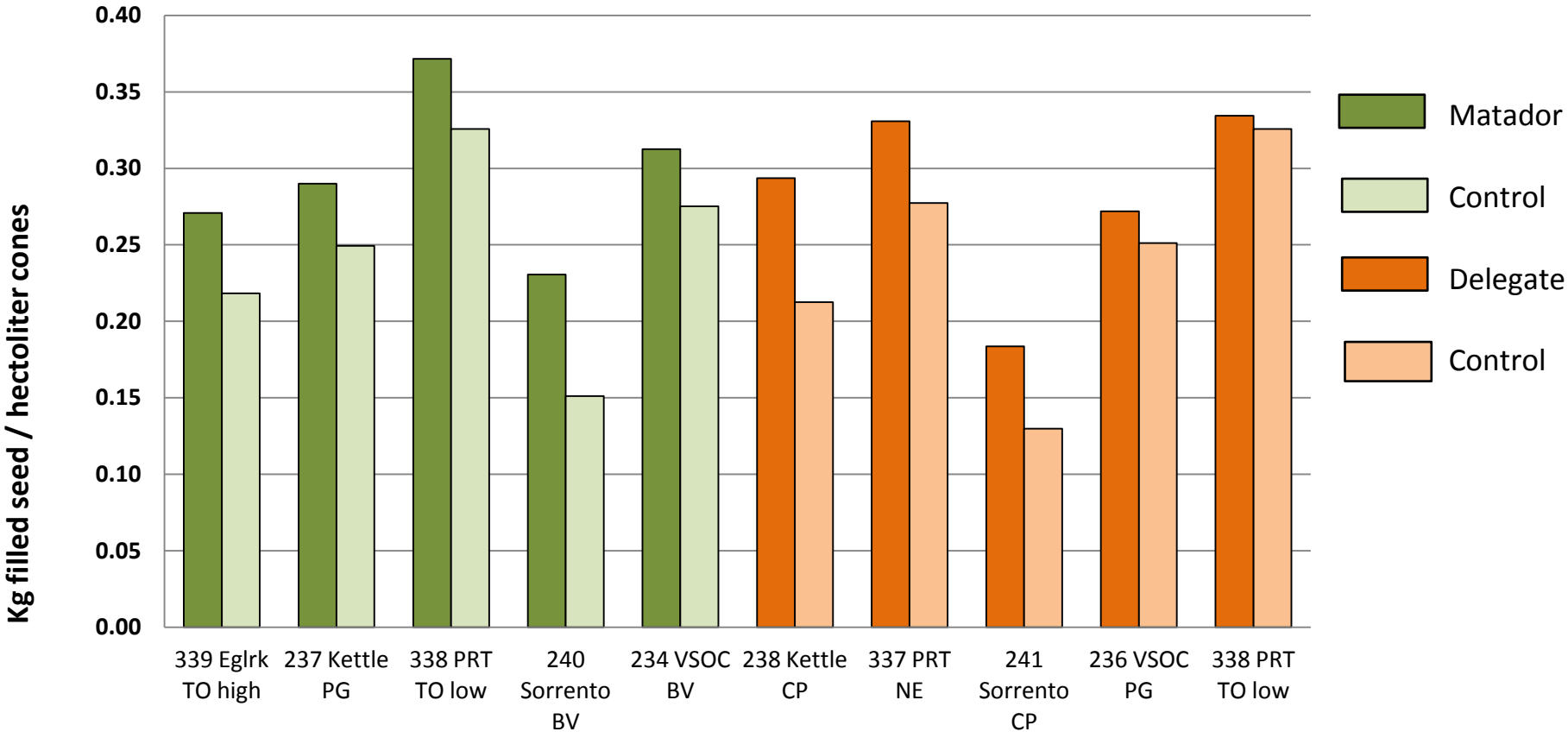
No differences found for:

- **Seed germination**
- **Seed weight**

2014 Matador was nearly as effective as bagging

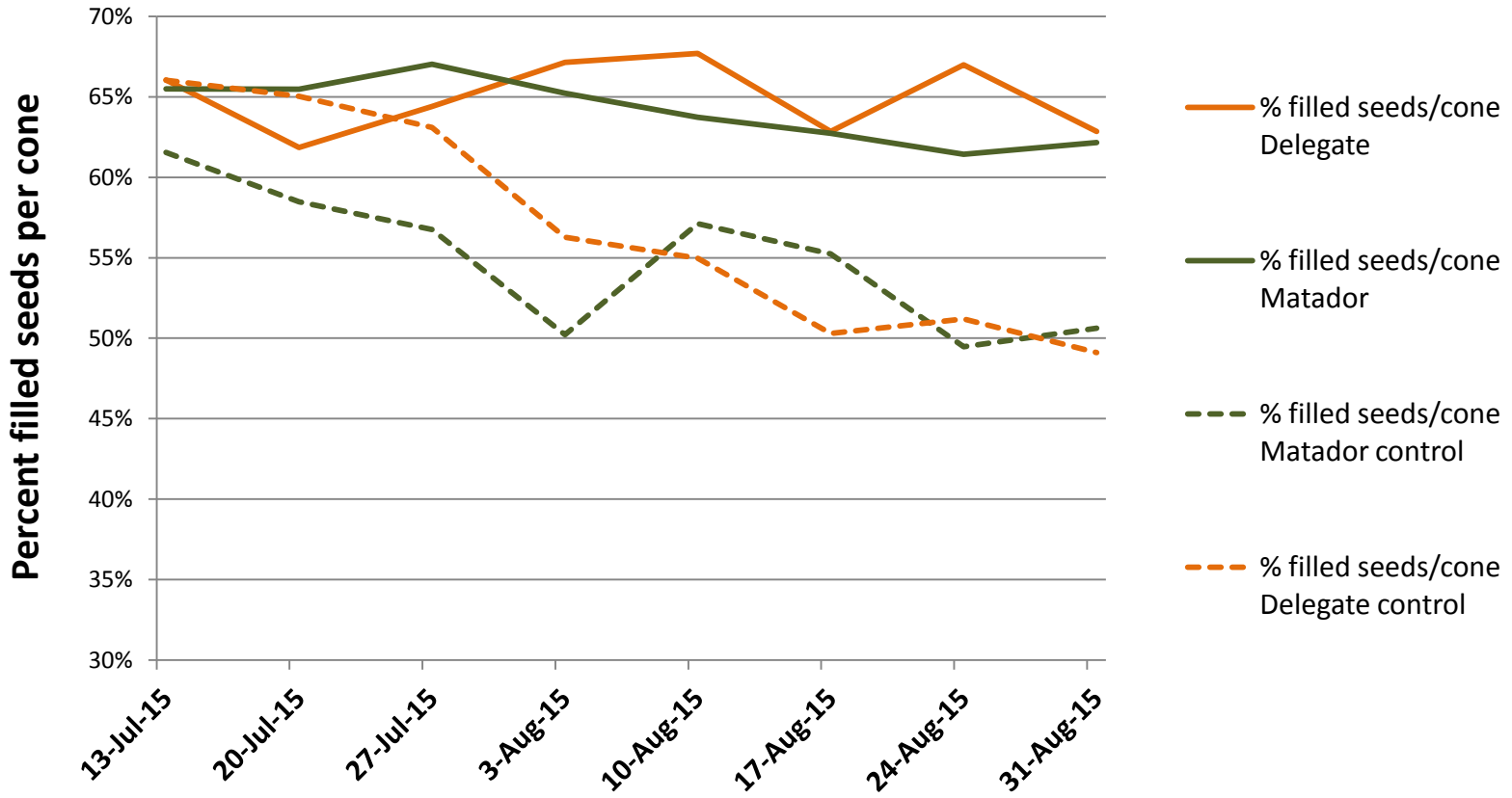


2015 Matador and Delegate seed production relative to controls



2015 – fewer Lepto and less gain in seed yield than in 2014

2015 harvest timing
Less FSPC decline; extended harvest window



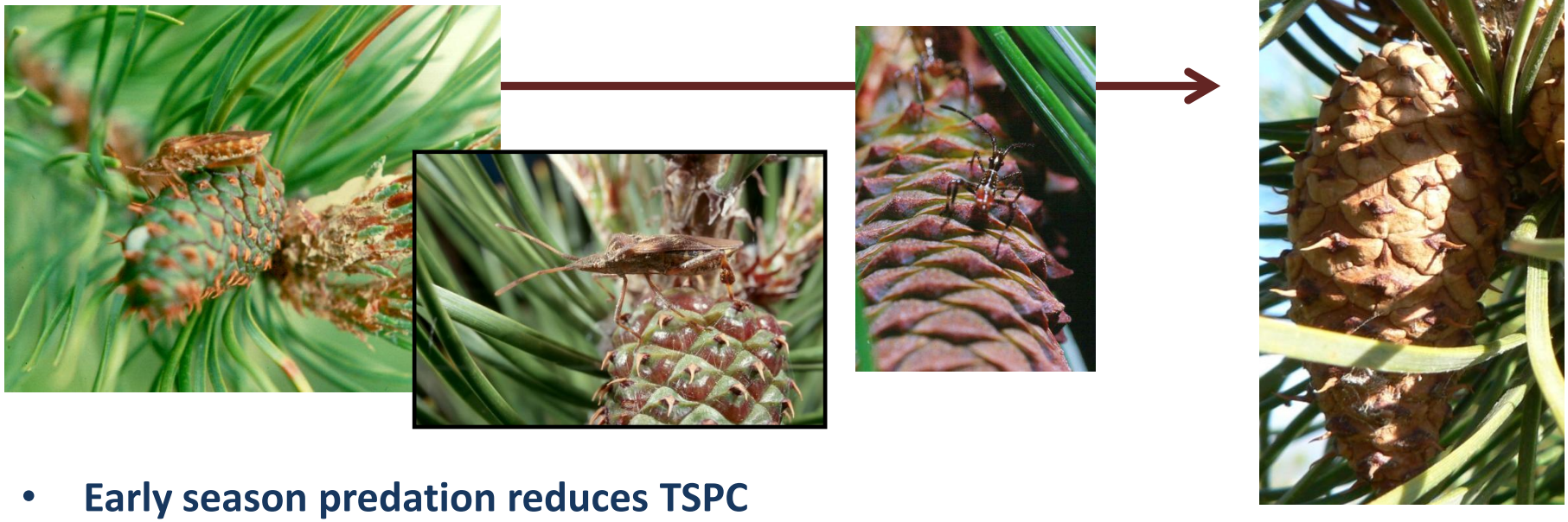
Early- and late-season predation by Lepto

May
- Lepto feeding starts
- Ovule predation; TSPC reduced

June
Fertilization

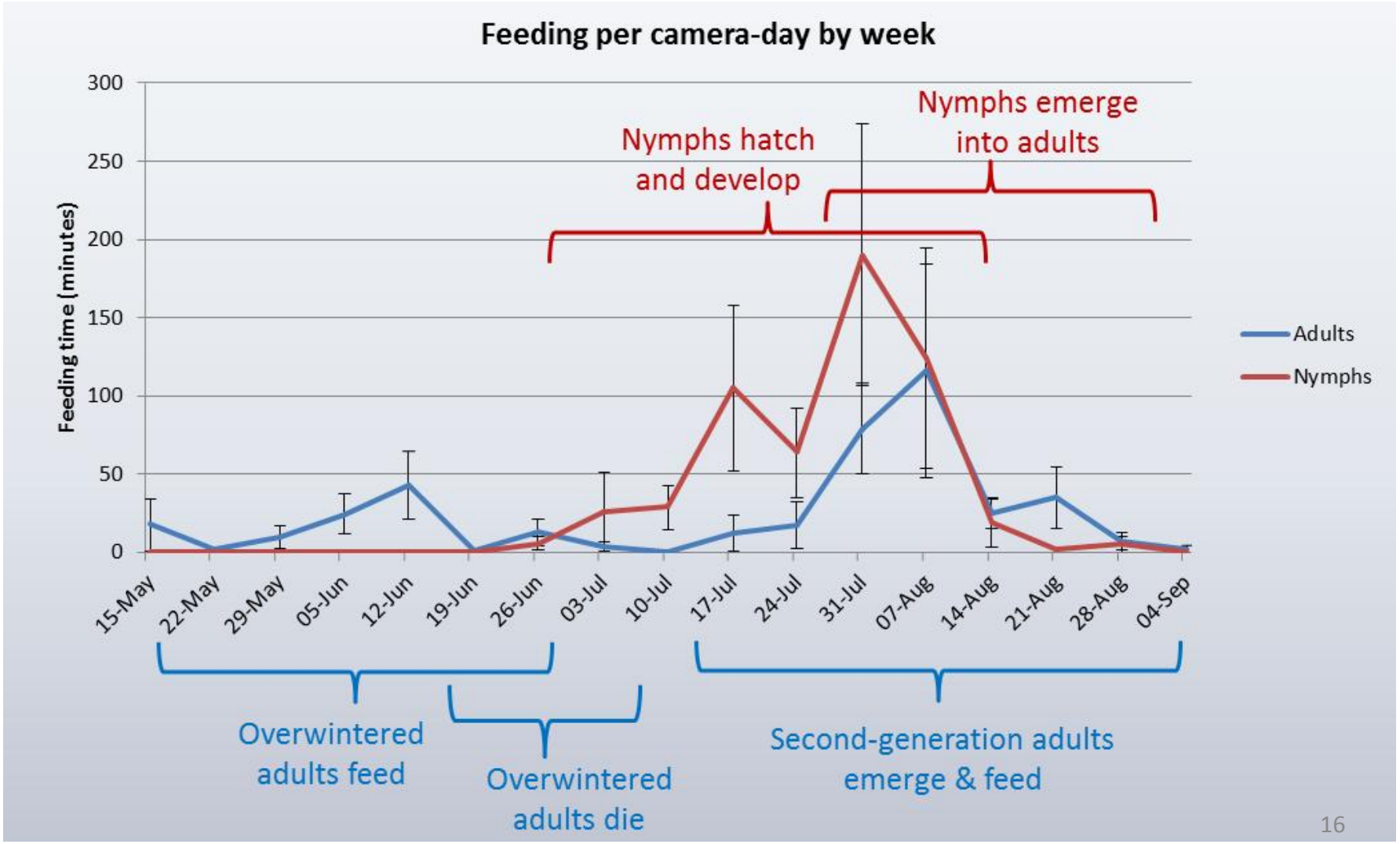
July
- Nymphs hatch
- Seed predation
- Loss of potentially filled seeds

August
- Nymphs mature
- Seed predation
- Harvest cones



- **Early season predation reduces TSPC**
- **Late-season predation reduces the FSPC and the % filled to total**

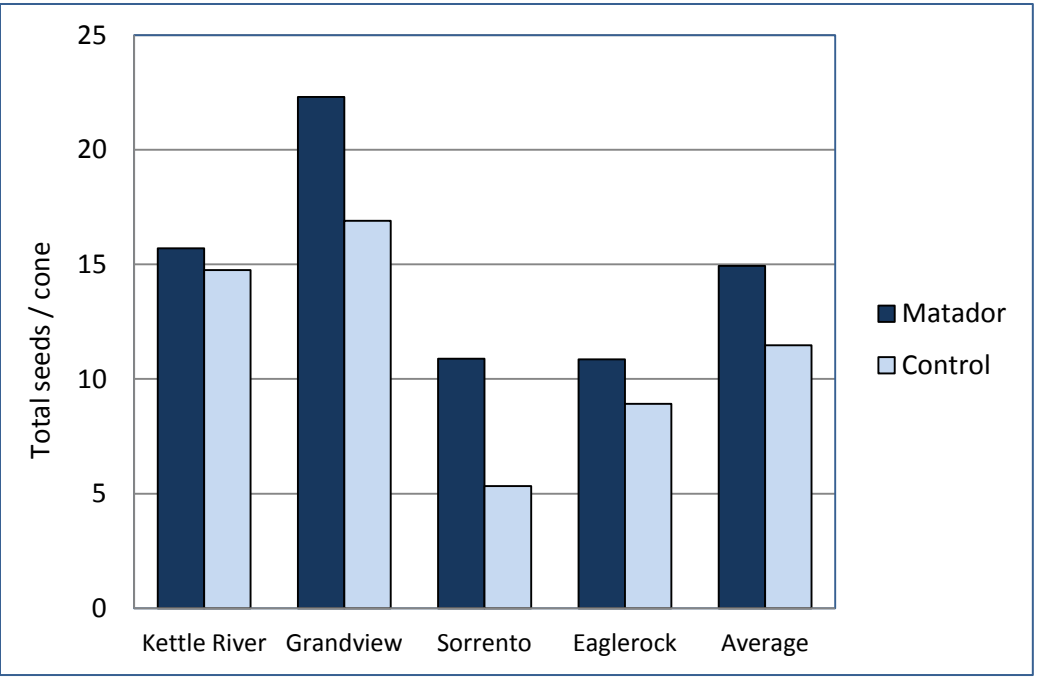
Lepto have two primary feeding periods



Total formed seeds per cone increased

2014

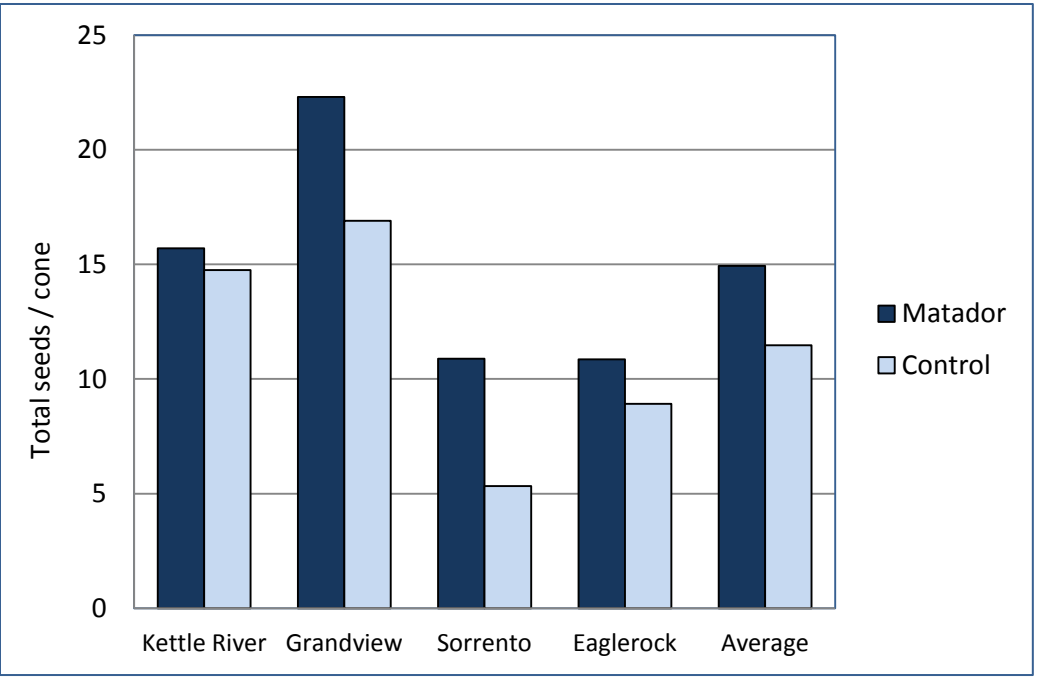
- TSPC increases
  - 41% in spray blocks
  - 47% with bagging



Total formed seeds per cone increased

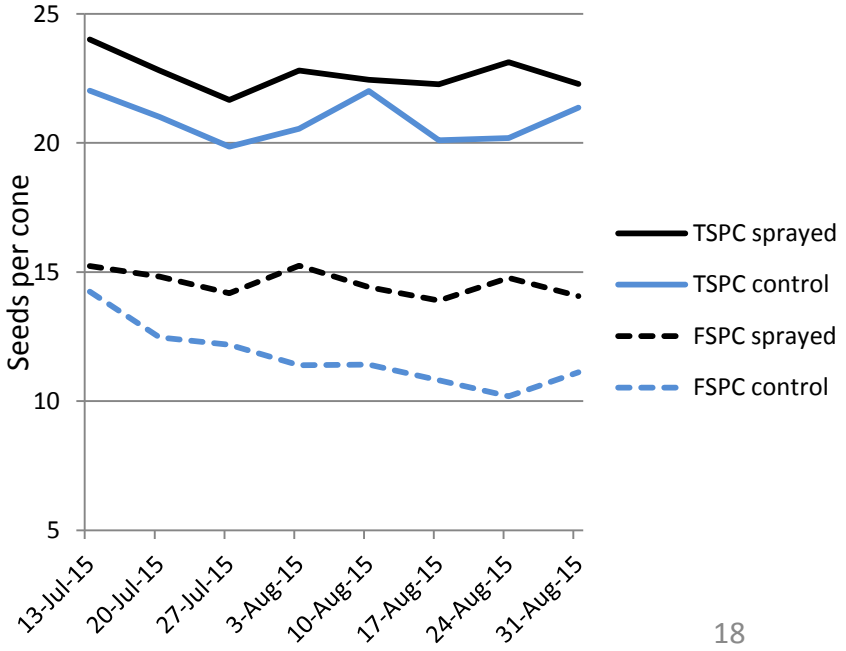
2014

- TSPC increases
  - 41% in spray blocks
  - 47% with bagging

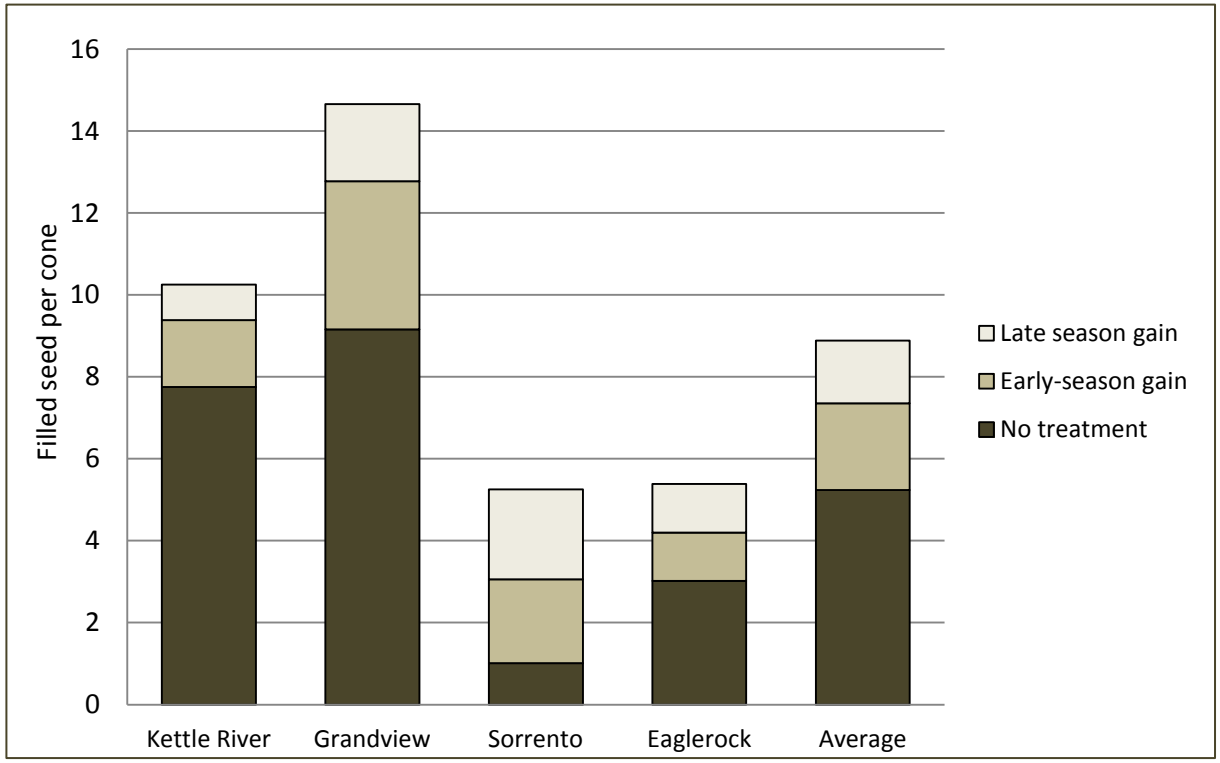


2015

- TSPC higher in treated blocks

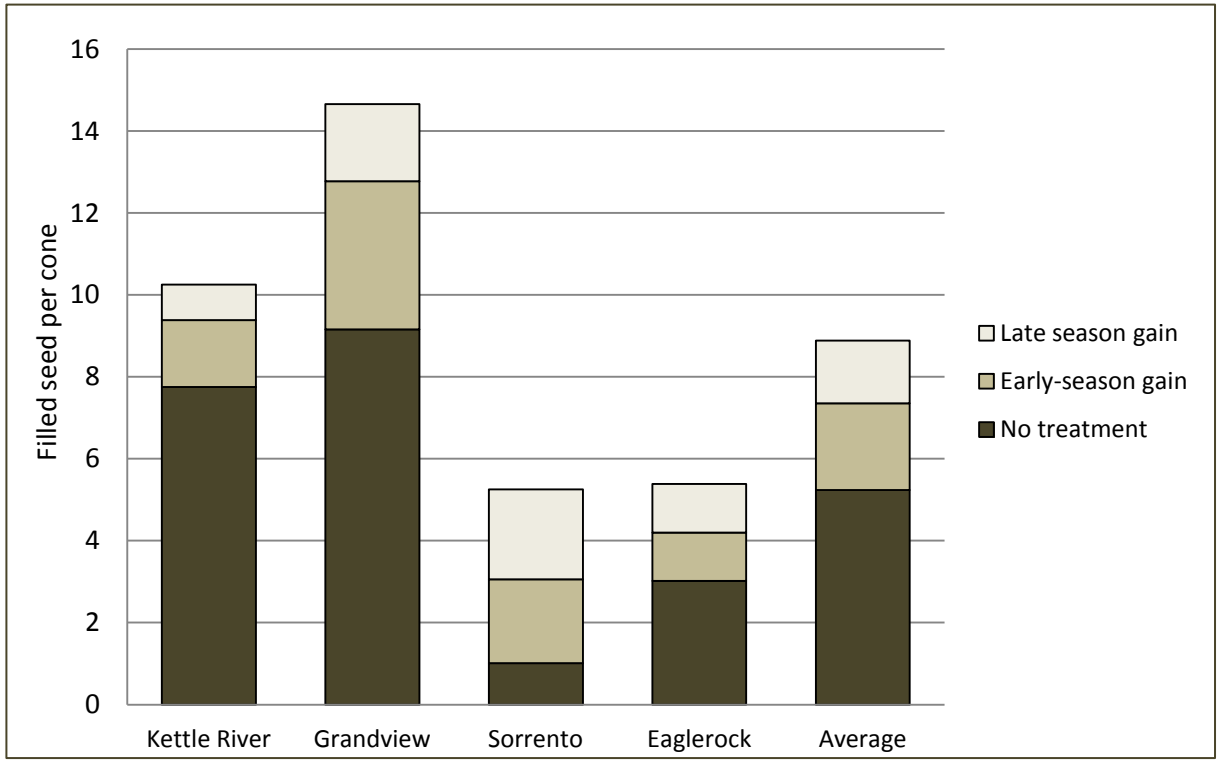


Seed loss to early and late predation are about equal (2014 result)



Supported by 2015 TSPC and FSPC data, but not investigated again in 2015

Seed loss to early and late predation are about equal (2014 result)



Supported by 2015 TSPC and FSPC data, but not investigated again in 2015

This means that early-season Lepto control is just as important as control later in the summer

2015: $ value or spraying

(low lepto year)

- Increased seed production value
  - Matador - $435 per hl cones
  - Delegate - $370 per hl cones
- Average cost per incremental Kg seed produced $574
- Benefit / cost ratio about 15 (in a low Lepto year)

Recommendations

- Matador at about 100 ml / ha increases seed set
- First treatment mid May or when Lepto observed (mid April this year for Okanagan sites)
- Second treatment mid to late June
- Possible third treatment prior to harvest or during harvest if numbers build (24 hour re-entry)
- Conduct regular Lepto surveys
  - 20 minute walk-through (not that effective)
  - Try branch-tugging with a hook on a pole and count Lepto that fly away
    - 100 large lateral branches on the sunny side
    - Warm- day; mid-day when Lepto are active