Potential causes of yield instability in canary seed

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Picture courtesy: Konstantinos Xyntaris
Introduction to the crop

canaryseed origin

producers: Canada, Argentina and others

farm cash receipts: up to $82 million

Saskatchewan: 89-98% Canada’s production

specialty crop, seeded area: 4.9 – 19% of specialty crops
Uses of canaryseed (*Phalaris canariensis* L.)

current use: feed mixtures

potential use: human consumption

Problem statement and aim

• unstable yield

• lower yield compared to other spring cereals
Grain yield variability recorded in SK

<table>
<thead>
<tr>
<th>Crop year</th>
<th>characteristic</th>
<th>Yields recorded by rural municipality (Kg./ha.)</th>
<th>Yield variability</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>drought</td>
<td>150 - 1600</td>
<td>11fold</td>
</tr>
<tr>
<td>2010</td>
<td>late seeding</td>
<td>135 - 1750</td>
<td>13fold</td>
</tr>
<tr>
<td>2013</td>
<td>high yields</td>
<td>489 - 2087</td>
<td>4fold</td>
</tr>
<tr>
<td></td>
<td></td>
<td>135 – 2087 (among site-years)</td>
<td>&gt;15fold</td>
</tr>
</tbody>
</table>

Sowing beyond mid-May

Lower yield (May et al. 2012)
Canary seed grain yield as affected by seeding date

- **Grain yield kg/ha.**
- **Seeding date - Day of the year**
- **May**, **June**, **July**
- **2012**, **2013**, **2014**
Temperature and day-length at different site-years

Kernen crop research farm
Soil temperature at 5 cm depth

- 2012
- 2013
- 2014

Temperature °C

Day of the year

Hours of daylight

Estevan
Prince Albert

Day of the year
Potential vernalization and day-length sensitivity

Time (days)

headed crop

vegetative crop

Picture courtesy: Konstantinos Xyntaris
Field experiment 2014:

Rep.1
- Seeded June 2\textsuperscript{nd}
- Seeded May 9\textsuperscript{th}
- Seeded June 25\textsuperscript{th}

Rep.2
- Seeded May 9\textsuperscript{th}
- Seeded June 25\textsuperscript{th}
- Seeded June 2\textsuperscript{nd}
Components of grain yield in cereal crops

Grain Yield (weight/area) = \# seeds/area \times \text{weight/seed}

(Less important in high canary seed yield variability)

\# of seeds/panicle \times \# of panicles

Picture courtesy: Konstantinos Xyntaris
Potential vernalization requirement can affect \# seeds/head

- Low temperature requirement
  - If requirement fulfilled
    - Early, i.e. 3rd leaf stage
    - Low \# of branches with florets
  - If requirement not fulfilled
    - Later, i.e. 4th or 5th leaf stage
    - Higher \# of branches with florets
Potential day-length effect on the #seeds/panicle

**Effect 1**
- More florets/branch
- versus
- More branches with florets

(Same as low temperature effect)

**Effect 2**
- More florets/branch
- versus
- thin panicle
- versus
- thick panicle

Picture courtesy: Konstantinos Xyntaris
Importance of tillers in canaryseed grain yield

Late sowing of canaryseed

Lower # of panicles/m² (ca. 20-25%)

Disproportionate yield reduction (ca. 40%)

(May et al. 2012)
Grain yield as affected by the # of heads

2013

2014
Take-home message

- Grain Yield = \# of potential seeds/panicle * \# of panicles/area

- Do canary seed cultivars have vernalization requirement and day-length sensitivity?

- Is vernalization requirement and day-length sensitivity of canary seed cultivars responsible for the high grain yield variability?
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Thank you for your attention. Any Questions?