An exciting new wild sunflower species: *Helianthus winteri*

Laura Fredrick Marek
Jessica Barb, John Constable, Gerald Seiler

1North Central Regional Plant Introduction Station (NCRPIS)
Iowa State University/USDA-ARS, Ames, IA

2Iowa State University, Ames, IA

3California State University-Fresno, Fresno, CA

4USDA-ARS, Fargo, ND
H. winteri
perennial:
1. flowers throughout the year
2. woody stems with apparent “rings”
3. plants live more than one season
2013 Plant Exploration in the western United States to collect sunflower germplasm for crop improvement
funded by: the Plant Exchange Office Unit, National Germplasm Resources Laboratory, USDA-ARS, Beltsville, MD
Helianthus winteri locations
- Stebbins, Winchell and Constable
- Marek and Seiler, 9/2/2013
Hwy 180 type location
**Helianthus winteri** locations

- **Red circle:** Stebbins, Winchell and Constable
- **Blue circle:** Marek and Seiler, 9/2/2013
- **Blue dot:** Marek, Larsen, Stebbins and Constable, 9/23/2013

*Parlier*
Found in a region of intensive agriculture.
expanded search for additional populations is planned
## Oil Analysis

(Oxford 4000)

<table>
<thead>
<tr>
<th>ID</th>
<th>taxon</th>
<th>oil content g kg⁻¹</th>
<th>palmitic</th>
<th>stearic</th>
<th>oleic</th>
<th>linoleic</th>
<th>arachidic</th>
<th>behenic</th>
<th>lignoceric</th>
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<tbody>
<tr>
<td>2796</td>
<td><em>H. winterii</em></td>
<td>250</td>
<td>6.40</td>
<td>2.50</td>
<td>55.90</td>
<td>34.50</td>
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<tr>
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<td><em>H. winterii</em></td>
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<td>52.20</td>
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<td>0.20</td>
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<td></td>
<td><em>H. argophyllus</em></td>
<td>225</td>
<td>7.80</td>
<td>7.30</td>
<td>40.10</td>
<td>44.30</td>
<td>na</td>
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<td></td>
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<td>225</td>
<td>5.00</td>
<td>2.70</td>
<td>23.30</td>
<td>68.30</td>
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<td>Hybrid 894</td>
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<td>7.00</td>
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<td>16.00</td>
<td>70.00</td>
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<td>4.10</td>
<td>21.10</td>
<td>69.70</td>
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<tr>
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<td>416</td>
<td>4.43</td>
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<td>62.90</td>
<td>26.56</td>
<td>na</td>
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</table>
We can see the stems are different from other sunflowers.

Why are they different?

Can the components causing the differences be useful?

_H. winteri_, Boyd Rd

_H. winteri_, Hwy 180
Helianthus argophyllus

Helianthus winteri
“S” lignin units are more easily digested than “G” lignin

<table>
<thead>
<tr>
<th>Species</th>
<th>S/G Lignin</th>
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<tr>
<td>wild <em>H. annuus</em></td>
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<tr>
<td>cultivated <em>H. annuus</em></td>
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<tr>
<td><em>H. winteri</em></td>
<td>1.80</td>
</tr>
<tr>
<td><em>H. argophyllus</em></td>
<td>1.74</td>
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<tr>
<td>poplar</td>
<td>1.74</td>
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<tr>
<td>aspen</td>
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<tr>
<td>switchgrass</td>
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<tr>
<td><em>Miscanthus</em></td>
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<tr>
<td>corn stover</td>
<td>1.74</td>
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<tr>
<td>wheat straw</td>
<td>0.94</td>
</tr>
<tr>
<td>sorghum</td>
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</table>
Wood chemistry of three sunflower species
PCA based on PYMBMS peak intensity

lower S/G lignin ratio

more sugars

higher S/G lignin ratio

more lignin

data: Rob Sykes and Crissa Doeppke
National Renewable Energy Laboratory
Potentially useful traits from a new wild sunflower species

flower structure differences
stem resistance to pests
woody biomass
grows in a low rainfall environment
genetics close to annuus; less genetic drag
fewer genomic rearrangements than *H. argophyllus*

Thank you!

collaborators:
Glenn Cole
John Stebbins
Rob Sykes
Irv Larsen
Brook Moyers
Greg Baute
Ed Stover