Hardy Kiwi: A closer look at wind versus open pollination of *Actinidia Kolomikta*. (With possibly looking at the best distance between a male and female for optimal fruit production.)
HISTORY OF THE KIWI PROJECT:
Environmental Scientist Bob Guthrie

- Volunteer with 20 years of work at the Minnesota Landscape Arboretum on hardy kiwi
- Non-public area of the Horticultural Research Center
TOOLS AND EQUIPMENT

- For collection: pruners, grocery bags, sharpie marker, compass and tape measure.
- For data and measurement: gram scale, caliper measurer, counting.
WHAT WAS MEASURED?

1) Berry mass in grams (g)
2) Berry size in millimeters (mm):
   A) Long axis measurement
   B) Short axis average measurement:
      - Took measurements at the thickest and thinnest points
3) Number of nodes on branch cutting
4) Unpollinated peduncles/flower stalks
5) Fruit abort/drop
Collected on: July 23rd, 2014

Weather: Partly cloudy, 82°F/ 27.8°C, 60° dew point

Collected controlled bags and open pollinated branches were both located at the same height and within close proximity.

Distances between male and female vine was always measured from trunk to trunk for consistent data.
Berry measurement included:

1) Mass in grams (g) by use of an electronic gram scale.

2) Size in millimeters (mm) by use of a battery-operated caliper:
   A) Longitudinal (largest) axis.
   B) Horizontal (smallest) axis average between smallest and widest.

(Following this slide picture of scale and caliper)
SCALE AND CALIPER
LONG VS. SHORT AXIS

Short Axis - Must take average

Long Axis
THE SEVEN SITES:

- NS: Nahotka Seedling
  1) NS- 1A
  2) NS- 1B
  3) NS- 1C
  4) NS- 3
  5) NS- 4
  6) NS- 6

- A/O: ?????? Seedling
  7) A/O Seedling

Did not collect: NS- 9
## AVERAGE LOCATION OF KIWI FRUIT

<table>
<thead>
<tr>
<th>VINE</th>
<th>DISTANCE(m)</th>
<th>HEIGHT(m)</th>
<th>DIRECTION(°/DIR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS- 1A</td>
<td>2.34</td>
<td>0.81</td>
<td>82° E</td>
</tr>
<tr>
<td>NS- 1B</td>
<td>2.34</td>
<td>1.26</td>
<td>82° E</td>
</tr>
<tr>
<td>NS- 1C</td>
<td>2.34</td>
<td>1.85</td>
<td>82° E</td>
</tr>
<tr>
<td>NS- 3</td>
<td>3.66</td>
<td>1.37</td>
<td>132° SE</td>
</tr>
<tr>
<td>NS- 4</td>
<td>10.52</td>
<td>0.86</td>
<td>23° NE</td>
</tr>
<tr>
<td>NS- 6</td>
<td>2.67</td>
<td>1.68</td>
<td>96° E</td>
</tr>
<tr>
<td>A/O SEED</td>
<td>3.15</td>
<td>1.62</td>
<td>128° SE</td>
</tr>
</tbody>
</table>
HARDY KIWI FRUIT CHARACTERISTICS

Data collected:
1) Individual berry mass (g)
2) Longitudinal axis (mm)
3) Horizontal axis, two measurements, then averaged
4) Number of peduncles separated into three classes: fruit, dropped fruit, unpollinated
5) Number of nodes on branch cutting
HOW MANY BERRIES?

Original goal: Collect 150 berries

Actual collected: 87 berries

Wind pollinated: 21 berries

Open pollinated: 66 berries
TYPICAL KIWI FRUIT COLLECTED:
# AVERAGE MASS OR BERRY SIZE CORRELATION:

(\text{in grams})

<table>
<thead>
<tr>
<th>Pollination Type</th>
<th>Average Berry Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open pollinated</td>
<td>2.24</td>
</tr>
<tr>
<td>Wind pollinated</td>
<td>1.43</td>
</tr>
</tbody>
</table>

![Bar chart showing average berry mass for open and wind pollinated types](chart.png)

- **Average Berry Mass**
  - Open pollinated: 2.24 g
  - Wind pollinated: 1.43 g

**Legend:**
- OPEN Pollinated
- WIND Pollinated
WHO ARE THE KEY POLLINATORS?

- Primary: Bee/Insect
- Secondary: Wind
DOES DISTANCE PLAY A ROLE IN FRUIT SET?

- No conclusive evidence of ideal distance between male and female flowers was discovered.
- However, the further the distance between male/female vines, the fewer berries developed.
- Closer the distance the larger the fruit.
DOES WIND DIRECTION PLAY A ROLE?

- This does play a role if there is a prevailing windrow, or direction the wind blows. This is dependent on many variables including particular location, terrain, surrounding vegetation and elevation.
- If there is a prevailing wind direction, this should be taken in consideration on where you plant your male vines.
Can contribute to many things:
1) Premature fruit drop/aborting
2) Inconsistent collection methods
3) Collecting too few fruits
4) Dropped peduncles both pollinated and unpollinated before collection
Unfortunately, did not reach 150 berry collection target. This could contribute to a decrease in accuracy or conclusions.

In addition, the open pollinated selection NS-3 did have some premature fruit drop that could lead to skewed data.
THANK YOU!

- Bob Guthrie, for his hard work over 20 years on the kiwi project!
- Mary Meyer, for her dedication to provide the best learning experience through a great internship program.
- HRC and Arboretum Horticulture grounds staff, for guiding and teaching us the best horticultural practices
- University of Minnesota – Twin Cities