Relationship Between Pepper Size, Harvest Time and Labor Costs in Hawai'i Grown Hot Peppers (*Capsicum* spp.)

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It’s “Chile” in Hawai’i

Hot peppers are important in Hawai’i:

- Asian & Latin cuisine
- Hot sauce & other value-added

Fruits are marketed and utilized by type:

- Thai & Hawaiian particularly important
Reducing production costs

- Local sauces are produced almost exclusively from imported peppers.
- Import replacement = high-value specialty crop for local growers, better marketability for products.
- Small fruited peppers are preferred by Asian & Pacific market.
- Labor costs expected to be major component of production costs.
- Can genetic variability in fruit size within “types” be exploited to reduce labor costs?
Objective

Determine links between fruit size and labor requirements for hand harvest of multiple hot pepper cultivars grown at two locations in Hawai‘i.
Methods

* 14 cultivars grown June-November 2009 in Waimanalo (mollisol) and Molokai (oxisol).
* Cultivars included local Hawaiian and Thai types as well as Jalapeno, Habanero and small fruited cultivars developed by TAMU.
* Cultivars were arranged in a RCBD; 3-4 reps
* Harvests (90-120 days after transplanting) were timed for each experimental unit (5 plants).
Fruit weight: an indicator of size

$r^2 = 0.98$
$\text{N} = 100$
Variability in fruit weight

Weight of 10 fruits (g)

- Thai hot
- Firecracker
- Hawaiian
- Rooster Thai
- Spur Super chili
- Indian Peto Orange
- Carib Red
- TAM Mild Hab
- TAM Hab
- Waialua Jal
- TAM Mild Jal
- TAM Jal

Varieties: Habanero, Jalapeno, Hawaiian/Thai
Hawaiian/Thai types

Fruit weight (g per ten fruit)

- Thai Hot
- Firecracker
- Hawaiian
- Orange Thai
- Rooster spur
- Super chili

Waimanalo Molokai
Fruit size vs. harvest time

- **P < 0.001**
- **R² = 0.76**
- **y = 0.23x + 7.74**
- **N = 72**

![Graph showing the relationship between fruit weight and harvest rate, with points labeled Hawaiian/Thai, Habanero, and Jalapeno.]
Fruit size vs. labor cost

- **C. annuum**
  - Waimanalo
  - Molokai

- **C. frutescens**
  - Waimanalo

- **Hawaiian/Thai**
- **Habanero**
- **Jalapeno**

![Graph showing fruit weight vs. labor cost for different types of peppers.](image-url)
To Conclude

- Significant, positive relationship between pepper fruit size and rate of hand harvest.
- Selecting for varieties with large fruit within market type is expected to reduce labor costs.
- Labor costs also likely affected by plant characteristics, harvest crew, duration of harvest period etc.
- Other fruit qualities (e.g. capsaicinoid content) should be evaluated to ensure market acceptance.
Acknowledgements

Roger Corrales, crew Waimanalo Exp. Sta.
Faith Tuipolotu, Molokai Exp. Sta.
Gita Neupune, Christina Theocharis, Jessica Radovich.

Funding:
- TSTAR
- HATCH
- WSARE
## Relative labor costs

<table>
<thead>
<tr>
<th>Variety</th>
<th>Weight (g)</th>
<th>Waimanalo</th>
<th>Molokai</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thai hot</td>
<td>0.79</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Firecracker</td>
<td>0.87</td>
<td>29%</td>
<td>--</td>
</tr>
<tr>
<td>Hawaiian</td>
<td>1.3</td>
<td>17%</td>
<td>--</td>
</tr>
<tr>
<td>Orange Thai</td>
<td>1.34</td>
<td>68%</td>
<td>65%</td>
</tr>
<tr>
<td>Rooster Spur</td>
<td>3.06</td>
<td>26%</td>
<td>36%</td>
</tr>
<tr>
<td>Super chili</td>
<td>3.43</td>
<td>17%</td>
<td>23%</td>
</tr>
<tr>
<td>Indian</td>
<td>3.8</td>
<td>10%</td>
<td>--</td>
</tr>
<tr>
<td>Peto Orange</td>
<td>9.45</td>
<td>6%</td>
<td>--</td>
</tr>
<tr>
<td>Carib. Red</td>
<td>10</td>
<td>4%</td>
<td>--</td>
</tr>
<tr>
<td>Mild Habanero</td>
<td>11.3</td>
<td>5%</td>
<td>--</td>
</tr>
<tr>
<td>TAM Habanero</td>
<td>12.3</td>
<td>4%</td>
<td>--</td>
</tr>
<tr>
<td>Waialua</td>
<td>21.4</td>
<td>4%</td>
<td>--</td>
</tr>
<tr>
<td>Mild Jalapeno</td>
<td>28.7</td>
<td>3%</td>
<td>--</td>
</tr>
<tr>
<td>Tam Jalapeno</td>
<td>36.9</td>
<td>2%</td>
<td>--</td>
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