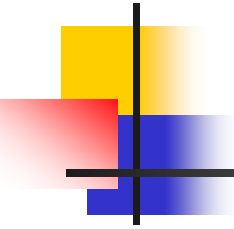


# Vegetable Garden Study

## Augusta Forestry Center

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Bill Berti and Dean Cocking  
South River Science Team  
November 9, 2004



# Vegetable Garden Study

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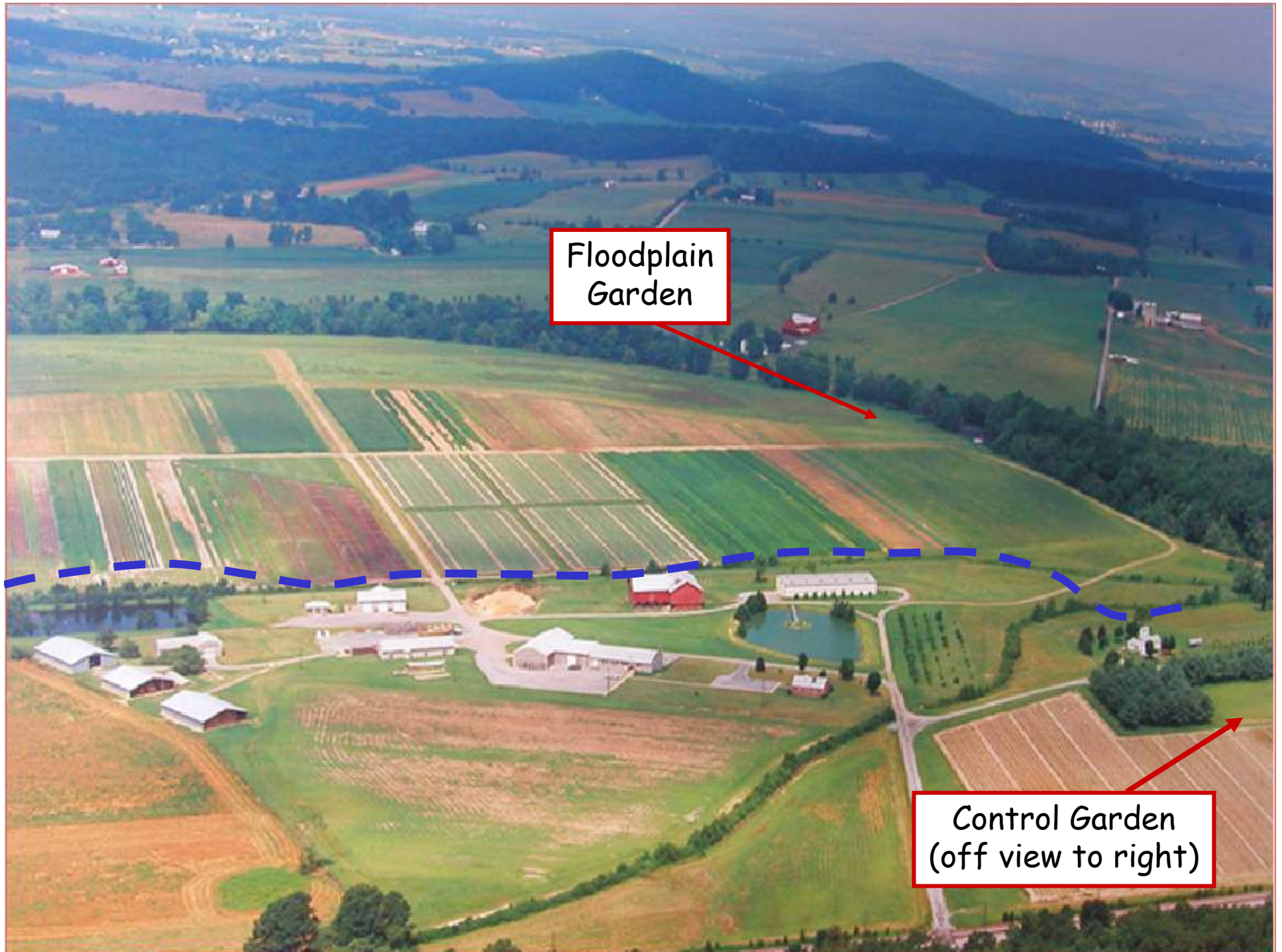
## Objective -

Determine if soil-Hg is taken-up by vegetables at concentrations sufficient to be a health risk

# Augusta Forestry Center - Crimora, VA



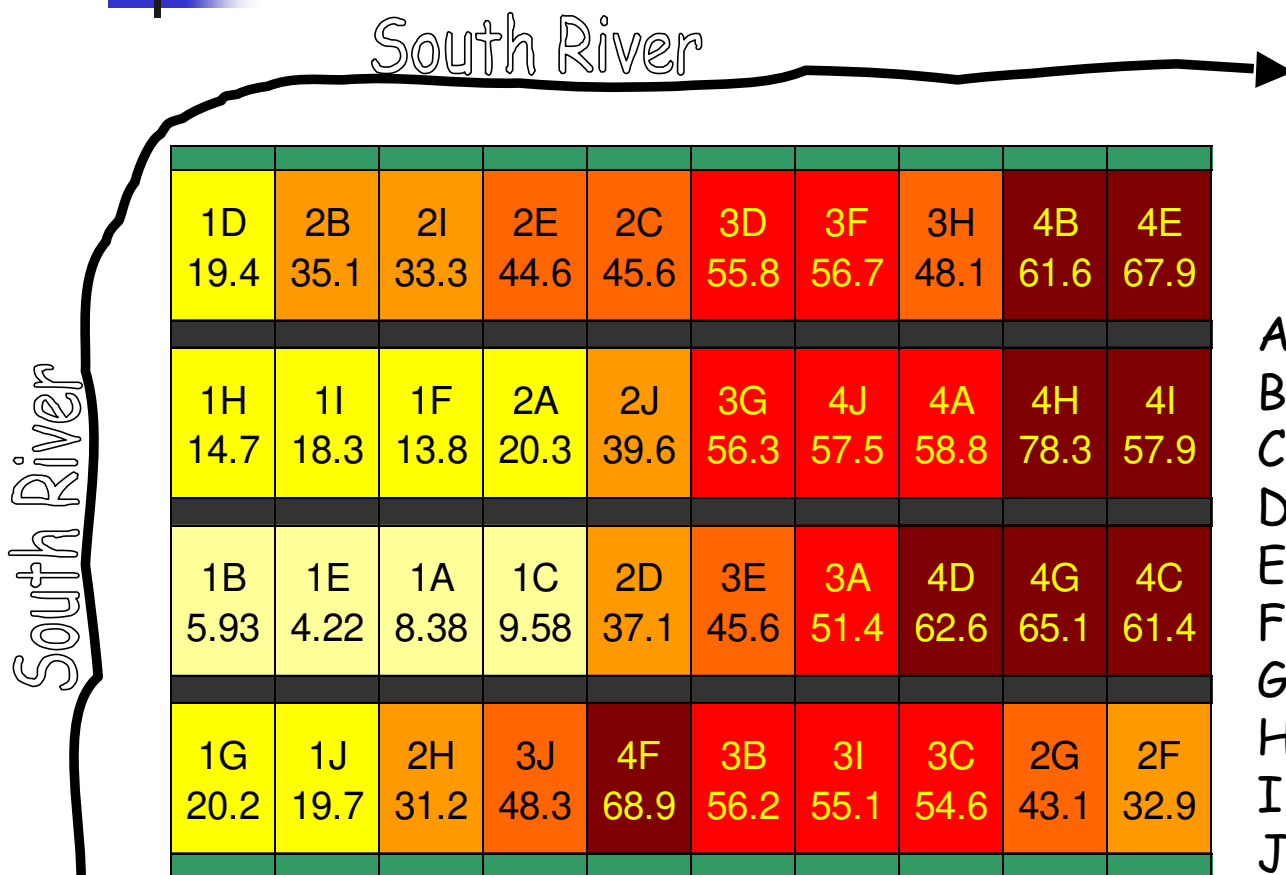
November 9, 2004



Floodplain  
Garden

Control Garden  
(off view to right)

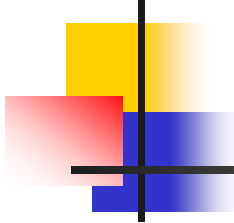
# Floodplain Garden - 2004



| Soil Hg,<br>mg/kg |
|-------------------|
| < 10              |
| 10 to 20          |
| 21 to 30          |
| 31 to 40          |
| 41 to 50          |
| 51 to 60          |
| > 60              |

- A Potato
- B Turnip & Beets
- C Pepper & Cauliflower
- D Cabbage
- E Onion
- F Squash
- G Radish & Carrot
- H Tomato
- I Spinach & Lettuce
- J Bush peas & Bush beans

Sampled Nov 23, 2003  
mg Hg/kg soil, dry weight basis



# Control Garden - 2004

Plots in 2 x 10  
Randomized  
Complete Block  
design with some  
plots containing  
two crops

|                  |                  |                  |                  |                  |
|------------------|------------------|------------------|------------------|------------------|
| IG<br>Plot C1    | IB<br>Plot C2    | IE<br>Plot C3    | I-I<br>Plot C4   | ID<br>Plot C5    |
| IA<br>Plot C6    | IJ<br>Plot C7    | IH<br>Plot C8    | IC<br>Plot C9    | IF<br>Plot C10   |
| II-I<br>Plot C11 | II-E<br>Plot C12 | II-D<br>Plot C13 | II-C<br>Plot C14 | II-H<br>Plot C15 |
| II-J<br>Plot C16 | II-A<br>Plot C17 | II-B<br>Plot C18 | II-F<br>Plot C19 | II-G<br>Plot C20 |

A Potato  
B Turnip & Beets  
C Pepper & Cauliflower  
D Cabbage  
E Onion  
F Squash  
G Radish & Carrot  
H Tomato  
I Spinach & Lettuce  
J Bush peas & Bush beans

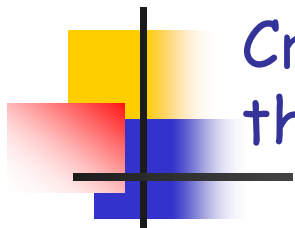
2004 Control  
garden is adjacent  
to (up-hill and  
North of) the 2003  
control garden



**After Hurricane Dianne  
29-Sept-04**

November 9, 2004

7



## Crops were planted much earlier in 2004 than in 2003

### Root Crops

| Crop list         | Planted as:       | Date 2003 | Date 2004 |
|-------------------|-------------------|-----------|-----------|
| Beet              | Seed              | -----     | 11-May    |
| Radish            | Seed              | 30-Sept   | 11-May    |
| Carrot            | Seed              | 25-June   | 11-May    |
| Turnip            | Seed              | -----     | 11-May    |
| Potato            | Cut seed potatoes | -----     | 24-April  |
| Red Onion         | Onion sets        | 25-June   | 24-April  |
| Scallions (onion) | Seed              | -----     | 14-May    |
| Lettuce           | Seed              | 30-Sept   | 11-May    |
| Spinach           | Seed              | 30-Sept   | 11-May    |
| Cabbage           | Transplanted      | 25-June   | 24-April  |
| Cauliflower       | Transplanted      | -----     | 11-May    |
| Bush pea          | Seed              | -----     | 11-May    |
| Bush bean         | Seed              | -----     | 11-May    |
| Bell Pepper       | Transplanted      | 25-June   | 11-May    |
| Tomato            | Transplanted      | 25 -June  | 11-May    |
| Squash            | Transplanted      | 25-June   | 11-May    |
| Sweet corn        | Seed              | 25-June   | -----     |

# Harvest Results

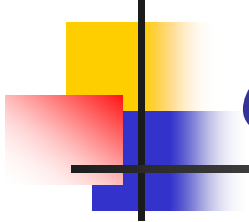


November 9, 2004

# Sample Preparation

- Harvested and stored cold
- Washed, sliced, and diced
- Shipped to analytical lab for Hg analysis
  - Samples digested and Hg measured





## Crop samples all less than MDL

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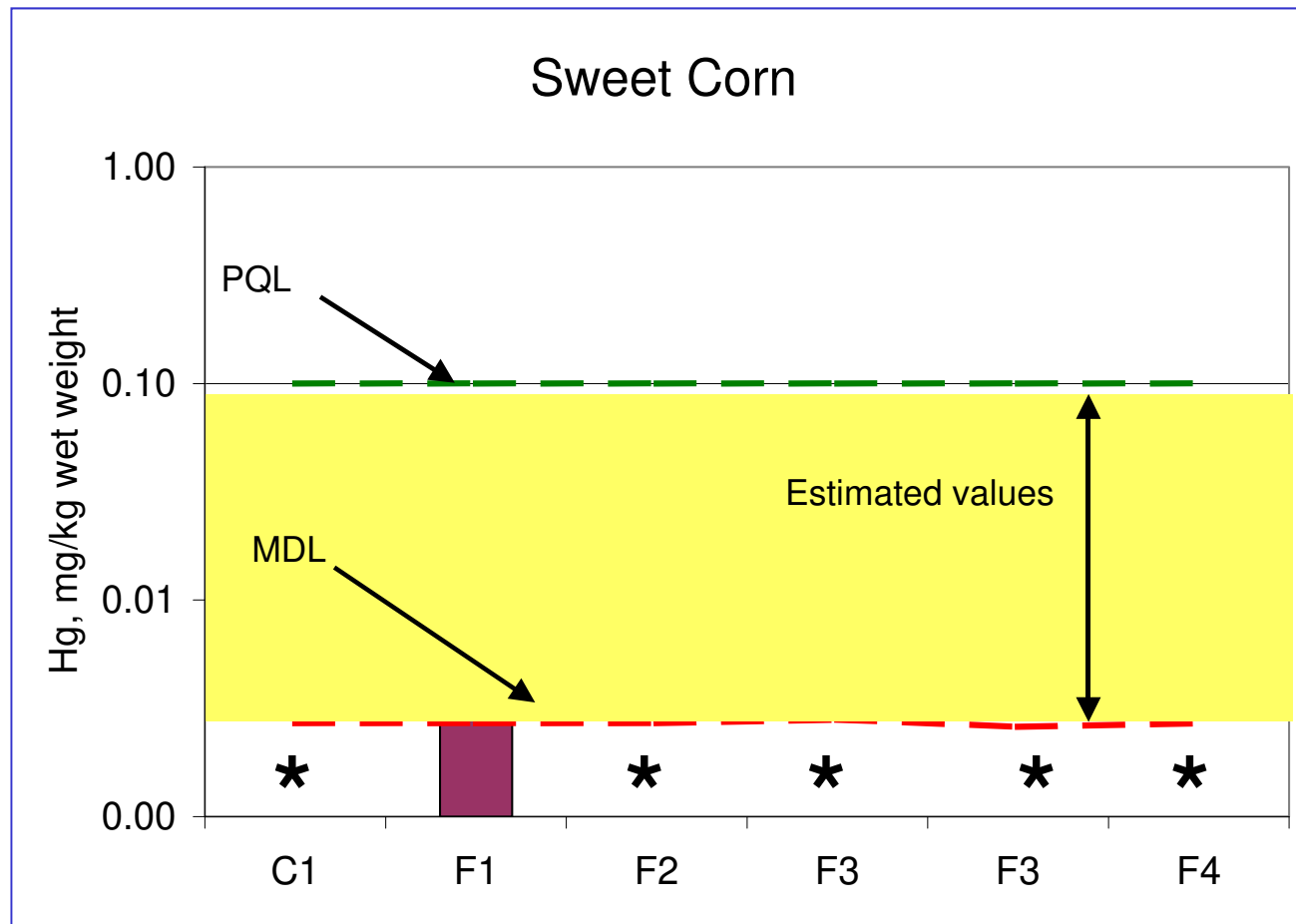
2003

- Cabbage
- Pepper
- Small squash

2004

- Bean
- Beet
- Pea
- Pepper
- Radish
- Red onion
- Potato

# Crop Harvest 2003

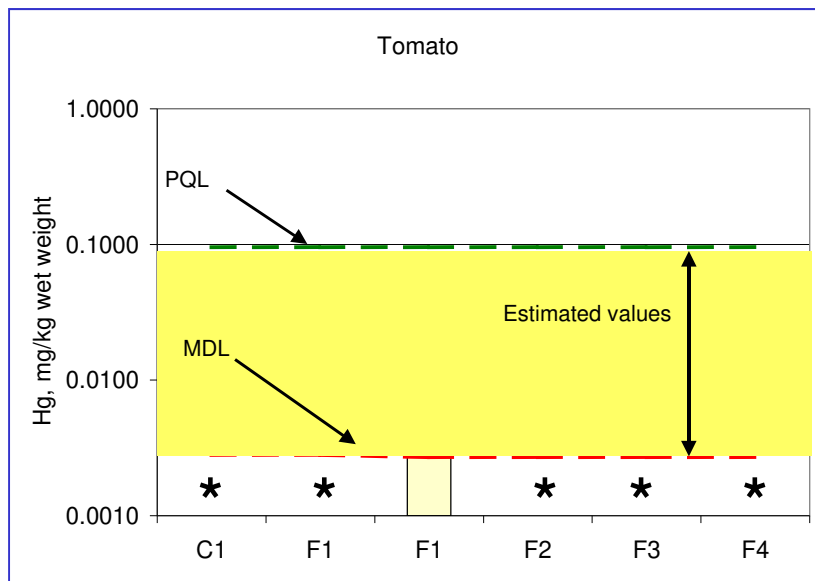


\* = less than the MDL

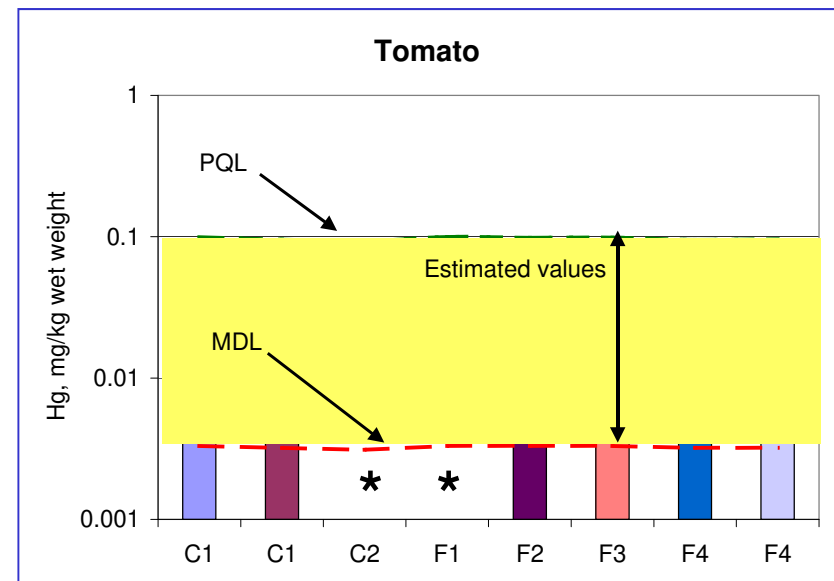
November 9, 2004

# Crop Harvest

2003



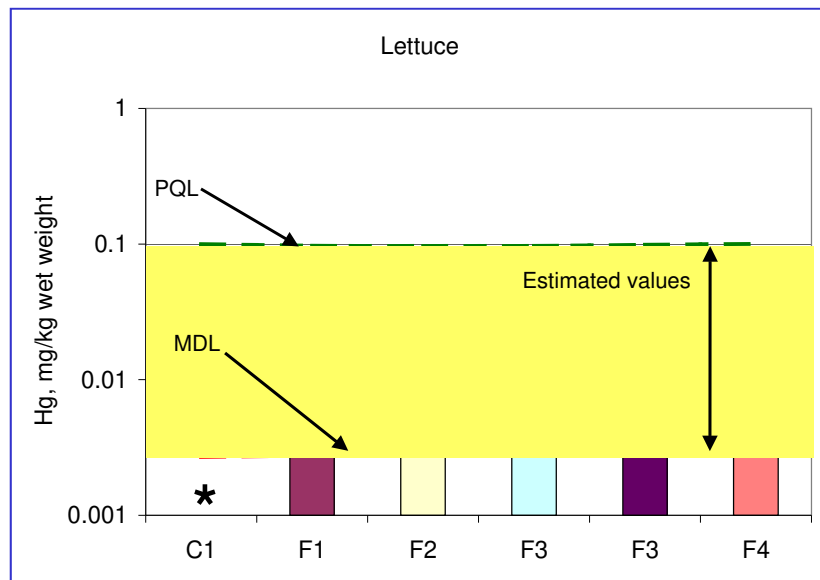
2004



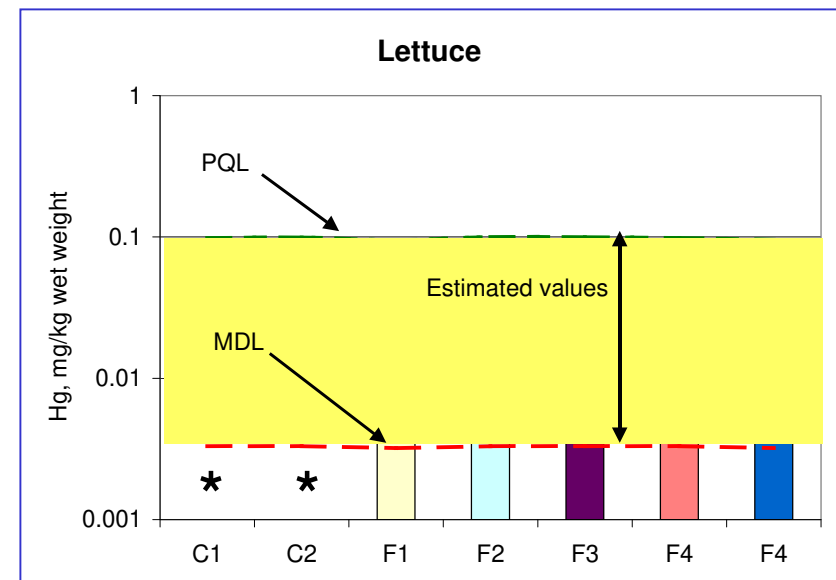
\* = less than the MDL

# Crop Harvest

2003



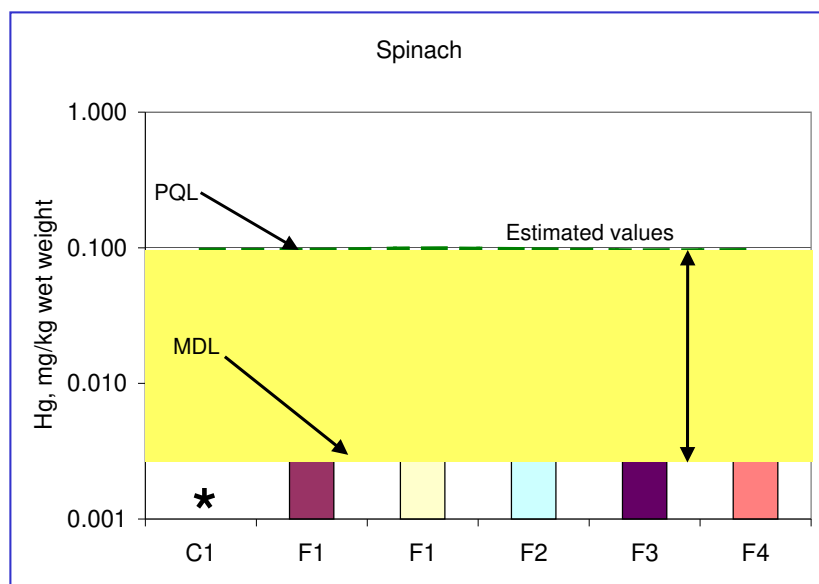
2004



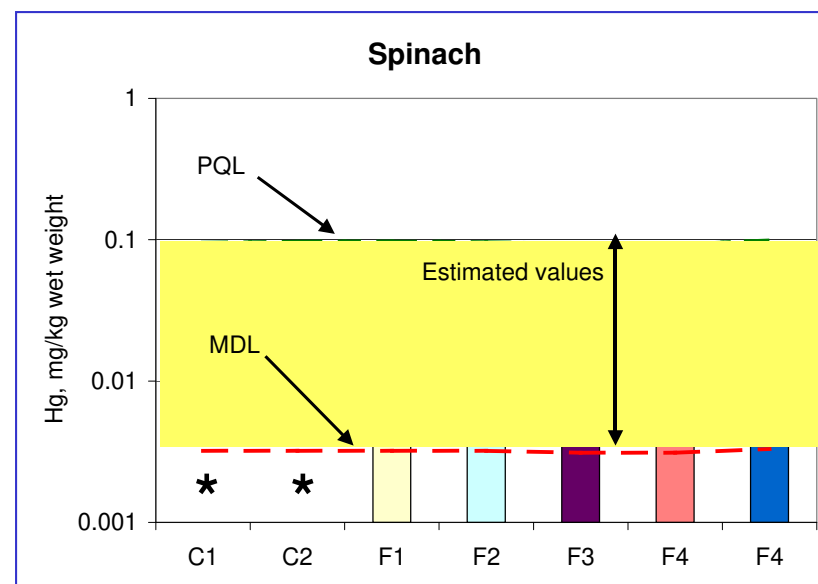
\* = less than the MDL

# Crop Harvest

2003



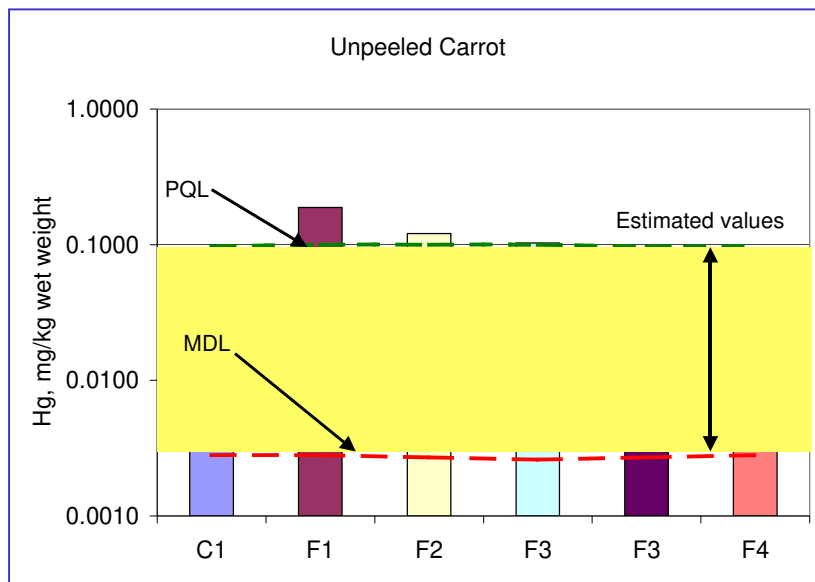
2004



\* = less than the MDL

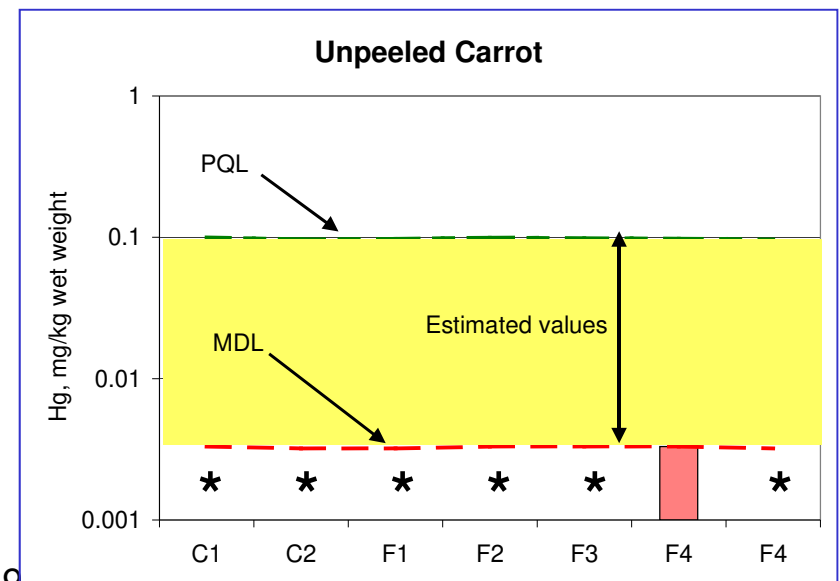
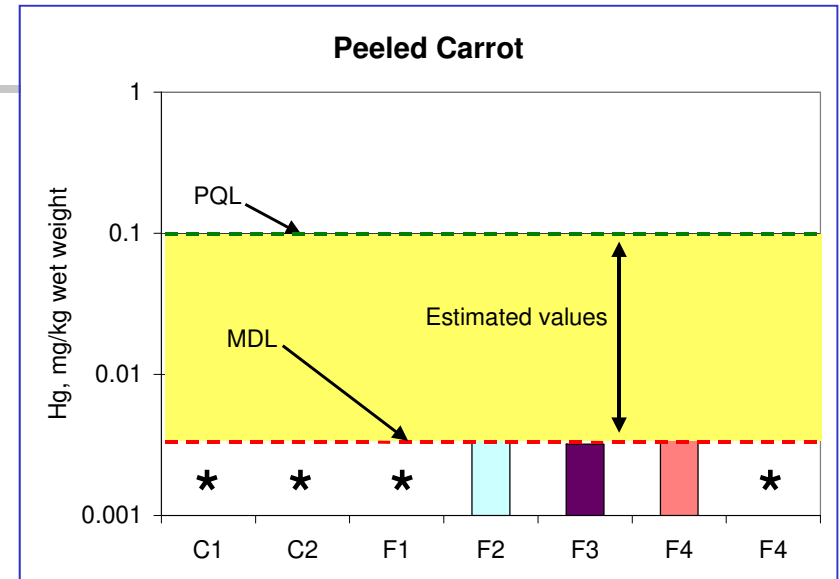
# Crop Harvest

2003



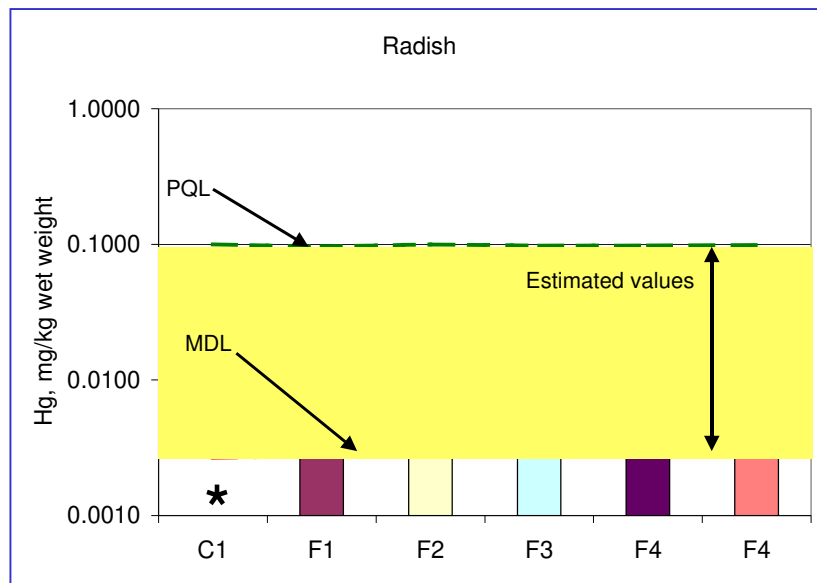
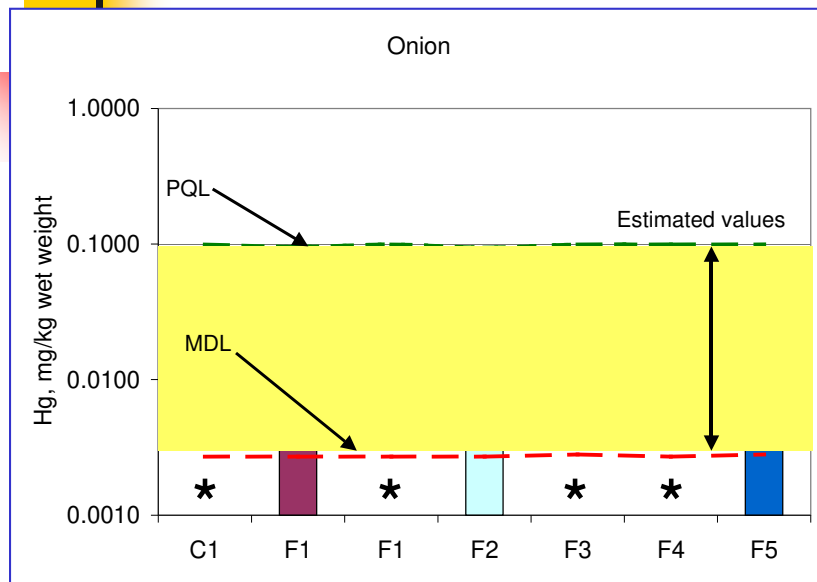
\* = less than the MDL

2004



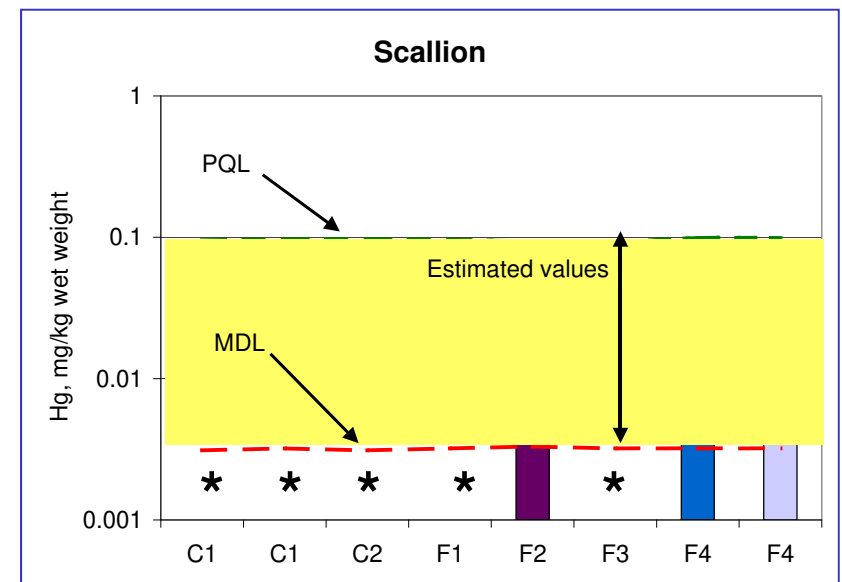
November 9, 2004

2003



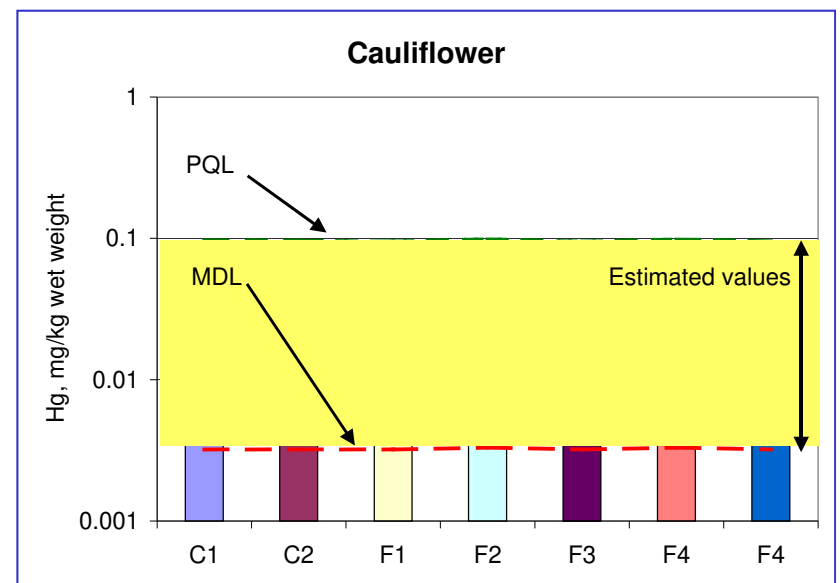
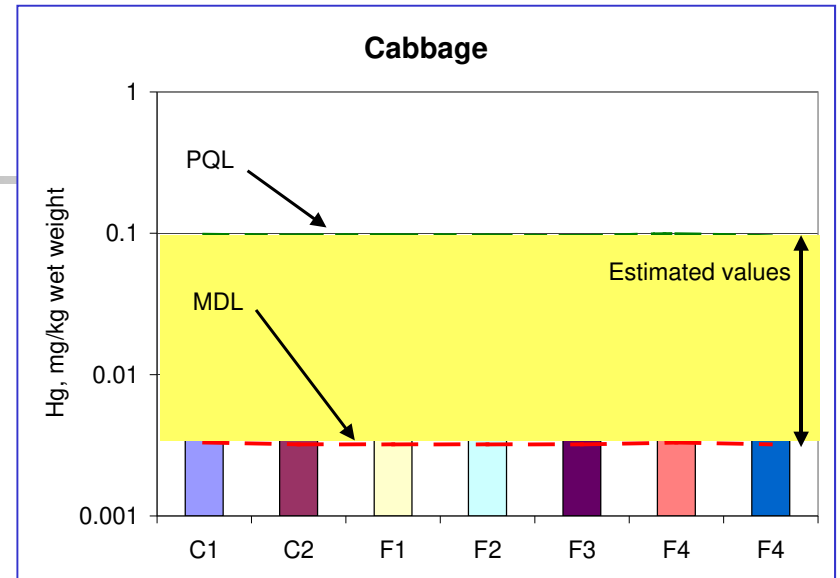
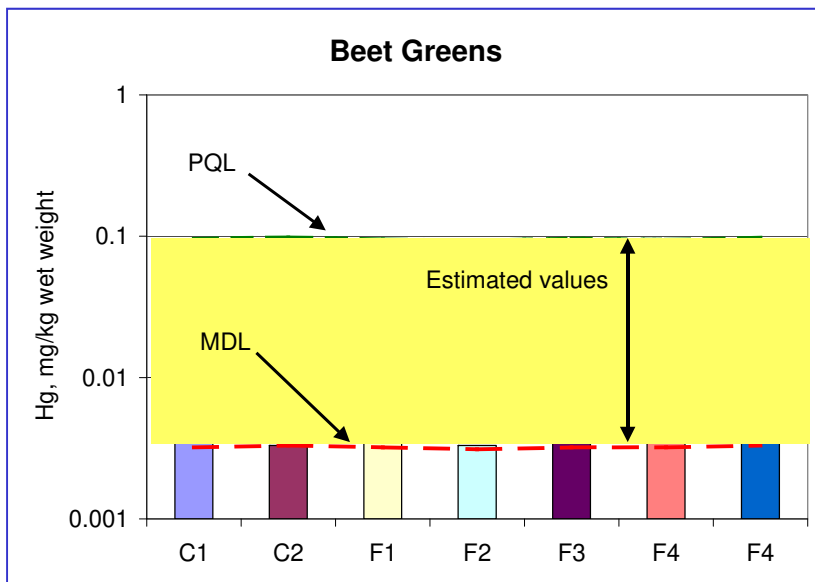
# Crop Harvest

2004



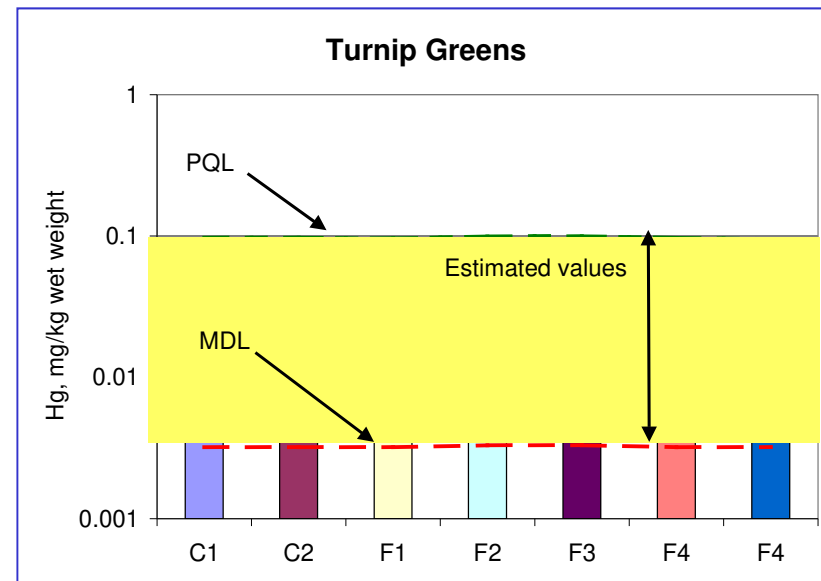
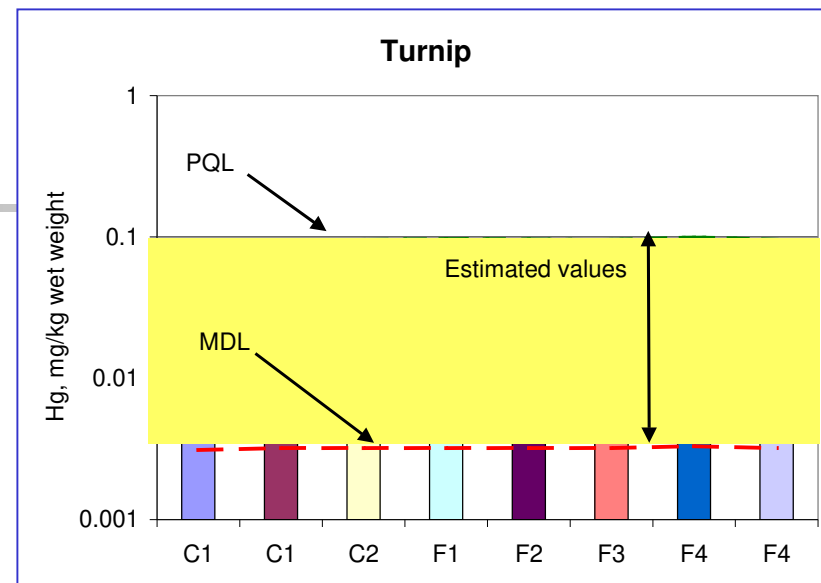
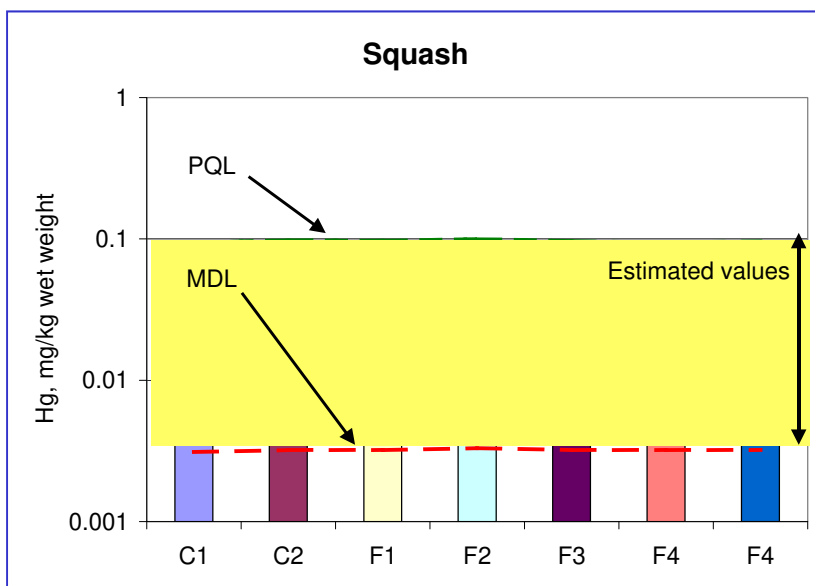
\* = less than the MDL

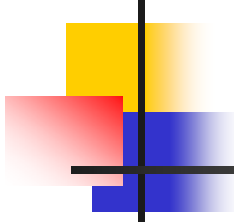
# Crop Harvest 2004



November 9, 2004

# Crop Harvest 2004

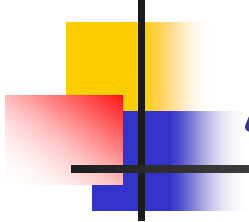




# Path Forward

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- Harvest and analyze fall crops planted 28-Aug-04:
  - Radish, carrots, lettuce, spinach, turnips and beets
  - Determine need for lower PQL
- Collect floodplain and control garden soils for total Hg
- SETAC presentation
- Evaluate the potential health risk of consuming vegetables grown in the floodplain based on data from study
- Evaluate 2004 results and plan for 2005
  - One year of data for potato, beets, scallion, turnip, bush beans, bush peas
- Begin work on publications



# Acknowledgements

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- Barry Wolstenholme
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  - Larry Estes
  - Thomas Frazier
  - Carolynn
  - Gene Salter
  - Bubba Matthews



# Questions???

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