



Spatial Crop Distribution and Fruit Quality

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Project background:

- From every tree there is variability in fruit quality
- Every orchard yields suboptimal quality fruit that are unprofitable
- Fruit quality potential must be identified as soon as possible

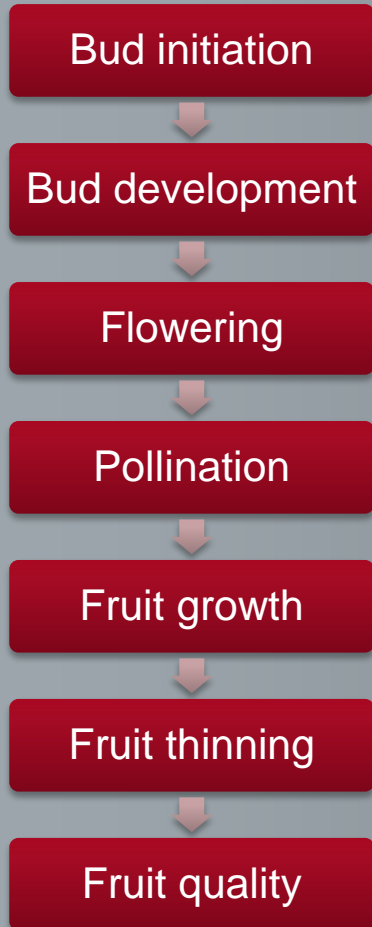


Fruit quality potential

Assumptions:

1. Fruit quality potential varies among buds/flowers/fruits
2. Fruit quality potential is lost throughout

Invest in fruit with greatest potential
Reduce variability



- **Three key questions:**
 - 1. By how much does fruit quality vary?**
 - 2. What are sources of this variability?**
 - 3. How can variability be reduced/improved?**



3rd leaf Fuji – 0.8 x 3 m

Defoliated trees

Mapped fruit position

Mapped wood





15 yr old Fuji
2.5 x 4 m



1. By how much does quality vary?

2-fold variability - 10 to 20 brix



Fruit soluble solids (°brix)

1. By how much does quality vary?

>4-fold variability - 90 to 400 g



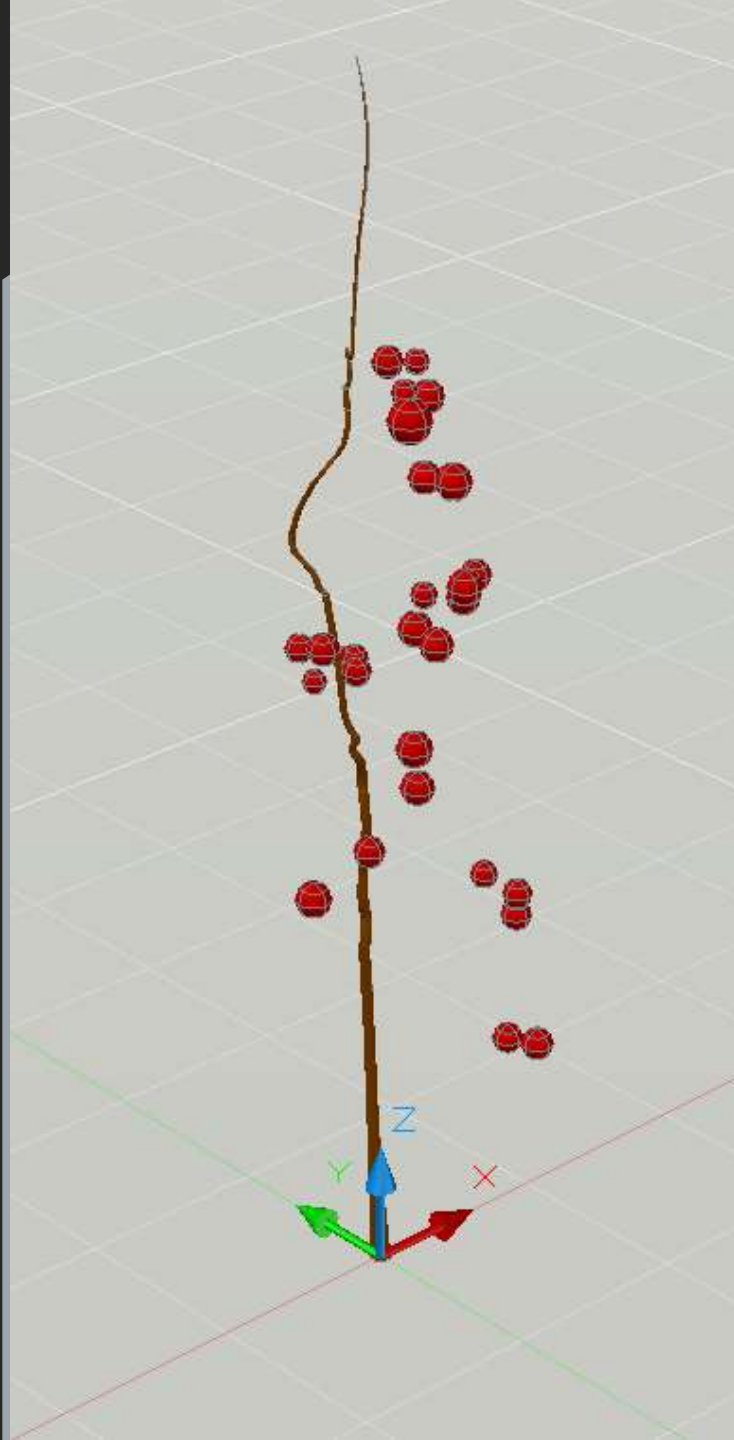
Fruit weight (grams)

1. By how much does quality vary?

Tremendous variability - 0 to 100%

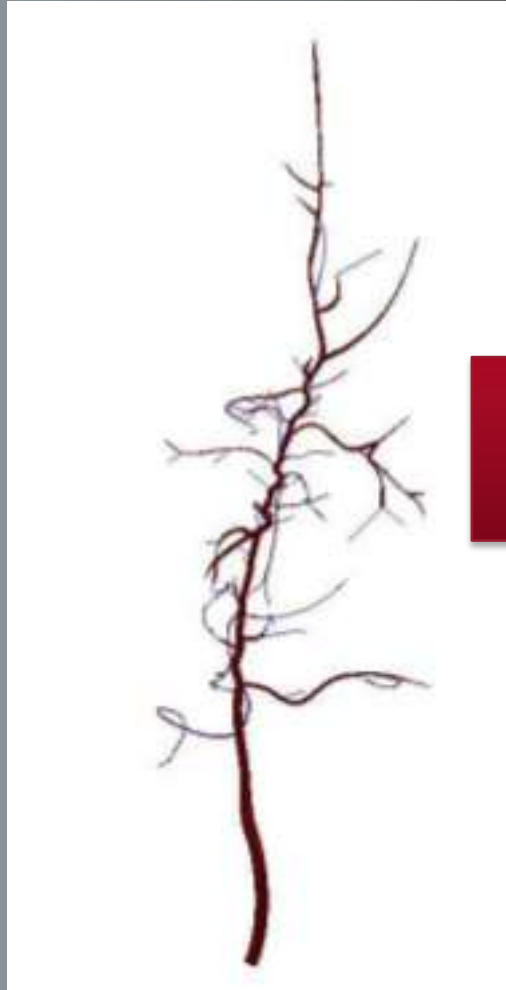


Fruit color (% red)

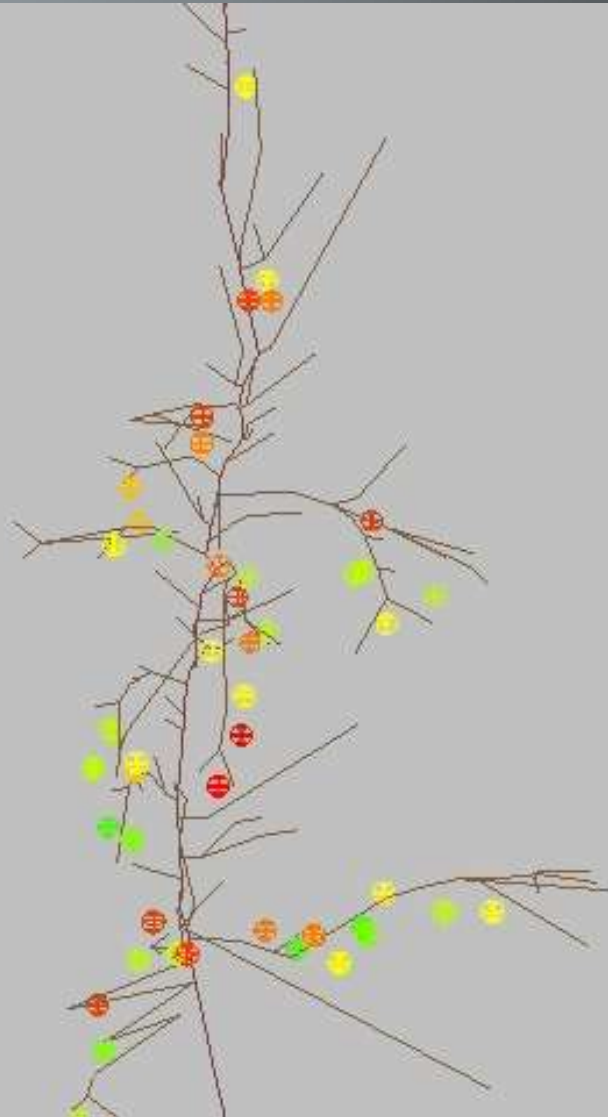


Differences in fruit quality
related to fruit position?

3D canopy models



Soluble solids

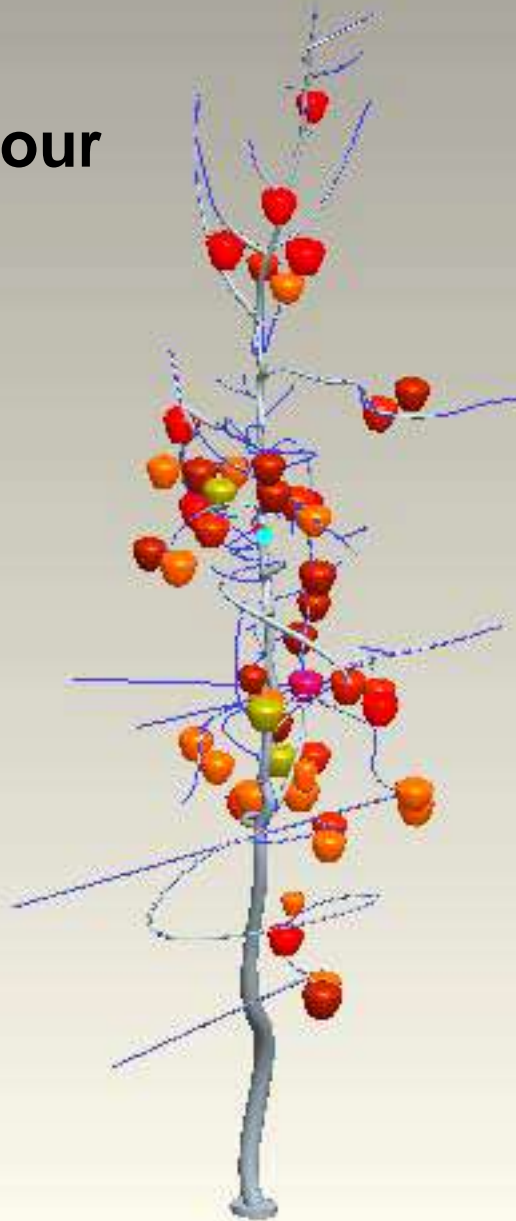


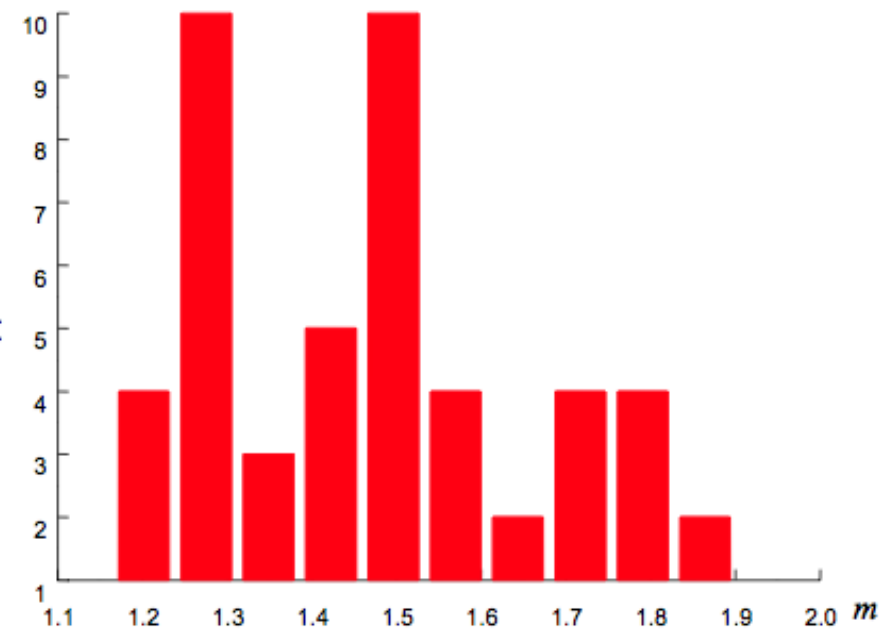
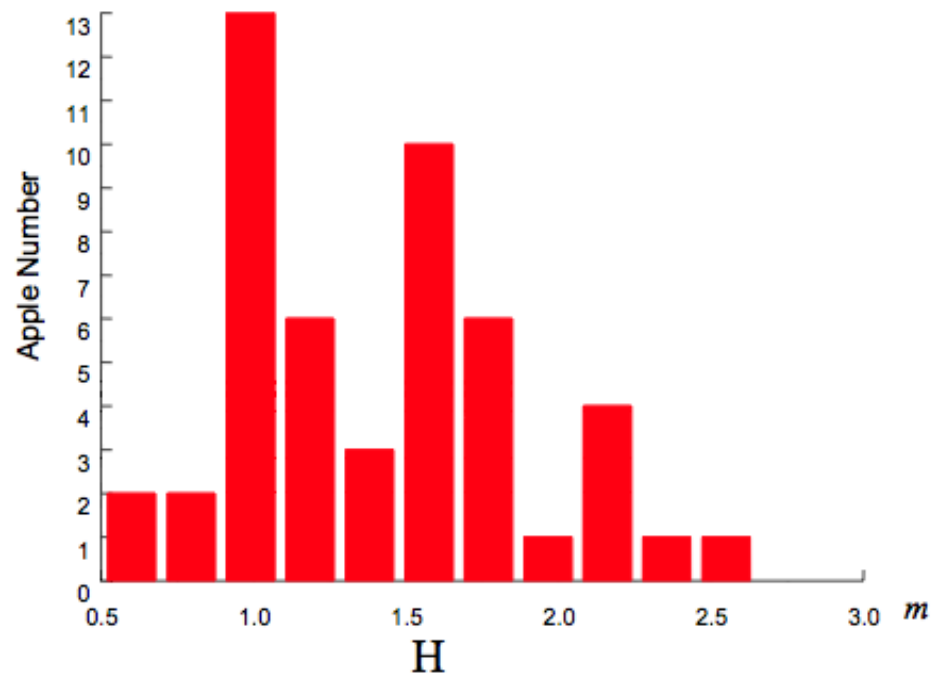
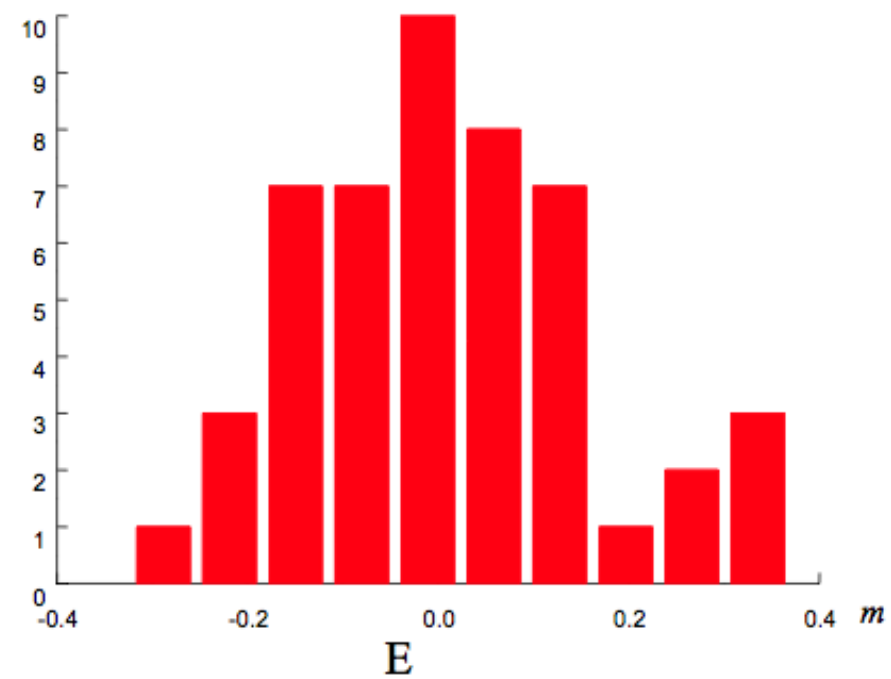
HR: 0.00

Fruit size and colour

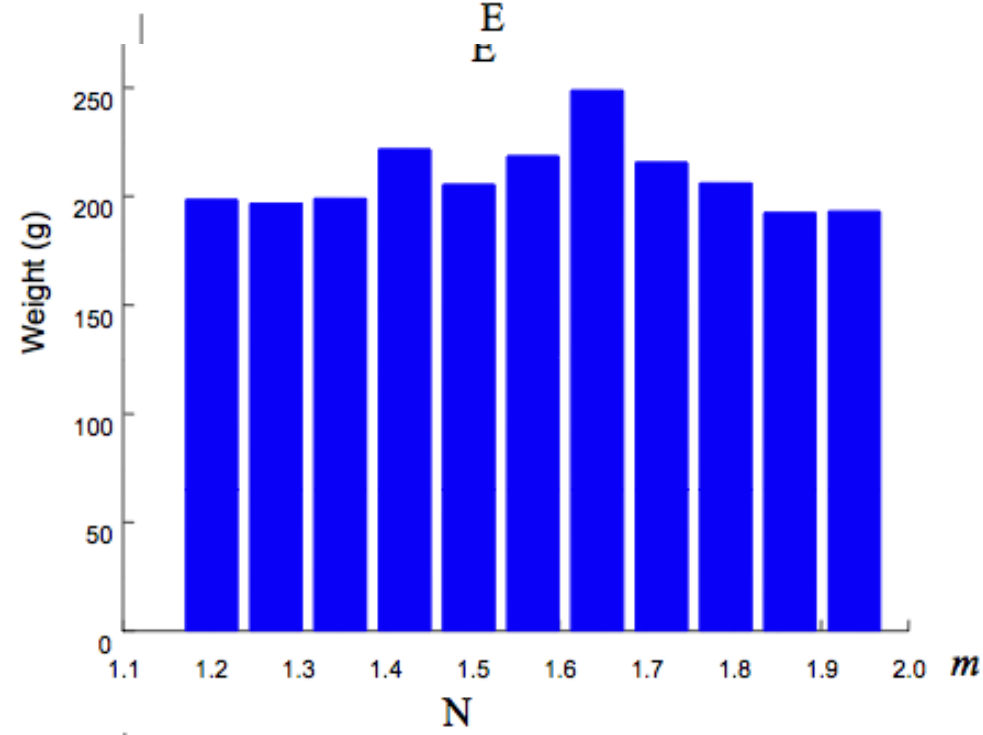
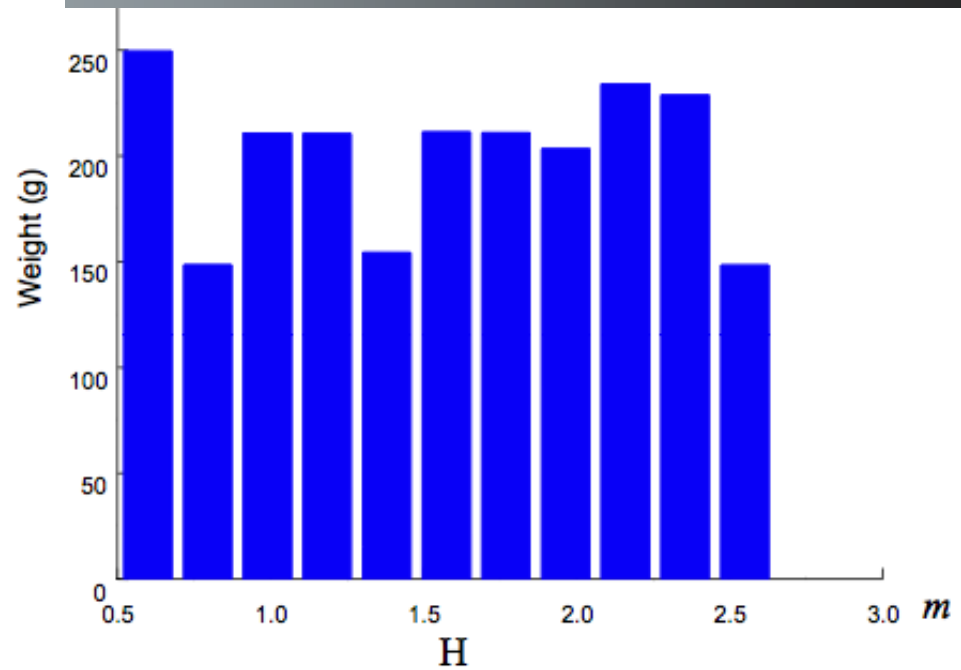
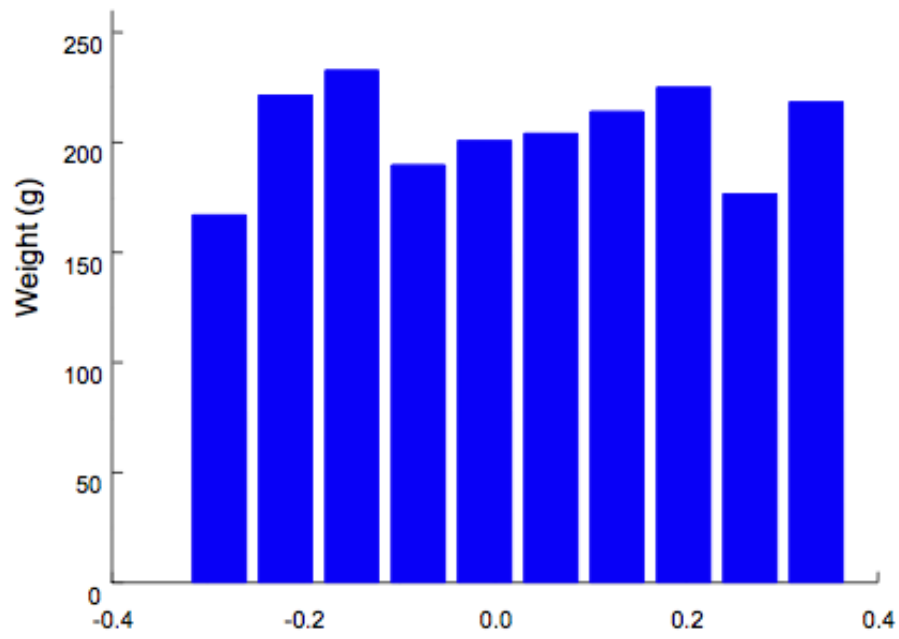
Tree 1

49 fruit

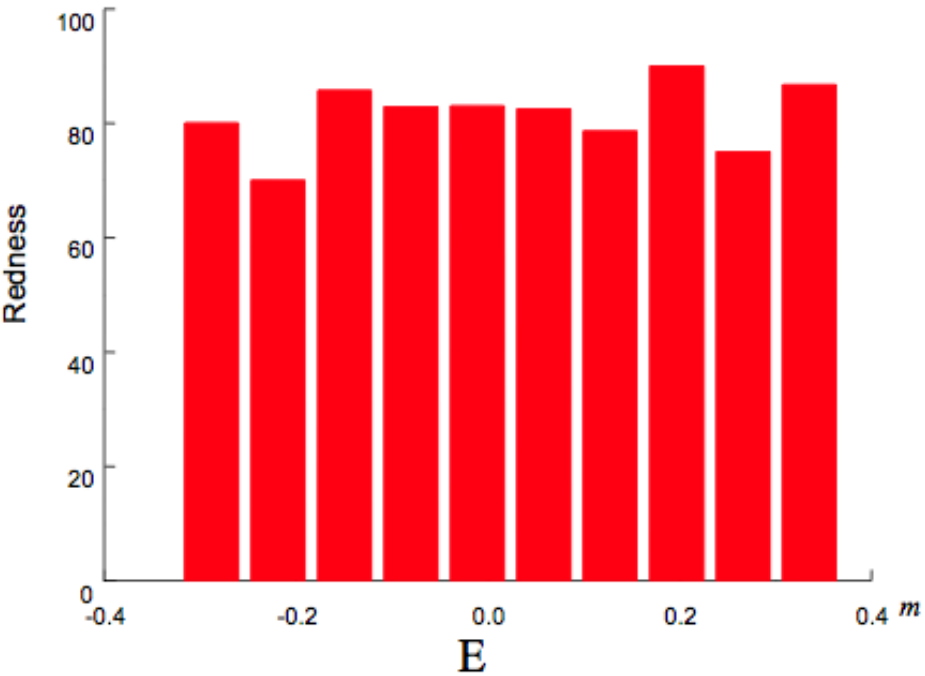
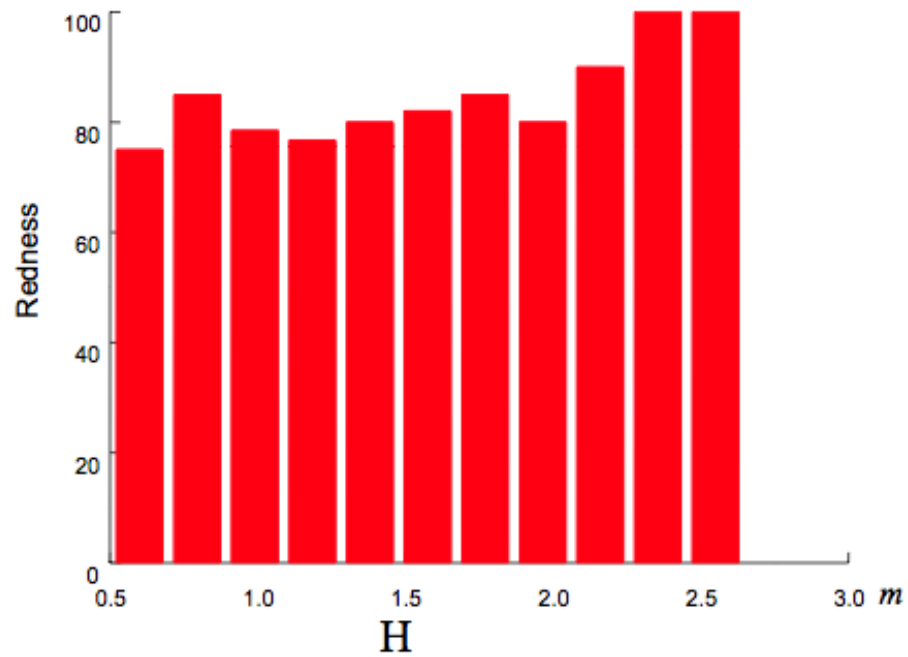
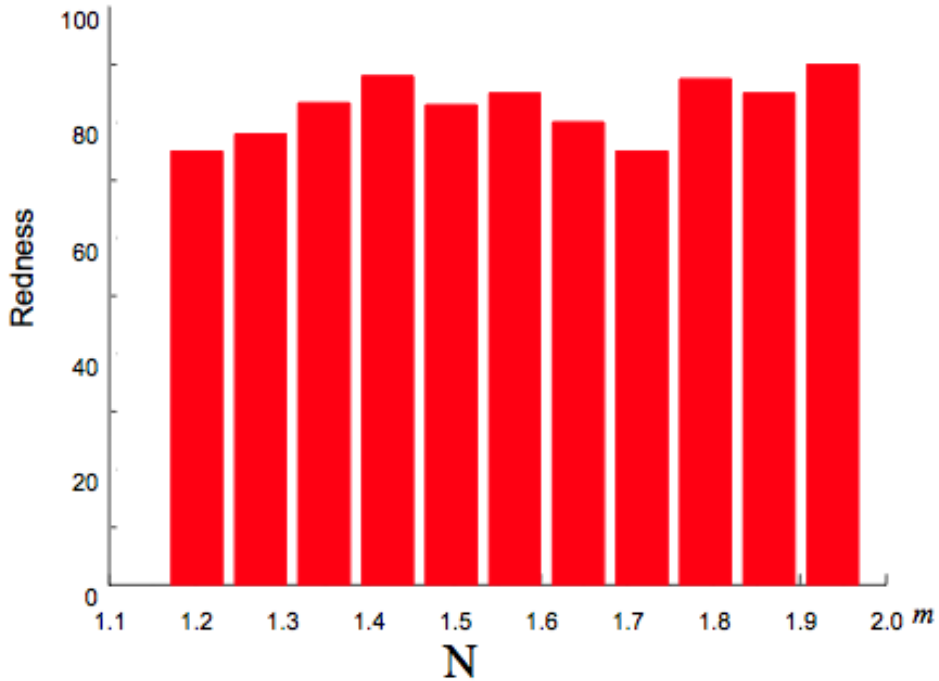




Fruit position in canopy



Fruit weight vs. position



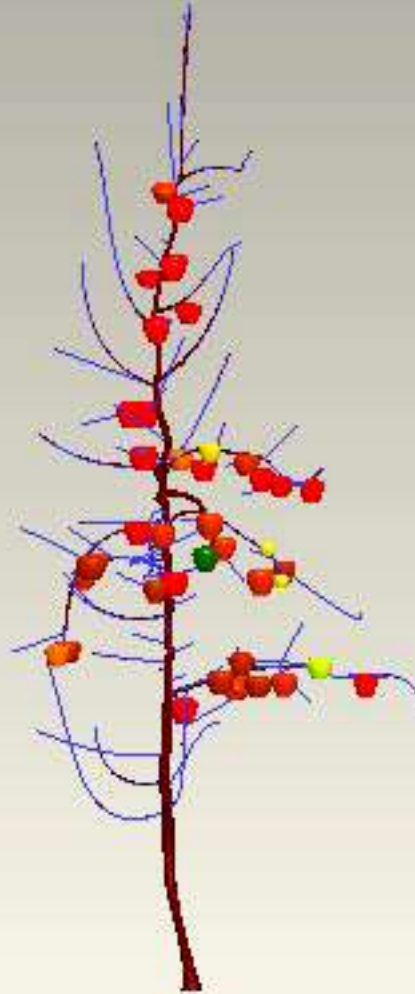
Fruit colour vs. position

NR: 0.00

Fruit size and colour

Tree 2

42 fruit



MR. 0.0

Fruit size and colour

Tree 3

29 fruit



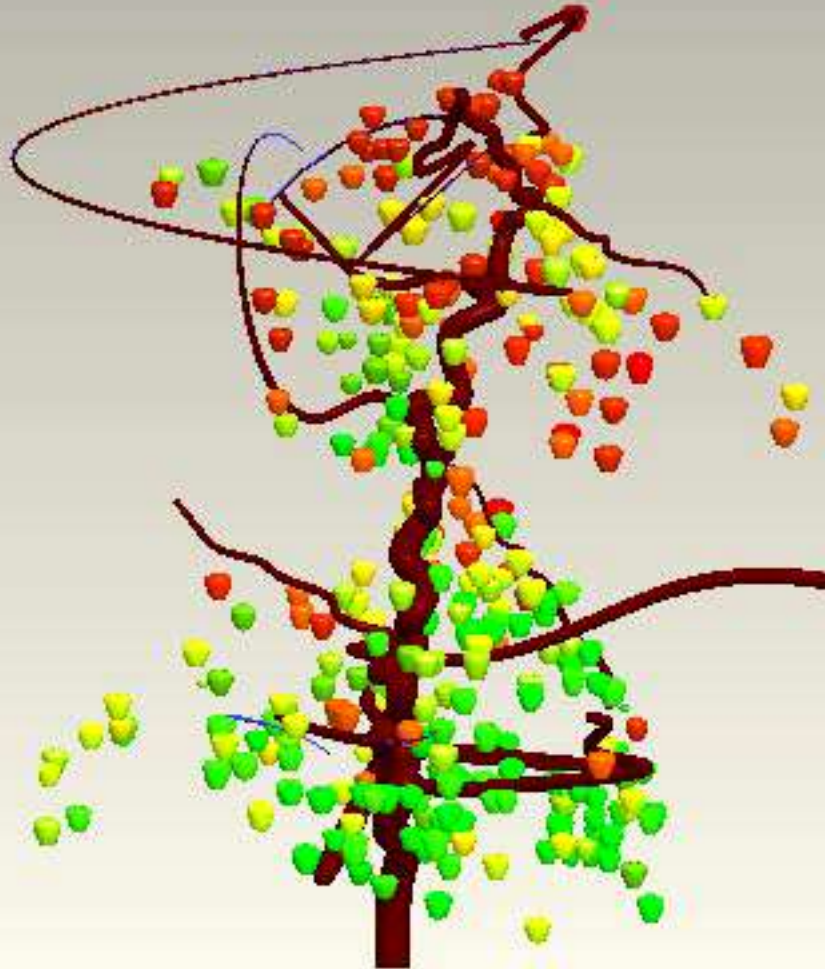
No clear positional effects

MM; 0.0

Fruit size and colour

15-yr old

384 fruit



Causes of variability?



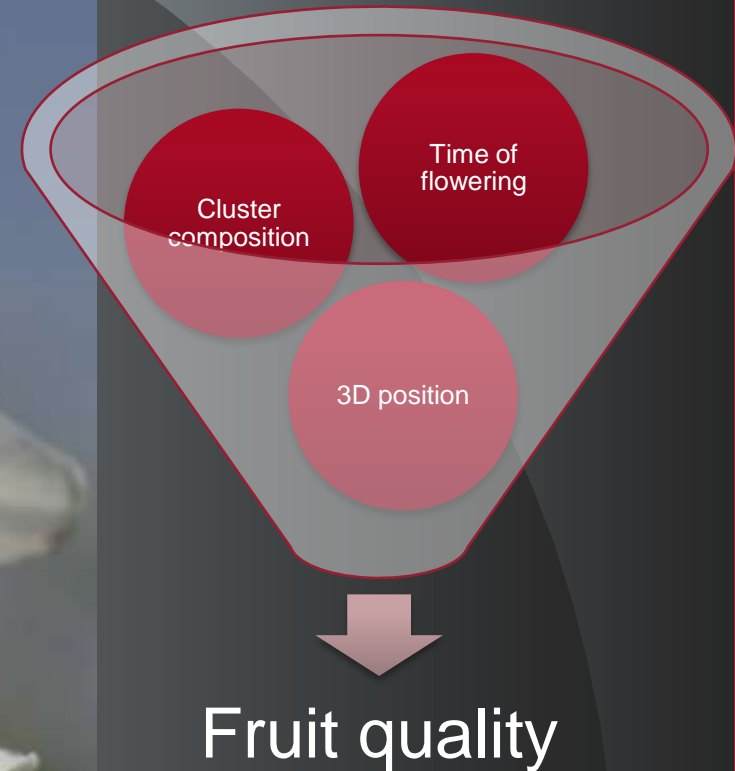
Objectives:

1. Document role of fruit developmental history on fruit quality
2. Map fruit quality and position within 3D canopies
3. Develop practical strategies for maximizing genetic potential and optimizing quality

Methodology:

Create database of developmental history of fruit:

- Individual fruit basis – 3 contiguous trees
- Fuji and Gala, 4th leaf spindle
- Yakima valley + collaboration w/phenology



Data collection:

- early
- late

Time of
flowering

Floral
hierarchy

- king
- side

- 1-flower
- 4-flower

Cluster
composition

Fruit
diameter

- at thinning

- vs. fruit
- vs. shoots

3D
position

FRUIT QUALITY

Standard crop load management – inform thinning efficacy



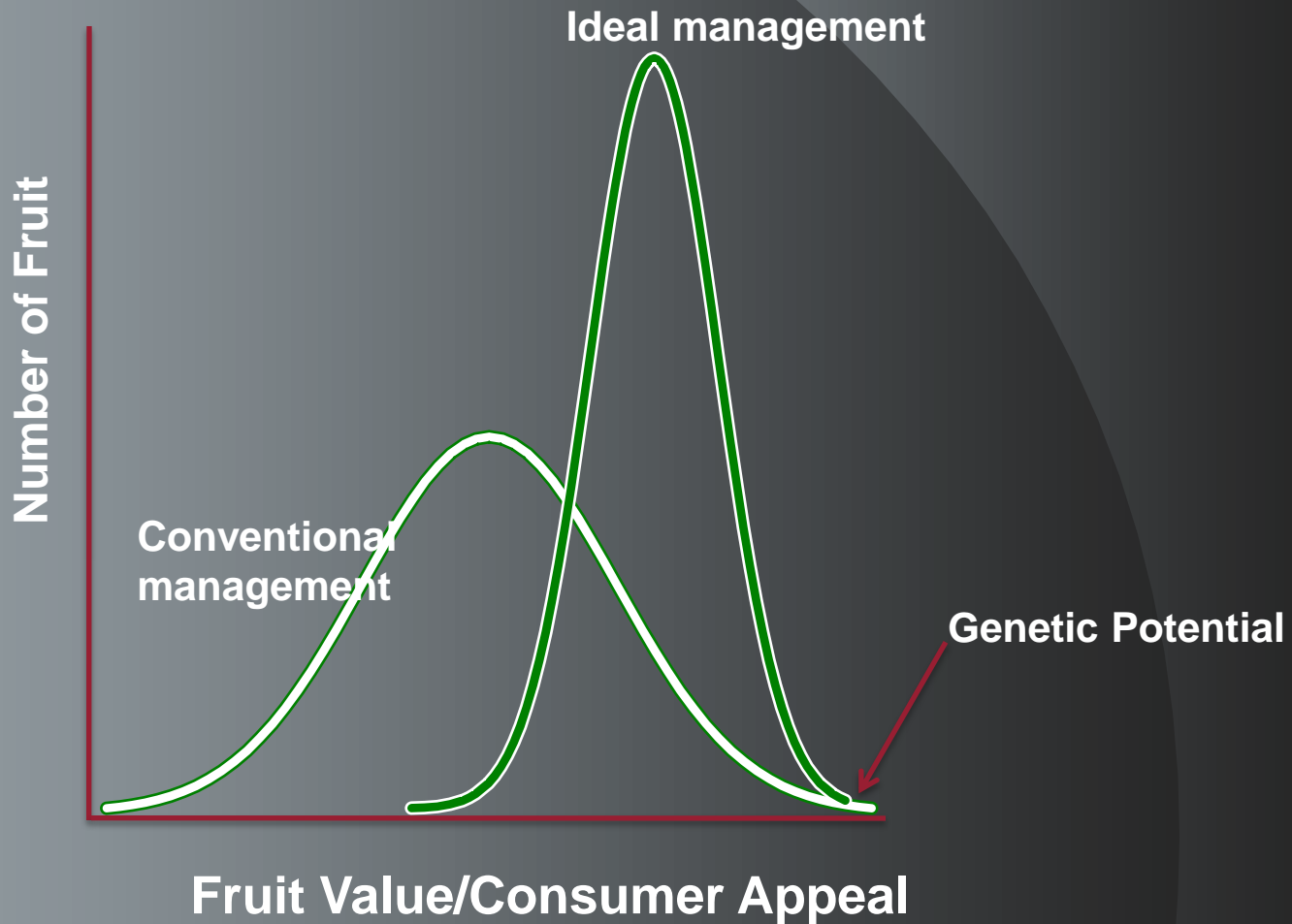
4 | 4

8 | 11

9



The ultimate goal:





Questions?