Bean CAP – Snap Beans

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OSU Oregon State University
USDA
United States Department of Agriculture
National Institute of Food and Agriculture

Snap beans – focus on “green” pods

- Phenotypic data collection is focused on this organ
- Traits of interest include:
  - Morphology (length, thickness, cross-sectional shape, height, width, fiber and suture strings)
  - Nutritional qualities (flavonoids and phenolics, minerals, vitamin C and carotenoids)

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150 cultivars & breeding lines selected

- Input provided by public and private snap bean breeding programs
- 11 pole (vining) as well as 139 bush types
- Range from heirlooms to contemporary commercial types
- Represent both Andean and Mesoamerican centers of domestication
- Flat-podded Romanos, round-podded fresh market and processing, wax, bush blue lake and extra fine European type

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Seed increase and maintenance

- Greenhouse in Oregon
- Seminis Vegetable Co. increased in Idaho in greenhouse during the winter of 2010
- Further increase was made by Seminis in the field at Filer, Idaho.

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Field trial in Oregon

- 150 snap bean cultivars in three reps
- Pole beans were grown in 5 meter plots on trellises spaced two meters between rows
- Bush beans planted in 5 meter plots with 0.75 meters between rows
- Grown under drip irrigation to minimize mineral contamination of pod
- Data were taken on plant height and maturity
- Pods were hand-picked at harvest maturity
  - (determined by when a cultivar had pods within certain sieve sizes, each target sieve distribution being specific to that variety)

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Excellent growth and yield

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Field trial in Oregon

- Pods hand-picked at harvest maturity
  - Determined by when pods within certain sieve sizes distribution, each being specific to that variety
- Pods divided among six subsamples:
  - Phenolic analysis (Mark Brick at Colorado State University)
  - Mineral analysis (Mike Grusek, USDA)
  - Fiber analysis (Brian Yorgey at OSU)
  - Carotenoid analysis (Myers, OSU)
  - Vitamin C analysis (Myers, OSU)
  - 10 pod measurements (Myers OSU)

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Nutritional analysis in process

- **Vitamin C**
- 450 samples (150 lines, 3 reps each) have been extracted
- Two of the lines were evaluated by HPLC analysis to check vitamin C content
- Range from 1.34 to 3.78 mg/100g tissue (whole pod with seeds).
- About 10 fold lower than reported in the USDA Nutrition Database for uncooked green beans, but may reflect the inclusion of seeds with pods.
- **Carotenoids**
- Nearly all samples freeze dried
- Next step is extraction and HPLC
- **Pod fiber analysis**
- About half of the 150 beans lines evaluated in duplicate
- 8 lines per week

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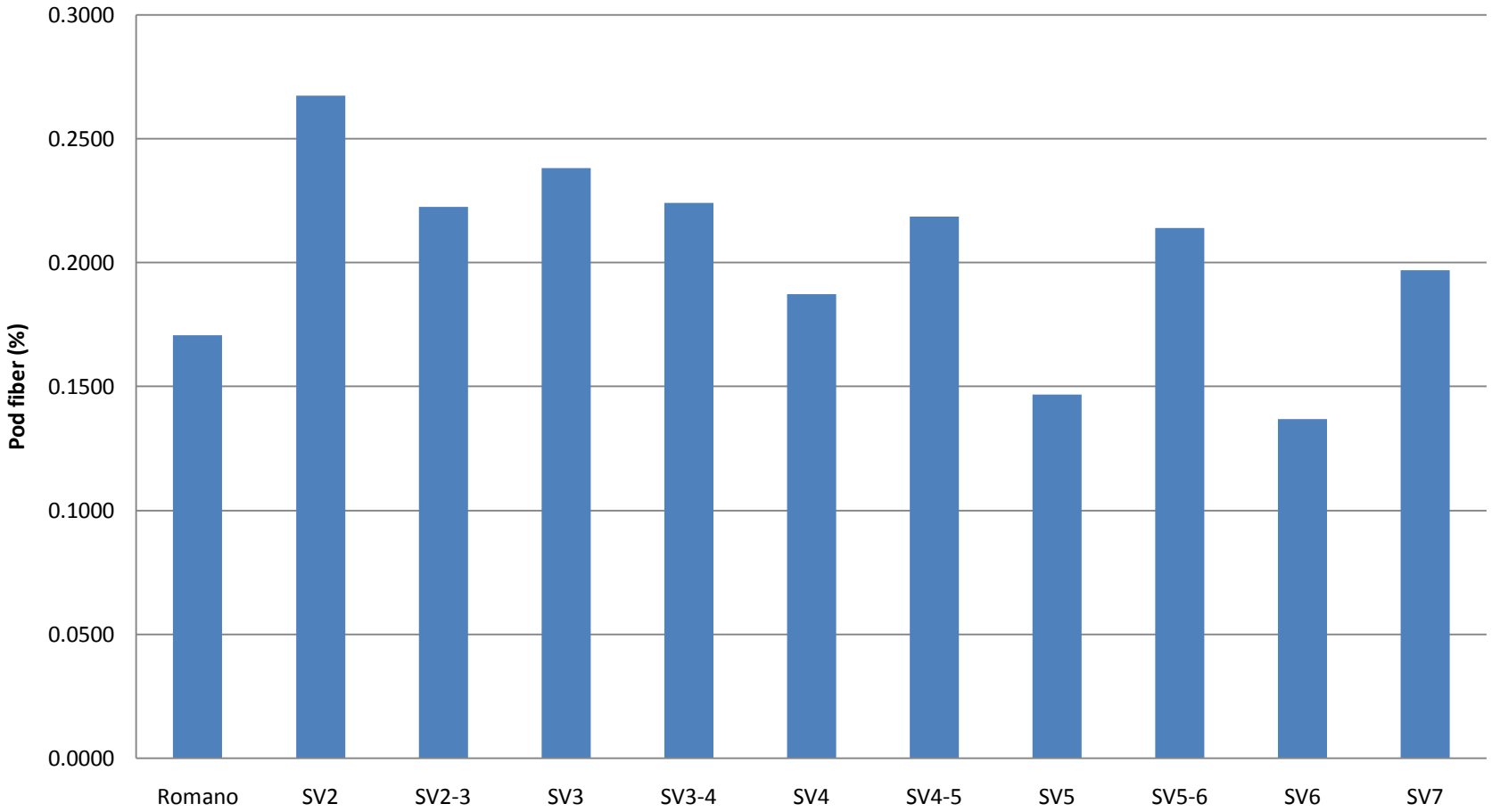
Pod fiber as related to sieve size class



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Pod fiber in snap beans – the highest and lowest from 85 analyzed to date

Entry	Type	% fiber
Blue Lake S7	Pole	0.0703
Romano gold	Romano	0.0777
Navarro	Romano	0.0797
Roma II	Romano	0.0852
Romano 118	Romano	0.0875
Kentucky Wonder	Pole	0.0902
Tapia	Romano	0.0914
BBL 156	BBL	0.1027
Unidor	4 sv wax	0.1103
Fortex	Pole	0.1113
Sea Biscuit	Fresh market	0.2929
Secretariat	Fresh market	0.2950
Stayton	Extra fine	0.2965
Espada	Fresh market	0.3011
NY 6020-5	Breeding line	0.3052
Opus	4-5 sv	0.3238
Angers	Extra fine	0.3308
Pretoria	Extra fine	0.3521
Idaho Refugee	Fresh market	0.4172
Cyclone	Romano	0.5550

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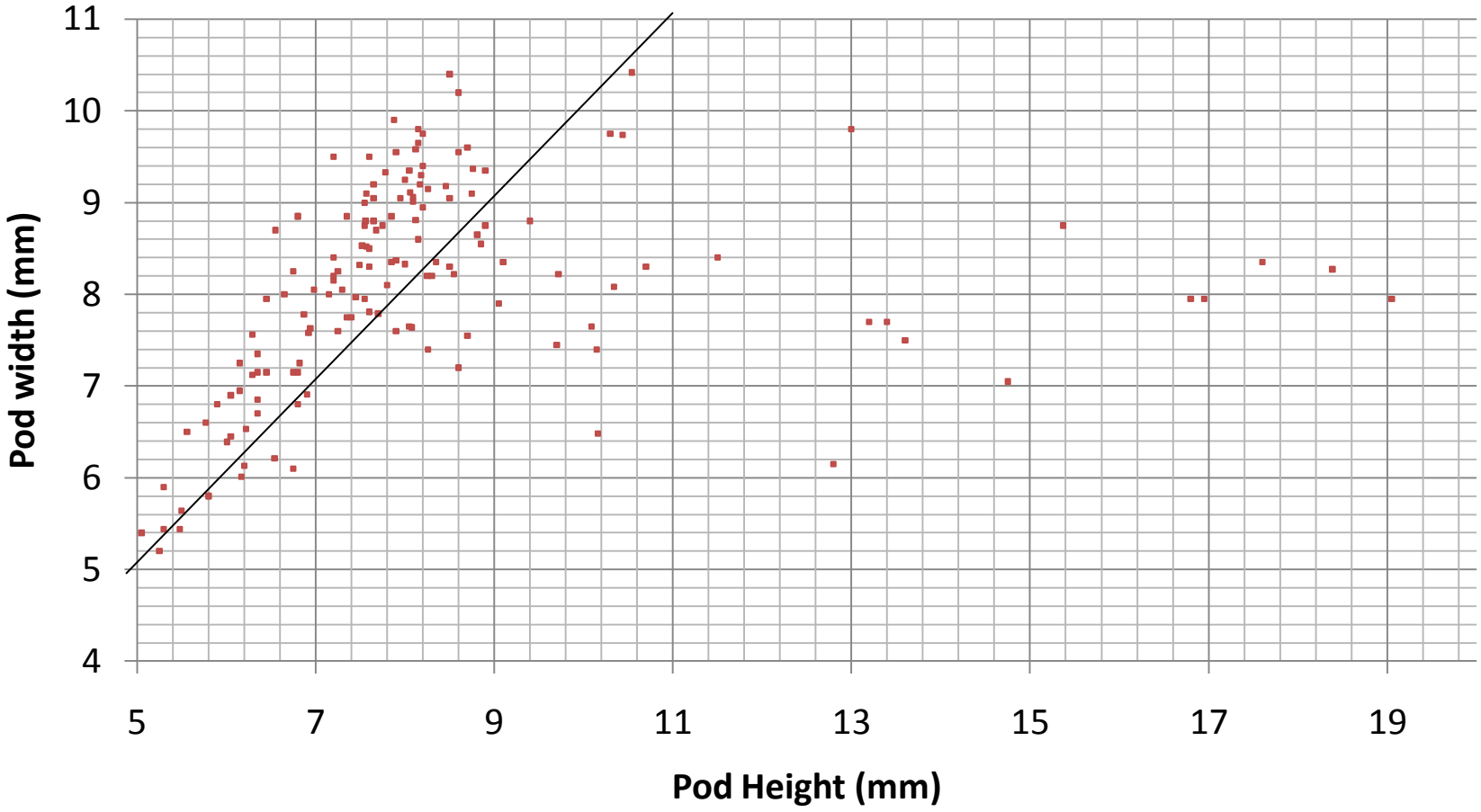
Pod morphological traits



Plans for 2011

- Repeat nursery at OSU
- 3 reps, no drip irrigation
- Evaluate plant architecture and pod morphology traits
- Harvest dry seed and send to Grusek for mineral analysis