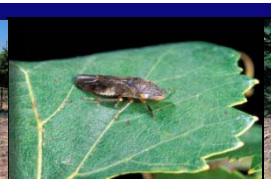
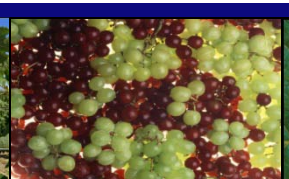
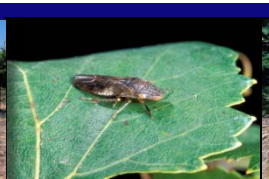
U.S. DEPARTMENT OF AGRICULTURE
Agricultural Research Service

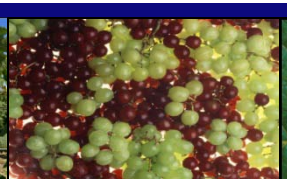
Mechanization & Sensor Breakout Group

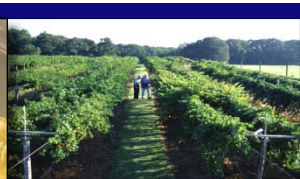




- Specific challenge/problem facing the industry and
  - Production is variable by season and by vine
  - We depend on significant semi-skilled workforce which is more difficult and expensive to attract

- Desired outcomes
  - UNIFORMITY
  - Increased accuracy of crop estimation
  - Measurement of maturity
  - Reduction of:
    - labor, (including pruning, harvest)
    - crop inputs (water, chemicals, nutrients)

- Specific research objectives needed to meet the goal
  - Need measurement of canopy
  - Need measurement of fruit (Crop Estimation & Fruit Maturity)
  - Variable rate management (precision agriculture – semi-mechanized or robotic)
  - Translational work to develop grape specific analogs

- Leader for objective
  - Canopy: Bates team
  - Cluster imaging: Intel/CMU team
  - Maturity: ARS (Beltsville night vision?)

– Variable Rate Management: ARS Kearneysville*
  - Evaluation of existing technology
  - Pruning/harvest robotics
  - Variable rate emitter

* Second phase; ARS needs additional resources

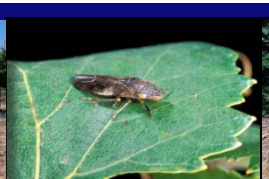
- Resources currently available
  - Expertise (research & commercial)

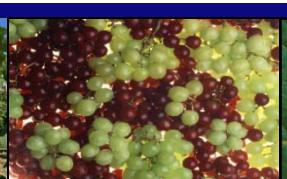
  Commercial Technologies exist without the translational work to make it applicable to vineyards (specify)

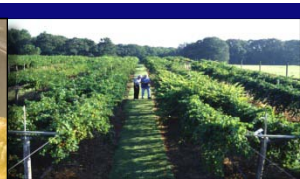
  Cornell/Carnegie Mellon/Intel team – prior tree fruit work, grape work
  - ARS Michigan State Group
  - ARS Beltsville
  - ARS Kearnesville, WV

- Equipment and facilities
  - Equipment developed by CM (as modified by NGWI study) can sense the canopy using infrared
  - NDVI and LIDAR to get a three dimensional image
  - Near Infrared could detect individual clusters and allow harvest at night and/or during cooler conditions
- Translation of information to change emitter for water and/or chemicals – need smart emitters
- NIR Vision Goggles (sensor group in Beltsville)

- FUNDS Available

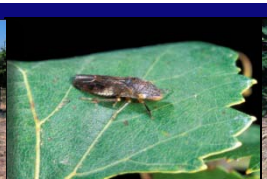



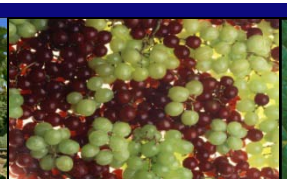



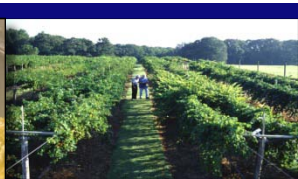
- Additional resources needed and potential sources
  - Expertise (research & commercial)

    Need to re-build the capacity within ARS to develop engineering knowledge applicable to grapes & other specialty crops
  - Equipment and facilities
  - Funds

- Plan for obtaining additional resources

- Outline the Project Management Plan
  - Who will do what and by when?