Overview:

General comments

All comes back to quality!! First three listed below relate back ultimately to quality- but not at the expense of economics

DC technology meeting for harvesting the oranges- camera that imaged everything at all different angles- would need a bunch of calibration to count and weigh, and probably wouldn't be more accurate than the human estimates-but could become more efficient with time

Vineyard design- row orientation, soil type, vine spacing, etc playing into design; layout to optimize/achieve uniformity- irrigation design strategy, through blocks and depths and in hopes of achieving uniformity; how to utilize trellis type, vine spacing and row orientation to optimize quality/uniformity-

ARS Accomplishments: not much by ARS,- is it really needed?
-GAPS: how to minimize labor inputs-see mechanization; maybe use NDVI to evaluate land for pre-planning
-Future work: see above gaps; in general, no direct needs-too long duration for ARS- too applied
-Suggested Researchers:
-How to improve money-use efficiency: work efficiently… N/A
-How will work be extended: see breakout session 1 comments (trade journals and extension?)

New Training/Trellis systems--wine- every imaginable trellis system has been used -raisin-ideal= max yield, high quality and ease of mechanization

- ARS Accomplishments: No work being done currently; no past work ever done by ARS; most done by industry
-GAPS: not much left to do in terms of the system itself;
-Future work: a trellis that does not require cane cutting at harvest (quality)-too applied for ARS??
-Suggested Researchers:
- How to improve money-use efficiency:
-How will work be extended:

Canopy Management Systems

- ARS Accomplishments: -"Squid" project- Tarara work combines trellis design and canopy management- good example of ARS work in this area- measuring the effect of diff env factors on canopy management
- GAPS: mechanization over the long term seems to result in reduced quality- see Aussies; Table grapes need to be included for this work?? But table grapes are more about size and color
- Future work:

- Suggested Researchers:
- How to improve money-use efficiency:
- How will work be extended?

Yield Estimation

- ARS Accomplishments: Tarara load cell project-lots of excitement; Eileen? Perry WSU- image sensing (side scan system)
- GAPS: maybe using density, sound or other wavelengths to get better estimates because so many grapes are hidden in the canopy
-proposals for additional research in this area in terms of the estimation- private personnel suggested to do the work- e.g. Joe Glassy- who in ARS would be doing this work- maybe some orange growers- spectral discrimination to distinguish leaves from fruit etc. - would work well for red grapes, but may be more difficult for white grapes; one of the toughest things to quantify
- Future work: what resources are needed: possible private/industry funds to help match ARS funds→ usual granting agencies AVF, Vit Consort.
Technology transfer of this info: usual suspects, trade journals trade journals, grower meetings and proceedings and cooperative extension- patent work, and getting the product to the growers-quickly!
- Suggested Researchers: Industry collaborators
- How to improve money-use efficiency:
- How will work be extended?

Crop Load Management-varies markedly for table, wine and juice grapes

- ARS Accomplishments:
-Gaps: Tarara's work doesn't tell you how many clusters should be dropped- anyway of using the load cell data to get better estimates of cluster weight – currently requires a lot of human labor- RESEARCH NEED- by Julie's group?
-difficulty is that you need to take off a total number of clusters on an average vine- but also link that with a qualitative judgment
-chemical applications to lessen the need for manual or mechanical thinning; should go hand in hand with yield estimates
-Future work:
-Suggested Researchers:
- How to improve money-use efficiency:
- How will work be extended?

Irrigation and Fertilization Requirement

-ARS Accomplishments: Krista Shellie, Paul Schreiner, Andrew McElrone- currently doing this work in irrigation efficiency
-is there a better way to know what the grapes are using? Sap flow sensors??
Julie Tarara, Me, Larry Williams, Ken Shackel- my collaborators
Tom Trout, Don Wang
GAP: -industry priorities- success stories from the past- lysimeter and water potential wok that has benefited industry in the past.- perhaps sap flow research is

next model system to improve efficiencies- DATA GAP- improvement of dendrometer technology in conjunction with sap flow- possibly marrying several technologies together- point measurements with the remote sensing- Trout and Wang?
-interagency collaborations may be useful in making better use of ARS research monies- collaborate and better communication

Fertiilization: expand the work by Paul Shriener to a regional basis because it is site specific- Regional work is needed- work should be taken to other areas. Shriener's work on developing nutrient standards; nutrient standards on a regional basis- needs to be linked with irrigation management (e.g. deficit irrigation)- N needs water for movement
Do we need work on the timing of application?
Not enough water put on wine grapes for leaching?? Is there a problem drainage into water sources?; foresight to see if we need to monitor ground water for nutrients… do growers need to make proactive changes now in anticipation of the tighter regulations (e.g. water amt, run-off, and deep drainage)
Possible people: need suggestions- can we make links to the university folks for work on fertilizers? Joan?? work with Krista and Paul??

-Future work: work that addresses the gaps above; sampling alternative tissues for nutrient status; see comments above
-Suggested Researchers: build collaborations within a given area because of the site specific aspects
- How to improve money-use efficiency:
- How will work be extended?

Mechanization and Automation Technologies

- ARS Accomplishments: None
-Gaps: -DC meeting has shown that ARS has done very little for nearly 30 years…related to immigration problem- Most work being done privately-engineering firms; mechanical pruning? Jasmonates- with Matt Fidelibus for chemical; should this be done in competition with private industry? hand-picking vs. mechanical picking with robotics-private industry
-CAN we encourage collaboration being privates doing this work and ARS scientists? Or taking the existing technology and run testing- Researcher evaluation of the technology.
-"MARS Rover" or "Roomba" for vineyards… can we automate it?
-Maybe industry has better set-up to develop more mechanized work
-can we mechanize spraying to minimize worker exposure
-Future work:
-Suggested Researchers: new engineer trained personnel needed
- How to improve money-use efficiency:
- How will work be extended?