Final progress report for Virginia Wine Board FY 2016

"Launching of GrapeIPM.org:
A new website for grape disease management decision support system"

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Objectives from 2016 proposal

1) Continuation of grapeIPM.org database development;
2) Beta-testing of the system with select growers in 2016 season
   (Aiming for actual launching in the winter 2017 to a small group of growers);
3) Validation of grape disease models in the system; and
4) Maintenance of existing weather stations which is 3 years old and some of sensors need replacement.

As noted in the 2017 proposal, we made a very good progress toward overall goal of establishment and development of database structure. A list below is detailed working items that are currently developed by our team. It is probably more detailed than you would like to see, but I want to point out the layers of decisions that is required to make system running.

Weather & Risk App

1. Data acquisition
   We are always looking for a better way to obtain weather data so that disease risk model will be applicable to all the users. Current options are listed below. What we are working on right now is to assess goals of data acquisition because coding is time-consuming and prone to bottlenecks.
   1. NEWA weather stations
      a. NEWA is weather network from Cornell. We are migrating into this system because of the ease of the data management
         i. *Rather than fixing some of aging weather stations, we went ahead and replace some of our stations with NEWA units, which cost considerably less than our current stations.*
      b. (to do) We need to communicate with Rainwise to establish a link for weather data on VA weather stations.
   2. Wunderground API
      a. We can also obtain data from Weather Underground. We are seeking a way to automatically import data from their database. If it is successful, we can bypass data quality management (= big time saving)
      b. *Progress made in 2017:* We have developed a Python codes for obtaining Weather Underground data. It will be implemented once the system is ready.
   3. Raster data?
      a. We can also look for other data sources such as NOAA, or MADIS, which are available. These data format maybe useful if we want to create maps, but data structure may be difficult to deal with.
   4. VT-AREC Campbell weather station network
      a. Currently in use, however, it also requires cost for maintenance
2. Improve import method

Current method (Feeds module) is limited by size of monitoring network - too many sensors, it can time out. A research associate, Dr. Curtis Olga (CO), is working on pre-processing of files generated by LoggerNet for better Drupal import. Pre-processing includes:

1. Store file format information for each weather station (there are 4 or 5 different formats between stations and reporting interval, .e. 15, 60 or daily).
2. Select only new information (not in grapeipm.org database) or specifically requested information (within some user-defined date range).
    a. A research associate Mr. Robert Burgholzer (RB) & CO working on this as of 10 Aug 2017, preliminary testing was complete.

IPM Spray Planning Application

- Priority Items from 2016 Review and Testing:
    - Finish Rate Calculation Screens/Code
    - Handle calculation and display of rate adjustments based on growth stage/canopy size.
    - Include handling of dilutant needed (For example, in some country (e.g. Japan), require dilution rate as a part of the label (it will help growers to determine the rate, regardless of the volume they are spraying; thus, it may be option for our growers.
    - Make sure all defaults are loaded from vineyard/block properties
    - Make sure all vineyard/block property defaults are settable on config screens

Inventory features (the main focus for 2017-19)

- Summing up total sprayed for period
    - I.e., historical data -- this is now complete, but needs review.
- Estimating needs for planned events
    - Basic report is same as historical sum, but need to think about warning messages about spray amount defaults if users have not actually added quantities in, but have only planned which fungicides to use.
- Calendar based planning and day to day management interface
    - This seems like a critical need after the review
        - It can be time consuming to revamp screens so requirements and work-flows need to be really concise (think 3 weeks of RB work per screen developed).
        - Staged development with basic functionality first, then enhanced interface widgets next
- Printable Forms for the EPA report
    - Draft forms complete, need to check how it meets the EPA requirement
        - Contact local extension agent to confirm.
- Creating database of existing fungicide
    - As of 10 Aug. 2017, we are in process of entering over 600 fungicides on the market to our database.

Administrative

Based on 2016 budget, $5,000 to have advanced payment for Amazon Web services.

- RB- follow up with AWS staff - they stopped talking after I indicated that we would not need the $150 / month support contract
- Structural decision points (from MN):

    - More SSD: Speed costs, but it maybe the most logical thing to invest. When we introduce a new system to non-technical people, it is better to be faster than slow.
    - More storage: we may need it, but not in the near future
    - If possible, flexible account is the way to go. We can upgrade using option #1 for next three years, and still get to keep some money in our account.

Project steering committee:
In 28 October, 2016, and 31 March, 2017, we had meetings with a steering committee/beta-testers to introduce the system and discuss how to improve. Here are list of topics (priorities to be re-evaluated after discussion):

- Management actions
    - Planned and Action - save them as two separate records
    - Copy your plan to a new block or to year
    - Disease and insect outbreaks - crowd sourcing
    - WPS REI, Reg, PHI, Block, Chemical
    - Explanation on the variety (block) information
        - Planting date, age,
    - Simplify the stages
        - icon-based guidance
- Recommendation: expected, pre-selected (minimum list), template? Last year's recommendation page
    - Template for planning?
    - Color coding of target disease and/or fungicide resistance risk
    - Practice based list or Spray recommendation - based on your spray
    - Based on your spray it will give me quick report on coverage.
    - Warning based on spray recommendation?
- Action management
    - Work order - email and text option give recommendation based on tank size
    - Check for complete application - force user to click?
- Rate and amount of water
    - need re-examination of the way the rate is recommended.
    - or make it simpler?
    - below the rate amount? - Check with Mike Weaver?
- Rate calculator
    - Need more tweak to make it simple
    - Should confirm legal requirements for rates.
    - Double print out at the rate calculator.
- Fungicide list --
    - sort based on name, FRAC, target
    - Manage material link
    - Color coding for fungicide resistance risk!
    - Link to label.
    - Cost input
        - Cost based on Jeanette's list
    - PPE
    - Input your own chemical?
    - Default recommended rate to be set

- Inventory management
    - recommendation based on what you got?
    - Estimate based your usage and amount you entered.
    - Planning Based on chemical inventory (Feedback loop)
- FRAC count
    - # planned and # applied should be there (requires "complete application" to b e selected - #6 below - may be a deal breaker for usability)
    - Feedback system (next priority, not current one)
    - Adding a new spray - check on FRAC
    - alert you to change next sprays (date, materials) based rotation + limit
- Function on the dashboard
    - Management
    - Planning
    - Recommendation
- Misc other items
    - Explain what you are doing at the beginning.
    - What the asterisks means
    - Option to create vineyards and blocks first
    - take word "material" from the table
    - Make sure have instruction for making a block
    - map - lost in the process...
    - Block - can you add or remove later?
    - Amount you applied - ability to modify at confirmation of application.
    - Ajuvants to the list
    - Have a calendar on the planning page.
    - IPM event
    - adjust date based on the last entry
    - Edit Spray plan - tied to the amount?
    - show timeline at the top
    - live site information
    - - Keep the format of the page the same for all!
    - Area based on row and vine spacing and number of row, and vines per row.