

## **Small Fruit Research, New Introductions and Virus Indexing<sup>©</sup>**

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### **BACKGROUND**

The University of the Fraser Valley (UFV) was designated the Agriculture Centre of Excellence for British Columbia by the Province's Premier in May, 2013. The message was that the Ministries of Advanced Education and Agriculture must work together to establish a hub at UFV that brings together the efforts of all other institutions in the province that have capacity in agriculture. While a work in progress, many avenues have been covered and many collaborations struck to develop the most environmentally, socially, and economically sustainable industry in North America and provide industry with resources to be proactive.

### **THE PACIFIC BERRY RESOURCE CENTRE**

The berry growers in the province of British Columbia (BC) are very progressive and have had to respond to many critical changes in their respective industries. At this juncture, because of increased competition from foreign markets, the strawberry industry in BC has switched almost entirely to fresh market production from an earlier time when nearly 100% of the product was processed locally.

The raspberry industry recently saw very low prices, up until 3 years ago, for their products. Both processing and fresh sales have seen a surge, but are now pulling back with the 2012/13 seasons being poor by virtue of weather and 2014 coming in as a good year.

The blueberry industry in BC, with nearly 30,000 acres and a 150 million pound total harvest expected for 2014, is riding a wave of health awareness that is yielding high returns to growers. As expected, in 2014 the price trend was downward as all of North America produces at full capacity.

The cranberry industry dealt with a price collapse 15 years ago and has just recently emerged with increasing prices and production for a more healthy industry overall.

That was the perfect time to combine resources with renewed vigor to develop an industry that is a leader in sustainable growing techniques, including soil management, cutting edge marketing and new product development. With the advent of the "100 Mile Diet," combined with BC's Agriculture Land Reserve (ALR), local farming is becoming increasingly important for production of locally grown food as well as for the preservation of green space for future generations.

It is necessary to have a network of co-operators in BC. Our industry is well-situated with an excellent climate, which produces the highest yields of raspberries, cranberries, and blueberries in the world, as well as the highest quality strawberries. To tackle the production challenges associated with these commodities, such as cultivar development, plant husbandry, postharvest management and marketing, UFV is to lead the efforts of this network of cooperators through the Pacific Berry Resource Centre. This Centre of Excellence will act as a hub to education, research, extension, and other industry efforts. Major cooperators will be the growers, processing industry, BC Ministry of Agriculture, Agriculture and Agri-Food Canada, private consultants and the Pacific Northwest berry groups.

### **WHAT IS THE VISION TO ACHIEVE THIS GOAL?**

Common goals for all organisations are to:

- Bring all research and resources together at the Pacific Berry Resource Centre of BC (PBRC) associated with the Agriculture Technology Department in UFV's Faculty of Applied and Technical Studies.

- Create superb cross-connections with various government levels as well as producer and other industry groups.
- Draft the terms of reference for the Centre. The premise is that the berry industry has control over the general direction and activities of the PBRC. A strong advisory committee was established out of the respective research committees. The PBRC also entertains projects funded by private entities and helps advance the industry portion thereof.
- Represent the research and development for the four commodities. Together they are larger, based upon number of acres and total dollars produced, than any other British Columbian horticulture sector, even more than all tree fruit and grapes. The berry industry in British Columbia has adopted and adapted many ways of sustainably growing their crops; their research programs and the goals of their associations have long incorporated sustainable industry goals. As such, the industries have developed integrated pest management (IPM) options, spinning off private companies that not only deliver the services needed but also spearheading new developments. Developments such as use of non-pest biologicals as a key component of integrated crop management.
- There was a small need for facilities, which are now provided by UFV. Through strong association with the BCMA and AAFC, as well as UFV lab facilities (in place by 1 April 2014), there is no anticipated need for any other physical space. A new greenhouse facility will house a wide range of industry related trials and observations.
- A field facility, where irrigated row crops can be grown, has been added. This could be used for research as simple as establishment of row crops (e.g., blueberries) so that researchers can perform a range of experiments in isolation from commercial plantings. University of the Fraser Valley has recently also secured relevant spots with greenhouse and land space in south Surrey as well as on Vancouver Island.
- The PBRC is well-suited to help rebuild a more complex extension service; something the industry has great need for, but neither the federal nor the provincial governments have set as priorities. A USA land grant university model is suggested, whereby teaching, research, and extension go hand-in-hand and each participant has varying degrees of joint appointments.

## **ACTUAL RESEARCH ACCOMPLISHED OR UNDERWAY**

### **Blueberry**

- Cultivar improvement through collaboration with the BC Berry Breeding Program, together with the BC Blueberry Council. This includes field trials with brand new cultivar releases from foreign programs, as well as advanced selection testing out of the BC Berry Breeding Program. The plant breeder is an adjunct professor at UFV.
- Field trials to test new cultivars or advanced selections under conditions encountered at different farms in various regions of the Fraser Valley.
- Fruit quality improvement with fertility management for each individual cultivar, such as calcium supplementation for some cultivars with calcium deficiency problems.
- Fruit set management in poor pollination years with plant growth regulators.
- Pruning management, differentiating the benefits of heavy versus light pruning and the influence on fruit yield.
- Irrigation management tools such as one versus two drip lines and additional overhead irrigation.
- Stopping overly vigorous plant growth for some cultivars and encouraging growth in others, similarly, keeping plants dormant longer and putting them into dormancy earlier.
- Researching the physiological cause of region-wide crop losses due to such factors as dry fall weather and/or severe winter cold damage.
- Improving propagation techniques, both by cuttings and tissue culture.
- Combating disastrous diseases and pests such as spotted wing drosophila.
- Advocating systemically acquired resistance to diseases and pests, as well as testing green pesticides for their merit and the veracity of the claims made.

- Growing under tunnels and various means of season extension.

### **Cranberry**

- Differentiating field establishment of plugs vs. cuttings.
- Establishing the damage levels and methods of control against the cranberry tip worm.
- Evaluating new cultivars for their merit.

### **Raspberry/Blackberry**

- New cultivar testing.
- Propagation by tissue culture as compared with root cuttings or traditional handling practices versus plug plants.
- Cultivar adaptation to local climate.
- New cultivar development with the BC Berry Breeding Program funded through the Raspberry Industry Development Council.
- Registration of new cultivars with Plant Breeders Right's Office.
- Raspberry yield decline study over many years with our partners in Washington State and Oregon. This intense study eliminated one after another of the possible reasons for the decline and drilled down to the actual causes, which is information that will be used in fertility research and breeding trials for superior adaptation to our soils and disease/pest background.
- Growing under tunnels and various means of season extension.

### **Strawberry**

- New cultivar testing for the BC Berry Breeding Program on behalf of the BC Strawberry Growers Association. Field testing for adaptation. Concentrating mainly on fresh cultivars, since the processed market has been greatly reduced.
- Season extension with day-neutral cultivars and tunnels, as well as raised beds and plastic culture.
- Runner suppression by application of naturally occurring plant growth regulators.
- Table-top growing of fresh strawberries.
- Testing different cultivars to survey customer acceptance.

### **Other Berries/Crops**

- Goji as a minor commercial crop — not too much acceptance yet.
- Haskap/honeyberry/blue honeysuckle — the following talk with focus on that topic.
- Working with propagators of new varieties of hazelnuts that are resistant to eastern filbert blight.
- Elderberries — assess varieties for commercial potential.
- Seabuckthorn — evaluated as a future crop.

### **Strange and Wonderful**

- Rice for Sake production and table consumption — trials concluded successfully for the Fraser Valley climate. Tested various propagation methods, water levels, fertility management options and varieties.

### **Other Activities**

The PBRC focuses on collecting new accessions from around the nursery industry to hold the genetic resource available to the specific contributor or, if they so desire, to whomever wishes to have a license for propagating the material. This, once again, provides industry access to novel plant introductions.

While we are still developing rapidly to build our capacity, a portion of our facilities are entirely designated to house and manage CFIA certified, virus-free propagation material under quarantine for controlled access to the nursery industry. The facility is faculty and student-run and requests for propagation material will be possible through the PBRC.

The novel, 12-meter-tall greenhouse with the most modern light diffusing covering

materials, ultra low-energy consuming fans and a closed structure without vents except the fans, has so many features it would take another 10 pages to discuss. Again, this is designed to move industry forward and make sure the local industry remains at the cutting edge.

### **THE FUTURE**

We find ourselves blessed with the most progressive growers, as well as local and international collaborators in the Pacific Northwest and beyond. We are able to pull together research, technology transfer, and instruction and extension services under one (BIG) roof! This closely resembles some of the collaborations at USA universities with their local and USDA partners, where we have our provincial, private, and federal government partners. More and more research is falling under the purview of universities and private entities, with organisations such as the grower councils leading the way. While we lament the government's withdrawal in some areas, we welcome the closer role that industry plays in research, learning, and extension services.

### **QUESTIONS AND ANSWERS**

Katreen Gradowska: Is the taste of new cultivar tested?

Tom Baumann: This is a very important characteristic. Yes, taste is evaluated. We bring the berries to food outlets, for example direct food marketing, and we interview people who come to purchase the crops. We give them up to 10 choices to evaluate.

Joe - Duluth, Minnesota: Do you have any connection with the University of Minnesota?

Tom Baumann: We get their cultivars for testing, but beyond that we don't collaborate directly with them.

Larry Rupp: Could you elaborate on the program you have working with nurseries that help you develop new cultivars?

Tom Baumann: There's really much more to it than that. We collect material from different nurseries and propagators. Bring it into our screenhouse and clean it up with heat therapy if it isn't clean already. Once cleaned, we'll keep it free of any pests or diseases. We then offer propagation material to growers from this cleaned material. Students at the University run the program.

Anna - Washington: Can you elaborate on the design of your greenhouse?

Tom Baumann: It is 12 m tall and we manage the above air space for energy savings and air movement using vertical fans. The glazing material is double-layered polycarbonate with dead airspace between the layers. The light transmission is ~82% and the light diffusion is ~95%. The material is called SolarSoft™ and originates in Israel. It costs less than glass and its insulation factor is greater than glass. The greenhouse is built to hurricane and earthquake standards using steel infrastructure. Using spacers, there is no direct contact between the steel infrastructure and the outside air. This eliminates water condensation and dripping inside the greenhouse. All cooling is done actively with fans; there is no passive cooling. More information can be found online at: <<http://www.ufv.ca/agriculture/pacific-berry-resource-centre/>>.