Research Projects Sponsored in part by PPI/PPIC/FAR in British Columbia

Effect of Potassium Fertilization, Nitrogen Fertigation, and Crop Load on Potassium Nutrition and Fruit Quality of High Density Apples under Atmometer Scheduled Irrigation

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The production of irrigated high-density apple orchards on coarse textured soils in British Columbia have been found to commonly be potassium (K) deficient, due in part to nitrogen fertilizer additions and over-irrigation. With the development of a drip irrigation system, where water additions are a function of water loss by evaporation (atmometer based), K deficiencies can be corrected by fertigation. Managing the balance of nutrients through both the non-fruiting and fruiting periods of growth requires careful attention to apple yield potential, as low yield in the presence of high plant K can inhibit tissue calcium (Ca) level and lead to reduced storage qualities such as soft fruit.

The first apple crop in this project was harvested in 1999. While a light bloom and disease limited yield potential of the Gala apples, the nutrient treatments were found to influence crop grade. All of the apples from the study received the top grade for color, however, only those fruit which received early season N or K met the size requirements for top grade. The addition of K can also result in a lowering fruit Ca concentrations, leading to an imbalance of K:Ca that results in poor fruit storage. The Gala apple variety used in this study has high Ca accumulation rates and as a result no imbalance with K was observed in 1999. The influence of fertilizer K on both production and quality will be a major focus of this research in 2000.

Effectiveness of Applied Phosphorus for Field Corn in Relation to Cropping Practices and VAM Colonization

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Early season phosphorus (P) deficiencies in corn seedlings grown on high P soils have been reported when starter fertilizer P is not used in the costal region of British Columbia. Corn roots have been shown to establish a strong association with vesicular arbuscular mycorrhizae (VAM) fungi. In some cases the association of the plant with VAM increases root surface area enough to meet seedling P requirements. However, this network of VAM fungi filaments in the soil is easily disrupted with tillage, or growing a previous crop that does not form an association with VAM. As a result, starter P management requires careful consideration of cropping systems management.

This research continues to show that VAM colonization of corn seedlings is seriously diminished, and P deficiency extreme, when either intensive pre-seeding tillage or a crop like canola is grown prior to corn in rotation. Canola does not associate with VAM fungi, and as a result the VAM population is diminished during the canola production year. The addition of starter P with corn under these management situations where the VAM fungi population has been disrupted corrects the seedling P deficiencies. Growers in this region of British Columbia now have good guidelines to help them in managing the nutrition of their corn crops.

Influence of Mineral Nutrition, Aluminum, Carbohydrate Metabolism, and Plant Hormones on Cranberry Flower Induction and Alternative Bearing

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The public closely monitors cranberry production in the costal region of British Columbia, given that it is one

of the provinces most environmentally sensitive regions. Management practices, and in particular the use of fertilizers, must be justified as essential to improving the production, quality and profitability of the cranberry crop.

Ensuring a proper balance of nutrients is critical to both floral induction and cranberry bud formation. Use of ammonium nitrate as the N source resulted in 37% more floral buds and 42% more flower primordia than when ammonium was used exclusively. While use of ammonium nitrate also improved the potassium, calcium and zinc status of cranberry plants, it resulted in a decline in the plant manganese concentrations. Fertilizer management of cranberry is complicated, given the very acidic nature of the wetlands used for production. High levels of aluminum in the soil under these conditions interfere with phosphorus availability and crop growth.

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