RESEARCH CLUSTER 3 PROJECTS
PLAIN LANGUAGE SUMMARIES

For more details, click **here** to access COHA's Research Cluster 3 webpage

Better production practices for better thrips control

Changing production practices to increase plant health and production efficiency in floriculture crops

Dr. Rose Buitenhuis – Vineland Research and Innovation Centre

Pests, such as thrips, are a major problem for floriculture crops. Thrips are attracted to and perform better on plants that are high in nitrogen – one of the main ingredients in standard fertilizer. This project is looking at ways to reduce fertilizer use and make floriculture crops less susceptible to thrips infestations while avoiding impacts on plant growth. Research conducted so far confirmed that reduced fertilizer use can indeed lead to less thrips, but this effect is overshadowed by the effect of different chrysanthemum varieties. Also, a few biostimulant products were tested, but these could not compensate for reduced fertilizer use.

Helping turf managers reduce fertilizer use and impacts on water

Optimizing turfgrass fertilization to reduce nitrate losses through leaching

Dr. Yves Desjardins & Dr. Guillaume Grégoire – Université Laval

Leaching of fertilizer nutrients into groundwater is a great concern for sod growers and turf managers. This project is looking at ways to improve fertilizer efficiency for turfgrass to reduce nitrate losses through leaching. Research conducted so far has shown that it is possible to maintain high quality turfgrass while reducing risks to water quality with minimal nitrate leaching. New protocols led to nitrate levels well below the Canadian standard for drinkable water.

Less water and high-quality plants with precision irrigation

Irrigation efficiency in nurseries: towards a more sustainable approach

Dr. Charles Goulet – Université Laval

Irrigation is one of the most important factors for nursery profitability. Yet, most growers base their decision making on visual appearance or pot weight. This project is looking to optimize irrigation management using wireless tensiometers combined with different automation strategies to develop recommendations and best practices for clustering plants in nurseries. Research conducted so far has shown 50% less water used with tensiometers with no effect on plant growth, confirming that automated irrigation can be used to produce high quality plants. While clustering according to water needs is an efficient approach to reduce water use, attention must be paid when pairing the plants as different species with the same overall water needs may not require the same amount of water at the same time during a season.

Innovations for removing chemicals from recycled greenhouse water

Enabling recirculation with hybrid treatment systems

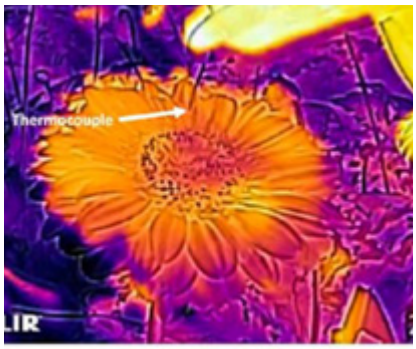
Dr. Ann Huber – Soil Resource Group

Water recycling has now become a necessity for lowering water consumption in greenhouses. Recycled water poses some risks and challenges. Recirculating water can contain residual nutrients, Plant Growth Regulators (PGRs), pesticides, and even pathogens that could contaminate crops. This project is looking at how well different media can remove common greenhouse chemicals from water to optimize the design of a Hybrid Treatment System (HTS) using woodchips, and a selection of mineral media including pea gravel, slag, wollastonite, and granular activated carbon (GAC) depending on grower requirements. Research conducted so far has shown that woodchips are almost as good as GAC for removing PGRs and many pesticides. Hydraulic retention time needs to be longer to remove pathogens compared to chemicals. Depending on the requirements, mineral cells can also be selected to remove chemicals and reoxygenate the water in a full system.

Does the temperature within a plant affect its growth?

Temperatures within horticultural plants: Stems and Flowers – explaining rapid growth

Dr. Peter Kevan – University of Guelph



The role of climate and weather is well-understood for growth and productivity of horticultural crops, both outdoors and indoors. Thermal conditions that develop within plants (microthermal regimes) are poorly researched and understood. This project is reviewing and exploring temperature cycles within plants and looking at how they might be manipulated to enhance commercial value and decrease risks, like disease and pests. Research conducted so far shows that internal temperatures within plant structures (flowers, stems and fruits) are several degrees warmer than surrounding ambient air in sunny conditions – this phenomenon is known as a micro-greenhouse effect – and this is much more widespread and biodiverse than previously thought. Micro-greenhouse effects occur through plant pubescence and in enclosed spaces (like hollow buds, flowers, fruits, stems, and galls). These effects do not apply at night or under cloudy conditions. The micro-greenhouse effects can be explained through structure and function. The extent of the effects in flowers and stems of several floricultural species (Gerbera, Amaryllus, Narcissus, squash), fruits (ground cherry, black cumin, peppers, prickly cucumber, milkweed), and other hollow, translucent plant structures is still being investigated. Structure is probably important for understanding how heat should be re-assessed for crop growth, maturation, and productivity, especially with climate change.

Giving Canadian sod growers a competitive advantage!

Integrating a genetic, agronomic, and economic approach to improving environmental adaptability and end use quality of creeping red fescue

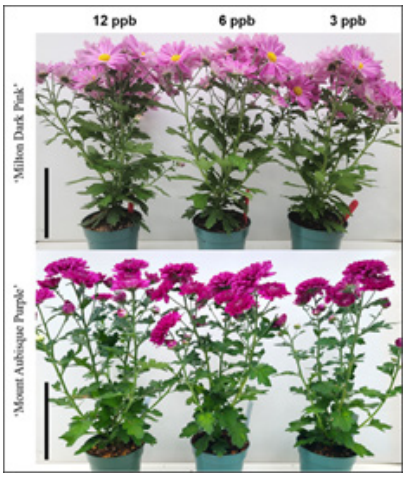
Dr. Nityananda Khanal – Agriculture and Agri-Food Canada & Alberta Agriculture and Forestry

Creeping red fescue is a major export commodity for Canada. Currently, our seed production is lower than our main competitors. Research is focused on improving the global competitiveness of Canadian growers. This project is looking at ways for breeding creeping red fescue to become more resistant to disease and easily adaptable to different environments, how to improve seed productivity and quality, as well as the economics of changing the way we manage seed crops. One cycle of breeding selection has led to polycross seeds being used for a new cycle of selection.

Cut nutrient inputs with sub-irrigation and drip-irrigation

Optimizing nutrient delivery in greenhouse-grown potted chrysanthemums: Sub-irrigation and drip-irrigation systems

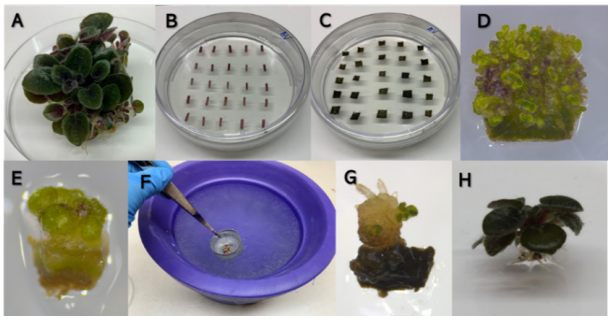
Dr. Barry Shelp – University of Guelph



Growers are often looking for ways to improve nutrient delivery – to be more efficient with nutrient input without affecting plant growth or quality. This project optimized the delivery of both macro- and micronutrients to sub-irrigated and drip-irrigated potted chrysanthemums. Research demonstrated that the entire nutrient supply can be removed during flowering, without affecting plant and flower yield and quality at harvest. Subsequently, it was shown that the supply of individual nutrients during vegetative growth can be reduced by 75% or more based on industry standards using subirrigation without any negative effect. From this information, an optimized fertilizer protocol was designed and tested successfully with both sub-irrigation and drip-irrigation systems. This project improves timing and reduces fertilizer supply, reduces volume of nutrient-rich feedwater for treatment or discharge, and reduces environment risk, contributing to low-input floricultural operations. It is believed that this strategy can be applied to other greenhouse crops.

New flower varieties thrive with less water and less fertilization

Integrated techniques for efficient breeding, production, and transplant survival of unique ornamental species



Dr. Alan Sullivan & Dr. Praveen Saxena – University of Guelph

The ornamental horticulture sector needs to reduce its municipal water consumption and limit the use of fertilizers that cause pollution. It also needs to quickly produce cultivars for rapid commercialization and keep plants alive and healthy during this process. Research is focused on improving breeding, production, and transplantation. This project is looking to breed new varieties that are adapted to low water and nutrient environments. It is also using micropropagation for low-cost rapid production and cryopreservation for disease-free transplantation. Research conducted so far has successfully produced new selections that survives well with low water and low nutrients. Also, it has enhanced the way we use cryopreservation by adding melatonin and serotonin for better growth after clod stresses. A tissue culture protocol for rapid release is underway.

Improving irrigation pond water quality for reuse

Minimizing horticultural impacts on surface water quality to encourage re-use through enhanced pond management

Dr. Jeanine West – Phytoserv

Recycling irrigation water can lead to poor water quality and excessive biological growth in ponds. This can mean poor quality water or expensive maintenance costs to clean out ponds and/or repair clogged intake filters for irrigation. Research was geared towards better management of irrigation ponds. This project evaluated in-pond technologies as well as pre-pond treatments to improve water quality. Research conducted so far has shown that preventing nutrients from reaching the pond is the most important practice, with a woodchip and slag hybrid treatment swale showing promise for preventing nutrient runoff. Where pond quality is compromised, covering ponds is successful at decreasing levels of phytoplankton while aeration is effective for breaking down organic matter.

LEDs are more efficient and longer-lasting than conventional lighting

Use of LEDs to improve ornamental crop production

Dr. Youbin Zheng – University of Guelph

Light-Emitting Diodes (LEDs) have gained wide acceptance in greenhouse ornamental, vegetable, and indoor leafy green production. There is still much to learn on how best to use LED technologies for indoor plant propagation and production. Research was focused on validating the replacing of HPS conventional lighting with LED technology. This project was looking at how light conditions affect seed germination, how different light qualities impact stock plants, and how effective pre-finishing LED treatments are for making plants more robust for shipping. Research conducted so far has found that LEDs are more efficient than HPS. They last 2 – 4 times longer and allow for narrower fixture designs that cast less shadow when used in the greenhouse. Also, LED allows for more complex lighting functionalities to be used.