Agricultural & Forestry Experiment Station
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Agroborealis

Fall 2017 Research Highlights

## Greenhouse production

*Research focuses on growing food crops and how lighting affects plant growth*

Meriam Karlsson's research focuses on greenhouse and controlled environment crop production and resource management in commercial greenhouses.

The University of Alaska Fairbanks horticulture professor has studied a diverse array of flowers and vegetables to see under what conditions they grow best. Because of the current interest in food crops, much of her work concerns greenhouse food production.

Her office is a few steps down the hall from the greenhouse where she conducts her research, on the south side of the Arctic Health Research Building.

Cucumbers and tomatoes grow successfully in Alaska greenhouses, and Karlsson believes that bell peppers could be another potential commercial crop. For the past three years, she has researched the best methods for growing them. To optimize greenhouse space and productivity, the plants are commonly trellised, with two lateral branches. Karlsson looked at how pruning the lateral branches affected the production on six cultivars of red, orange and yellow peppers.

This past summer, she and a research assistant thinned blossoms on three varieties of red, orange and yellow peppers to see if they could get a more uniform fruit load and more consistent production. The peppers were counted and weighed. Thinning blossoms did result in more consistent production

Found online at: www.uaf.edu/snre/agroborealis

About the photo:
Meriam Karlsson is researching the best methods to grow bell peppers as a commercial greenhouse crop. She is also comparing the nutritional value of Alaska-grown produce.

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and, surprisingly, did not decrease the yield, she said. More research is needed to understand how to best optimize the growth of bell peppers, she feels.

This past summer, as part of a state agricultural grant, she also looked at the nutritional value of locally produced vegetables compared to imported vegetables in grocery stores.

"Although the common feeling is that Alaska-grown vegetables have a high sugar content, there was really no good data to support that," she said.

In particular, she is analyzing the sugar and mineral content in different varieties of tomatoes, peppers, romaine and leaf lettuce, cucumbers and kale. She grew some of the produce in greenhouses and some was purchased from farmers markets. The locally grown produce is being compared to similar varieties grown Outside and purchased from Fred Meyer and Safeway. A research assistant bought vegetables six times this summer, every two weeks starting in June, and she continued buying into September.

The Brix, or sugar content, of vegetables was evaluated in a fairly simple test, by placing sap from the vegetables into a digital refractometer. Minerals are being analyzed through a more complex chemical process. Samples are dried and ground, and a mixture of water and acid is added. The samples are being tested with a method called optical emission spectroscopy. Among the minerals to be checked are magnesium, calcium, iron, potassium and phosphorus.

The mineral results are not available yet, but Karlsson said preliminary results show that compared to vegetables from Outside, the sugar values of tomatoes and peppers, in particular, are significantly higher in produce grown in the university greenhouse or purchased from the farmers market.

"It's looking like Alaska grown has, as we expected, higher sugar content," she said. "And now we have the supporting data."

Karlsson also studies greenhouse resource management. Because Alaska greenhouses depend on a lot of supplemental lighting, she is studying LEDs, or light-emitting diodes, which use less energy but provide a different quality of light than traditional sodium lights. She is also looking at how different combinations of LED lights affect production.

Meriam Karlsson is studying the effects of different colors of LED lighting on plant growth.

Could LED lights help grow spinach, which tends to bolt in the long daylight hours of Alaska summers? Blue LED lights especially tend to suppress or delay flowering in spinach, and Karlsson is looking at whether seedlings grown under LED lighting can be successfully transplanted and grown outdoors. LEDs could also be used in greenhouses to grow spinach quickly without flower formation throughout the year.

Much remains to be known about what combinations of light affect production, but the LED lights can be used differently than sodium light since they don't produce as much heat. They can be placed closer to the plants within the canopies.

If LEDs can be used successfully here, that would also result in energy savings because of the greater need for lighting compared to elsewhere. "LEDs may make a difference in Iowa but an even bigger difference here," Karlsson said.

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