

NCERA-101 Station Report April - 2007
University of Alaska Fairbanks
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New facilities and Equipment

A controlled environment agriculture lab (CEAL) has been completed on the UAF campus. This facility has approximately 1,500 square feet of growing area using only artificial lighting. Various lamp types, combinations and arrangements will be evaluated here as they apply to northern greenhouse and controlled environment conditions.

Accomplishment Summaries

Geothermal resources are used for generation of electric power and heating in a collaborative project with Chena Hot Springs Resort (CHSR) located 60 miles northeast of Fairbanks. Two recently constructed greenhouses (40' x 60') are used to continuously produce tomatoes and lettuce throughout the year with exclusively geothermal power and heating. Due to the far north location, year round production poses challenges as to environmental controls, off-season production protocols, scheduling, cultivar selections, harvesting techniques, packaging and marketing. Additional greenhouse area is planned for increased production to allow local marketing beyond the restaurant and catering needs of CHSR.

High tunnels have been evaluated for improving and extending the short growing season. Various crops including leafy greens, various types of lettuce, snap beans, peppers, onions, potatoes and culinary herbs have performed well. The high tunnel results suggest opportunities to produce cultivars not fully adapted to high latitude seasonal conditions. For instance the snap beans 'Provider' and 'Concesa' were planted sequentially throughout the seasons of 2005 and 2006. 'Provider' is a snap bean less preferred by consumers but well adapted to northern conditions while 'Concesa' is a frost tender high quality green bean. July 2005 air temperatures averaged 2°C higher than historical records, although the end of season frost occurred on September 2. Cold weather with unseasonably late frost (4 June) slowed crop production in 2006. 'Provider' produced significantly more ($2.54 \pm 1.27 \text{ kg}\cdot\text{m}^{-2}$) than 'Concesa' ($1.12 \pm 0.81 \text{ kg}\cdot\text{m}^{-2}$). The high tunnel environment favorably supported 'Concesa' compared to the field in both years. Despite the colder 2006 season, the harvest of 'Concesa' beans was similar ($1.8 \pm 0.06 \text{ kg}\cdot\text{m}^{-2}$) to the 2005 season in the protection of the high tunnel.

Impact Statements:

A general public desire to support locally grown and advantages such as freshness, quality and specialty crops are opportunities for marketing Alaska produce. High tunnels have been shown a successful regional management technique to improve and overcome seasonal inconsistencies in

field production of snap beans, strawberries and other crops for high value specialty local markets. Several local growers are now using high tunnels for consistent, quality and increased production to capture premium marketing and price opportunities.

Due to the extreme conditions of high latitude areas, controlled environments are required for year round local production. Geothermal, waste or other alternative energy sources are and will be necessary to run these facilities. The approach developed in collaboration with CHRS to use geothermal or waste heat for greenhouse and controlled environment production is adaptable for rural communities of various sizes in Alaska and other areas.

Published written works

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Karlsson, M. 2006. Greenhouse tomato production for Alaska. *Agroborealis* 38:28-30.

Leiner, R., H. Geier and M. Karlsson. 2006. Restaurant interviews to determine demand for baby greens in Alaska. AFES Miscellaneous Publication 2006-02. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks.

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Rader, H. and M. Karlsson. 2006. High tunnels for high latitude snap bean production. *HortScience* 41:1074. (Abst.)

Scientific and outreach oral presentations

Karlsson, M.G. 2006. Geothermal direct use applications, greenhouse production. Alaska geothermal conference, August 21-22, Chena Hot Springs Resort.