

## **Proceedings for the Pacific Northwest Vegetable Association Conference:**

### **Climate Friendly Farming™**

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#### *Why does climate change matter to you?*

Recent predictions by the University of Washington's Climate Impacts Group (as published in Science Magazine) indicate that climate change could have severe consequences for water resources in the Pacific Northwest (Service 2004). The Cascade snow packs could be reduced by as much as 60% in the next 50 years, reducing the reservoir of stored water for irrigation, hydro-elect power, fish and residential needs. This concern is further complicated by the likelihood of shorter winters, more erratic precipitation events, longer droughts and the movement of the peak snowpack earlier in the spring. The snow pack makes up 75% of all water in streams in the West and decreased snow pack could reduce stream flows by 20 – 50% in the summertime. Dr. Phil Mote, Washington's state climatologist, emphasizes that impacts of climate change are not only a risk in the future. His research shows that we have already lost of average of 30% of the Cascade snow packs in the last 50 years – in spite of increased precipitation. In parts of the Oregon Cascades – the loss has been 100% (Welch 2004). Economists have predicted that snowpack losses in California could reduce the value of irrigated agricultural land by as much as 15% (Service 2004)

What was once considered an innocuous gas just 30 years ago has now become the major culprit in changing the chemical composition of the atmosphere. Scientists are only now considering carbon dioxide (CO<sub>2</sub>) a major pollutant. "Greenhouse gases" like carbon dioxide are labeled as such because they increase the heat from the sun that is trapped in earth's atmosphere – much like the glass on a greenhouse – instead of allowing it to radiate back into space. Key greenhouse gases from agriculture include not only carbon dioxide, but also methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O). Levels of these gases have varied over geologic time, but in the last 250 years CO<sub>2</sub> has increased in atmospheric concentration by 31%, CH<sub>4</sub> by 151% and N<sub>2</sub>O by 17% (IPCC 2001). The speed of change of these gas is the greatest concern, since it limits the ability of humans and other species to adapt, and increases the likelihood of sudden, unpredictable climate changes that could be catastrophic. With our current understanding and technology, our society must quickly find ways to reduce greenhouse gas emissions and adapt to impending changes. As indicated by the predictions of water impacts in the Pacific Northwest, agriculture could suffer significant losses if actions are not taken soon.

An August article in Business Week magazine stated "Consensus is growing among scientists, governments, and business that they must act fast to combat climate change . . . many companies are now preparing for a carbon-constrained world" (Carey and Shapiro 2004). The article goes on to discuss "ancillary benefits" that many of these companies have discovered while

attempting to curb emissions – such as increased operational efficiency, financial savings, and the development of new, marketable technologies! Rather than being a burdensome cost, meeting the challenge of climate change has made many companies and industries financially stronger and better prepared for the future. Washington State University's Center for Sustaining Agriculture & Natural Resources has a new research project helping farmers develop and implement agricultural systems and practices that mitigate global climate change.

### *The Climate Friendly Research Project: Adaptation and Mitigation*

The irrigated component of the Climate Friendly Farming Project is focused on three elements: 1) the potential of irrigated crop lands to sequester carbon from the atmosphere at a rate greater than that possible in dryland farming, 2) reducing emissions of N<sub>2</sub>O from irrigated soils by improving nitrogen use efficiency, and 3) researching the potential of adding oilseed crops to high-value vegetable production as a feedstock for a biofuels industry. The research lead for the irrigated component of the project is Hal Collins, USDA Agricultural Research Service in Prosser.

Two long-term cropping systems experiments have been established to evaluate the sustainability of reduced-till, and conventional till cropping systems and the use of fall-planted cover crops in irrigated rotations. The major focus of this research is to evaluate the sustainability of the irrigated production systems by measuring agronomic performance, soil quality, nutrient dynamics, soil biological activity and determine and understand the mechanisms controlling carbon and nitrogen cycling and trace gas (CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>) fluxes under reduced tillage in irrigated cropping systems. This research will provide a greater understanding of the relative sustainability of conventional and alternative 'climate friendly' cropping systems, identify key challenges to increased sustainability, and develop a better understanding of mechanisms controlling ecological processes. This research utilizes intensive measurements and modeling of energy, water, carbon, and nitrogen-related processes that assess management and environmental controls over seasonal dynamics. Specific management practices evaluated in irrigated cropping systems include low disturbance systems (conservation tillage and no-tillage), water and energy conservation practices (reduced tillage, water conservation), crop diversification (use of cover crops, perennial crops) and precision agriculture applications (water, nitrogen, crop diversity). We are implementing field demonstrations of the most promising systems on working farms and are monitoring the performance, both biologically and economically, for comparison with the projections. The results of this research will lead to both adaptation to climate impacts (improved water use efficiency) and mitigation (reduced greenhouse gas emissions through improved nitrogen management).

In the spring of the 2004 growing season a project was established to assess the inclusion of oil seed crops in irrigated cropping systems of the Pacific Northwest. The objective is to identify potential benefits of increased soil carbon sequestration under conservation tillage systems, and to evaluate the potential for biodiesel production in the Pacific Northwest. The field data, along with biodiesel emission statistics, will allow assessment of greenhouse gas emission reduction and carbon sequestration potential for a full-scale biofuels industry in the Pacific Northwest and determine the economic value of these benefits based on greenhouse gas reduction requirements.

A likely market for biofuels is within agriculture itself. Low-cost alternative fuels, such as biodiesel, can be used to power farm tractors and small agricultural production and processing facilities within rural communities. Pacific Northwest biofuels production has the potential for assisting rural and farm development, aiding our national security through increased reliance on domestic renewable energy, and improving upon existing environmental concerns such as greenhouse gas emissions. Development of crushing and processing plants for biodiesel, in particular, within the region could effectively add to state and, in particular, rural and farm economies by utilizing area commodities through the creation of a new job related infrastructure. Biodiesel includes fuels derived from corn soybeans, sunflower seed, cottonseed, canola and rape seed, crambe, safflower, flaxseed, and mustard seed, each of which could be grown in rotation with high-value vegetables. Biofuels are a key for mitigating climate change, because in addition to their benefit in reducing greenhouse gas emissions in cropping systems, they also offset the combustion of fossil fuels.

*How can you become involved?*

The Climate Friendly Farming Project has an active extension program. We host annual field days, a website with the latest project updates and research, as well as workshops and presentations. We are also partnering with other key stakeholders in supporting the development of a biofuels industry which benefits growers and local communities through research and outreach. You can visit our project website at <http://cff.wsu.edu>. Research team members are encouraging participation in the project by interested growers and other stakeholders.

Another developing opportunity that irrigated producers should be aware of is the USDA's new Conservation Security Program (CSP). CSP is a new entitlement program authorized by Congress in the 2002 farm bill, which makes payments to farmers for using conservation-based farming systems and practices. While the program has yet to be fully funded, it has been piloted this year in 17 watersheds in the US, including the Moses Coulee watershed in Washington. As pressure on our current government support programs from international trade agreements and concerned tax payers increase, it seems more and more likely that the US will need to shift public support for agriculture away from price supports for commodities to a program like CSP. This provides a new opportunity for irrigated vegetable producers to be eligible for public financial incentives. Most of the irrigated 'climate friendly' farming practices and systems we are researching should be eligible for payments if the program is fully funded. For more information on CSP, visit the USDA's Natural Resources Conservation Service web site for Washington state (<http://www.wa.nrcs.usda.gov/programs/csp/csp.html>) or view the Center for Rural Affairs' CSP fact sheet at [http://www.cfra.org/pdf/CSP\\_Fact\\_Sheet.pdf](http://www.cfra.org/pdf/CSP_Fact_Sheet.pdf).

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