

PROGRESS REPORT: Organic Cropping Research for the Northwest

TITLE: Evaluating Vegetable Varieties for Organic Systems

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DATE (period which report covers): January – November 2006

KEYWORDS: organic, icebox watermelon, winter lettuce, variety trial, crop diversification

ABSTRACT: Farmers in Washington are looking to diversify crops to meet demand for organic, local and direct market production. Two crops that can meet these needs are icebox watermelons and winter-grown greens. Icebox watermelons tend to be earlier maturing than picnic watermelon varieties, and thus offer farmers throughout Washington a means of producing high quality watermelons locally. At WSU Vancouver REU we evaluated 44 varieties of icebox watermelon in 2004, 101 varieties in 2005 and 117 varieties in 2006. In 2006 we also evaluated 5 varieties in Pullman and 10 varieties in Mount Vernon. Results from our large variety trial at WSU VREU indicate that 70 varieties matured relatively early enough (<90 days), making them productive in our region, while at Pullman and Mount Vernon more testing is needed to determine which varieties are best suited for those areas. In our previous studies we showed that more than 30 lettuce varieties could be grown in the winter at WSU VREU in a field hoophouse. In 2005-06 we initiated a study at WSU VREU and in Pullman to evaluate the productivity and quality of 25 varieties of winter-grown lettuce and Asian greens in an unheated, unlit field hoophouse. Preliminary results indicate that all varieties can be grown successfully at both locations, though time to harvest and head size differs for each. Varieties also differed in nitrate content, which has an impact on human health and food quality.

OBJECTIVES:

1. Evaluate watermelon varieties for yield, fruit size, fruit number, sugar content, taste, and number of days to maturity.
2. Evaluate winter-grown lettuce and Asian greens varieties for yield, number of days to maturity and nitrate content in a field hoophouse.

PROCEDURES: These studies were conducted at Washington State University Vancouver Research and Extension Unit in 2004, 2005 and 2006 and in Mount Vernon and Pullman in 2006.

Icebox Watermelon. We evaluated 44 varieties of icebox watermelon in 2004, 101 varieties in 2005 and 117 varieties in 2006. In addition, in 2006 we evaluated 5 varieties in Pullman and 10 varieties in Mount Vernon. At all locations, the greenhouse for transplant production was managed organically and varieties were evaluated in a certified organic field. The study design was a randomized complete block with 3 replications in Vancouver, 2 replications in Mount Vernon and 1 plot in Pullman. Plots were single rows, 21 feet long, with 7 plants per plot. Spacing was three feet between plants in the rows, and 10 feet between rows. Varieties were seeded in the greenhouse in mid April and transplanted into the field on May 26, 2004, June 6, 2005 and June 1, 2006. Rows were mulched with black plastic (1.0 mil), with drip tape beneath. Plants were drip-irrigated at the rate of 1-inch per week. Fertilizer was applied 4 times throughout the growing season through the irrigation system (fertigated). Ripe fruits were harvested twice weekly from August 12 to October 4, 2004, August 22 to September 28, 2005 and August 8 to October 13, 2006. Harvested melons were measured for weight, length and width, and number of fruit per plot. After each harvest, one melon per plot was measured for percentage of soluble solids using a Brix meter. The percent of soluble solids is an estimate of sugars, and is used to evaluate ripeness and flavor.

Winter-grown Greens. Three plantings of 25 varieties of lettuce and Asian greens were planted on November 9, November 23 and December 7 in Vancouver and Pullman. Crops were transplanted 4-5 weeks after seeding into a field hoop house. The experimental design was a randomized complete block with 4 replications and each plot contained 2 plants. Spacing between plants in the row was 12 inches and spacing between rows was 12 inches.

Table 1. Seeding, transplanting and harvest dates in Vancouver and Pullman in 2005-06.

<u>Planting</u>	<u>Seeding</u>	<u>Transplanting</u>	<u>Harvest</u>
1	Nov. 9	Dec. 14	Jan. 18 – Feb. 15
2	Nov. 23	Dec. 21	Mar. 1 – 22
3	Dec. 7	Jan. 4	Mar. 8 – Apr. 5

Seedlings in the greenhouse and plants in the hoop house were watered daily as needed. Plants were fertilized at transplanting and every 3 weeks thereafter. Fertilizer was soluble fish powder (Mermaid 12-0.25-1) and soluble seaweed extract powder (Acadian 1-0-4 w/ trace minerals), and was applied at a rate of 5 lb/A and 3 lb/A, respectively. Two weeks prior to each transplanting, compost was applied to the bed in the hoop house at the rate of 37 cubic feet per 200 square feet (2-3 inches) and incorporated to 4 inches. Soil and compost samples were collected prior to compost application, and soil samples were also collected at transplanting and at harvest. Soil temperature was measured at the soil surface and at a 2-inch depth in the soil inside and outside the hoop house with Hobo temperature monitors. Temperature was measured once an hour.

Varieties were harvested as soon as they reached a marketable stage for salad mix. Samples were stored in a cooler (40° F) while sampling was conducted in the lab. Whole plant samples were weighed (g) to determine yield potential. Inner outer leaves were then removed, main ribs were pressed, and nitrate (mg/l) was measured with a Cardy meter. Samples were dried and analyzed for nitrates (mg/kg).

PROGRESS TOWARDS OBJECTIVES:

Icebox Watermelon. A full copy of our icebox watermelon report will be available on our website, <http://vegetables.wsu.edu/Watermelon.htm>. In Vancouver, over 70 varieties were harvested prior to September 1 (91 days after transplanting). In Mount Vernon, plant productivity was low and only 3 out of 10 varieties reached maturity. In Pullman, 4 out of 5 varieties reached maturity. More testing is needed in Pullman and Mount Vernon to determine which varieties are best suited for those areas.

There is great diversity among varieties in fruit yield, number, color, sugar content, flavor, size, and length of growing season. In marketing studies, we found that preferences for fruit taste and appearance vary among different consumer groups, and growers who are considering production should test several varieties for productivity and preferences in their area. In both Vancouver and Pullman, customer and farmer feedback indicates that fruit size of 10 lbs or less is preferred for farmers market and CSA sales.

Melon weight is used to distinguish between market groups of watermelon (personal/mini, icebox , or picnic), and traditionally, icebox watermelons are considered to be between 8 and 12 lbs. However, in this study we found that a large number of varieties produced an average melon weight between 6 and 8 lbs, but showed average lengths and widths that correspond with the general size concept of an icebox type. Based on these results, we suggest that the categories for watermelon should be: personal/mini (<6 lbs), icebox (6-12 lbs), and picnic (>12 lbs).

We collaborated with a farmer-vendor at each of 3 farmers' markets in Battle Ground, Vancouver and Moscow. Also, the WSU Organic Farm in Pullman (where our plots were located) included one watermelon fruit in each CSA share box. At Battleground, where this was the second year that we cooperated with a farm vendor, customers requested yellow-fleshed fruit as often as red-fleshed fruit at the beginning of the season. In Vancouver, where we supplied a large number of fruit throughout the season, customers were initially resistant to yellow-flesh fruit but by the end of the season, the request for yellow-fleshed fruit was equivalent to that of red-fleshed fruit. Most people indicated they had never before seen white or yellow-fleshed watermelons, they were unfamiliar with the diversity of flavor and sweetness, and they did not know that icebox varieties could be grown successfully in our region.

A major challenge faced by organic growers is obtaining organic or untreated seed. Although placing a seed order early may help to ensure that untreated seed will be available, we have found it to be no guarantee, especially when the seed order is relatively small (less than 5 lbs). It is only through increased demand for untreated and organic seed that seed companies will begin to fill this need. It is work such as this study that has the potential to help increase demand for organic and untreated seed which will then result in increased availability of this seed.

Winter Lettuce. This study is being conducted by an M.S. student. All field data has been collected for the 2005-06 season but sample nitrate analysis is not yet complete. Based on preliminary Cardy meter readings, outer leaves appear to have higher nitrate concentration than inner leaves. At this time there are no results to report, but the study is being repeated in 2006-07 with funding from the CSANR BIOAg program. The student is on track with her work and the methods are being refined as the work progresses. As a result of this trial, our farmer-cooperator

in Pullman, Brad Jaeckel, applied for and received a Grower/Rancher SARE grant to investigate the production potential for winter-grown greens.

OUTPUTS:

Field day WSU Vancouver REU August 30, 2006. 200 attendees. In addition, 2 farmers and their crews and 2 agricultural classes (Evergreen State College and CASEE Center) visited the field plots.

Farmers' Market test market, Battle Ground, Vancouver and Moscow. Approximately 200 customers. Also, the WSU Organic Farm in Pullman included one fruit in a CSA share box.

Miles, C., K. Kolker, T. Smith, J. Reed, G. Becker, and C. Adams. 2006. Icebox watermelon variety trial in Western Washington. Hortscience 41(4):1014.

Icebox Watermelon, <http://vegetables.wsu.edu/Watermelon.htm>. This page includes a brief introduction to icebox watermelons, our 2005 report (2006 report is not yet complete), and a page that includes a photograph and description of each variety in our trial.

Watermelon Description Table. <http://vegetables.wsu.edu/WatermelonTable.pdf>. Includes mean data from 2004-2005; mean with 2006 data is being calculated.

Winter Lettuce, <http://agsyst.wsu.edu/WinterLettuce.htm>. Currently includes a description of lettuce types, and a report of 2004-05.

IMPACT: At the 3 farmers markets, we introduced approximately 200 people to a wide diversity of watermelons, all locally produced. Customers purchased watermelons from the cooperating vendors and demand in Pullman exceeded supply. Preferences for fruit taste and appearance vary among different consumer groups, and growers who are considering production should test several varieties for productivity and taste preferences in their area. Preferred fruit size for farmers markets and CSA farms is 10 lbs or less.

INSTITUTION: Washington State University

STATE: Washington

FUNDING SOURCE(S): CSANR Organic Cropping Research for the Northwest

FUNDING AMOUNT(S): \$39,097

ORGANIC RESEARCH LAND (indicate number of acres on all that apply):

Station	_____ non-organic	_____ transitional	_____ <u>2</u> certified
On-farm	_____ non-organic	_____ transitional	_____ certified

FARMER COOPERATOR(S): Number 3

Name(s) Brenda Stanton, Battle Ground; Brad Jaeckel,
Pullman/Moscow; Michael and Missy Stucky, Vancouver