round in the Mid-Atlantic region using a combination of suitable genotypes and season extension technology. The objective of this comprehensive lettuce evaluation was to examine heat and cold tolerance of diverse bibb and select romaine lettuces within West Virginia during 2012 using low and high tunnels for extended season production. Lettuce seed of 30 cultivars was acquired from several cooperating seed companies and seeded for transplants on 3 Apr., 3 July and 25 Sept. 2012. Plugs were hand-transplanted into rows on black or white plastic mulch within a high tunnel on 5 May, 6 Aug., and 7 Nov. 2012. The high tunnels were located in central West Virginia (37°N lat.) Each mature head was weighed and head diameter recorded. Bolting, flavor and tip burn incidence were noted for each variety. Shade cloth (≈50% black) was used for mid-summer lettuce production of select varieties. Row covers were used for winter high tunnel production. Storage quality of washed and unwashed bibb and romaine lettuce was also evaluated in September. Economic analysis of extended season lettuce production was conducted. The 2012 growing season had record high temperatures and was the warmest summer on record in West Virginia. The following lettuce cultivars performed very well across all planting dates: 'Australe', 'Buttercrunch', 'Coastal Star', 'Dancine', 'Helvius', 'Nancy', 'Nevada', 'Regina delle Ghiacciole', 'Rex,' 'Rouge Grenoblois', and 'Sierra'. 'Parella Rosa', 'Passion Brune', 'Brune D'Hiver', 'Regina di Maggio', and 'Quatro Staggioni' were not heat tolerant lettuce cultivars and bolted rapidly during the summer heat. Butterhead and romaine lettuce which was washed in chlorinated water and stored at 2 °C had excellent quality for more than 16 days. Head lettuce is a 60–80 day maturity crop depending on the season of the year. Thus it is possible to have as many as four lettuce crops per year in West Virginia. Estimates of profitability have shown lettuce can produce a net return of $1600–2700 per 1000 ft^2 within a high tunnel. A commercial high tunnel with approximately 2800 ft^2 could produce as many as 5400 single heads of lettuce per crop cycle.

(165) Fruit Yield and Composition as Functions of Grafting and Irrigation Regimen in an Organic High Tunnel System

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Grafting, rootstock (RS) and irrigation regimen effects on the yield and composition of tomato (*Solanum lycopersicon* L.) fruit taken from organic high tunnel plots were documented in 2009 and 2010. Four 5-week-aold scion (S; 'Cherokee Purple') seedlings were grafted, using the cleft method, to seedlings of two experimental rootstocks (314, 338) developed at OARDC. Ungrafted S control plants were also prepared. Grafted plants produced three-four new leaves during the healing phase and were scored and sorted according to quality and vigor. Thereafter, in late April of each year, a uniform subset of high quality plants were set into single-row, raised-bed, drip-irrigated, 6.5-m^2 plots containing 9 plants of a single genotype. Plots were replicated four times and arranged in a randomized complete block design within a 9 m x 24 m single poly-layer high tunnel. All plots were covered at the soil line by black, semi-permeable polyvinyl fabric and supplied by a standard drip irrigation line plumbed to operate independently from others within the different irrigation regimen. After being set, plants were pruned to the third node and trellised using a Florida stake and weave system. All plots were irrigated concurrently for the first 30–40 days after establishment, followed by the onset of flowering. Thereafter, irrigation events occurred every 3 ("standard") or 6 ("reduced") days depending on regimen with approximately 6.4 mm water delivered per event regardless of regimen. Irrigation in "standard" plots totaled approximately 12 cm over the final 60 d and 17 cm over the final 90 d of the study in 2009 and 2010, respectively. Total and marketable fruit yield (number, weight) were recorded at weekly–biweekly intervals 9 times in 2009 and 11 times in 2010 before fruit production and ripening stalled. Total and marketable yield were greater in grafted than ungrafted "standard" plots in both years and in "reduced" plots in 2009. Yield in "reduced" plots was unaffected by grafting in 2010, possibly due to two instances of water infiltration from rainfall-fed surface flow. Fruit Brix values were greater in grafted plants under both irrigation regimens in 2009 and in "standard" plots in 2010 but were lower in "reduced" plots in 2010. Brix values tended to increase through time in all treatments in both years. Fruit pH was unaffected by either grafting or irrigation regimen. Overall, the data suggest that water relations and fruiting characteristics may differ between grafted and ungrafted tomato plants.

Specified Source(s) of Funding: The Ohio State University; USDA–NIFA Integrated Organic Program

(166) Production and Quality of Grafted Watermelon Cultivars

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Grafting of seedlings is an emerging technique for watermelon production in many countries. Due to higher costs, the use of grafted seedlings can only be recommended if it provides clear biological and economic benefits. Since rootstock performance is influenced by compatibility with the cultivar, by the existing disease pressure, and by the climate conditions, it is necessary to evaluate rootstocks with predominant cultivars to appraise