Based on these results, we have identified productive and high quality varieties and breeding lines for further selection in the upper Midwest.

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Oral Session—Growth Chambers and Controlled Environments 3

Moderator: Hye-Ji Kim
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4:00–4:15 PM

Growth Promotion By a Microbial Biostimulant Depends on Application Frequency in Semi-protected Fall-to-Spring Lettuce Production in Ohio

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Microbial biostimulants (MBSs) contain one or more types of selected bacteria or fungi and other components and they are applied to enhance crop growth and/or tolerance of abiotic stress. Two sets of experience spur interest in MBSs among researchers, growers, and industry: 1) numerous scientific experiments demonstrating that pure cultures of individual strains can alter plant vegetative and fruiting parameters in controlled settings, and 2) MBS manufacturer and grower claims that MBSs can enhance farm productivity. Experience also indicates that MBS performance is context-dependent and that conditions under which they perform most consistently are not well understood. MBS effects under dynamic temperature, moisture, and other conditions common to fall- and springtime leafy vegetable production in semi-controlled settings in Ohio appear to be untested. The longevity of inoculant-derived microbes under these conditions and hence, optimal MBS application frequency, is also unclear. Therefore, we set out to determine whether fall-time MBS application enhances lettuce productivity fall and spring, whether these effects depend on application frequency, and whether soil microbial populations in inoculated and control plots differ long after treatment. A randomized complete block design with five replications was used. Organic 'Parris Island' lettuce seeds were sown on 5 Nov. 2015 at the OARDC at a rate of 9700 seeds/m^2 into five, 9.1 m x 1.2 m, wood-framed, un-heated raised beds covered with medium weight (34 $g \cdot m^{-2}$) floating row covers and 6-mil embossed greenhouse film overtop gothic-shaped frames. Certifiable-organic rooting medium in the 30 cm-high beds consisted of 30% peat moss, 20% parboiled rice hulls, 25% field soil, and 25% compost (by volume). "Biogenesis I NP Soil Amendment", containing 12 common beneficial rhizobacterial species, was applied as a drench up to four times: 1) none (control); 2) at seeding; 3) at seeding and two weeks thereafter; and 4) at seeding and at weeks two and four after seeding. Plants and rooting medium were collected on 16 Dec. 2015, and 25 Jan. 2016, to measure leaf fresh and dry weight and ºBrix and to estimate rhizospheric microbial populations. Soil and air temperatures within the tunnels were monitored with 'HOBO Pro V2 Temp/Ext-temp' dataloggers. At Harvest 1, leaf fresh and dry weight and estimated microbial populations, but not ºBrix, significantly increased with application frequency. At Harvest 2, however, only plots receiving four applications registered significantly greater fresh weight and ºBrix values and microbial populations were lower than at Harvest 1. Other parameters were unaffected.

4:14–4:30 PM

Seed Density, Fertilizer Concentration, Temperature, and Substrate Depth Effect on Three Microgreen Species of the Brassicaceae Family

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Microgreens are a young, tender and edible crop harvested shortly after emergence of the first true leaf. To date, insufficient published data exists on the influence of cultivation practices on plant yield, morphology, and nutritional composition of microgreens. The objective of this research is to determine the effects of varying seeding densities, fertilizer concentrations, ambient air temperatures, and substrate depths on the growth of microgreens. Four experiments were conducted to independently determine the influence of seeding density (1.1, 1.65, 2.2, 2.75, and 3.3 seeds/cm^2), fertilizer rate (0, 50, 100, 150, and 200 ppm N) at each irrigation, aerial temperature (14 °C, 18 °C, 20 °C, and 22 °C) from germination to harvest and substrate depth (1.8, 3.3, 4.3 and 5.8 cm). Trials were conducted using three species, mizuna (*Brassica rapa*), arugula (*Eruca sativa*) and mustard 'Garnet Giant' (*Brassica juncea*) in a glass greenhouse in Ithaca, NY, with temperature trials between the months of December and January. Measured parameters included fresh weight (FW), plant height, and dry weight (DW). Results were analyzed using linear and quadratic regression. Each experiment had between 8 and 12 replicates per treatment combination with a total of 3 experimental replications over time. For temperature trials, FW increased linearly for all three species as temperature increased from 14 °C to 20 °C with little to no further FW gain at 22 °C. Seed density trials showed that for all three species, FW increased in a significant quadratic fashion as seed density increased from 1.1 to 3.3 seeds/cm^2 with diminishing FW above 2.75 seeds/cm^2. In the analysis of varying substrate depths, arugula FW increased linearly as substrate depth increased from 1.8 to 5.8 cm. Mizuna was best fit by a quadratic regression with FW increasing as substrate depth increased from 1.8 to 5.8 cm. Evaluation of basic cultivation practices on the growth of these emerging crops is an