humidity levels. Our team has installed innovative University of California Davis (UC Davis)-invented solar dryers, which facilitate airflow and reduce drying times while improving the quality of dried products. Seasonal flooding and expansion of aquaculture reduce the availability of suitable locations for family gardens which provide safe and nutritious vegetables and herbs. A bamboo raft was designed to hold soilless media for vegetable production, and these are floated in the sunny part of fishponds. This technology can combat food insecurity when water levels in the region rise by providing small plant-growing platforms that can be used even during the rainy season. Our team gathers an extensive number of data points including inputs and outputs to extrapolate the profitability prerequisites and potentials for each technology using a UC Davis-developed model. Based on the preliminary data of this ongoing study, the implementation, operation and scaling of the above technologies supports household nutrition, adequate quality and quantity of food intake, and can potentially reduce illness while supporting inclusive economic development.

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Organic Horticulture 1

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10:00 AM – 10:15 AM

A Pilot Study of Using Sunn Hemp Biomass for Anaerobic Soil Disinfestation in Organic Pac Choi Production

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Anaerobic soil disinfestation (ASD), based upon supplying a labile carbon (C) source, tarping, and watering the soil to field capacity to achieve soil anaerobic conditions, has shown to be a promising strategy for controlling soil-borne plant pathogens and parasitic nematodes and to improve vegetable production. To test the effectiveness of a summer leguminous cover crop, sunn hemp, as a potential carbon source for ASD, a pilot study of organic pac choi production was conducted at the University of Florida Plant Science Research and Education Unit in Citra, FL during Fall 2017. Summer-planted sunn hemp was used as the carbon source for ASD treatment using two approaches: terminated and incorporated into the soil in situ (SH_I) versus aboveground biomass harvested and transported off site for soil incorporation (SHT). In addition, composted poultry litter (CPL) was incorporated with sunn hemp (SH + CPL) or without (SH) in the ASD treatments. A standard ASD treatment with molasses and CPL and an untreated control (UTC) were also included. The raised beds for pac choi planting were irrigated to saturation and covered with black totally impermeable film (TIF) to initiate a three-week ASD treatment beginning 19 Oct. 2017. Twenty-four-day-old pac choi seedlings were transplanted on 13 Nov. and the mature heads were harvested 38 days after planting. Two field trials each using a completely randomized design with four replications were conducted simultaneously. In trial 1, SHI+CPL, SHT, SHT+CPL, and the standard ASD had significantly greater yields than SHI and UTC. In trial 2, treatments that utilized CPL resulted in higher yields than treatments that included only the cover crop and UTC. Interestingly, yellow nutsedge, the predominant weed in the beds and planting holes, grew in significantly higher numbers in SHI+CPL compared to UTC and other treatments in trial 1, while both SHI and SHI+CPL had significantly greater nutsedge counts than UTC and other treatments in trial 2. The crop yield discrepancy between the two trials might have resulted from the different levels of weed pressure present in the field. Nevertheless, the potential of using sunn hemp biomass as a carbon source for ASD treatment deserves more in-depth studies, together with analysis of the contribution of sunn hemp to soil fertility and quality

Specified Source(s) of Funding: USDA-ARS

10:15 AM – 10:30 AM

Assessing the Influence of Microbe-containing Crop Biostimulants on Vegetable Crops and Farms through On-station and On-farm Study

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Commercial microbe-containing crop biostimulants are advertised to maintain or enhance crop growth, perhaps especially under sub-optimal conditions (e.g., drought, nutrient deficiency, high temperature). More than two-hundred such products ranging in composition (e.g., bacterial, fungal, both; cfu/ml) are currently available, complicating product selection. Regardless, to be effec-

tive, users must establish and maintain conditions supporting the plant-microbe interactions from which they seek to profit. These conditions are largely unknown, thereby: a) helping to explain the erratic and context-specific outcomes from inoculation in field and high tunnel settings reported to date, b) impeding key research, and c) slowing the transmission of related research-based recommendations for product use, all of which raise serious questions about the product category. In response, a program consisting of ongoing sets of integrated and complementary on-station and on-farm experiments (many involving a citizen-science/farmer-led approach) testing hypotheses specific to the effect of product composition, crop, application timing, application rate, and/or experimental setting on crop yield and quality was developed. Since 2015, program experiments have been completed in seven states (Iowa, Illinois, Michigan,Missouri, Ohio, Pennsylvania, and Tennessee), on fifteen farms and two research stations, on seven crops (broccoli, carrot, lettuce, pepper, spinach, squash, and tomato) grown in field or high tunnel settings, and with ten OMRI-listed products (Azos Blue, Biogenesis 1 TM NP, BioYield, EcoFungi, Environoc 401, Hydroguard, MycoApply All Purpose Granular, MycoApply Endomax Concentrated WP, Mycogenesis, NP Bioplin). Individual on-station experiments begin spring, summer, or fall with treatment factorials including multiple levels of product (e.g., four-six) and multiple levels of either rate or timing (e.g., seeding, transplanting, after transplanting), with plots arranged in a randomized complete design and applications made as a root-zone drench. On-farm experiments, however, while also collectively completed over much of each calendar year, involve fewer experimental variables and levels of each. To date, outcomes from standard statistical approaches common in product evaluations, variety trials, and cultural management comparisons show that significant increases in yield or quality have been rare, regardless of inoculation parameters or experimental conditions. When found, yield increases were most common following the application of mixed inocula (single products containing multiple species or strains of bacteria, fungi, or both) and typically below eight percent. Analysis of crop data using approaches (e.g., transformation) common in other areas of study in which skewed data are common (e.g., pathology, entomology, weed science) and economic analyses exploring the return on investment from microbe-containing crop biostimulant use are also underway.

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10:30 AM – 10:45 AM

Soil Balancing Effects on Specialty Crops and Their Soils, Weeds, Farms, and Growers

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Opinions on the "soil balancing" philosophy of soil management among growers and private- and public-sector grower advisors and researchers range wide and, so far, rarely achieve consensus. Proponents, including increasing numbers of specialty crop growers (many sustainable-organic) and some advisors, report that soil chemistry — specifically, percentages and ratios of calcium, magnesium, and potassium – can be altered through applications of lime, gypsum, and other materials to improve soil physics (tilth) and biology and, thereby, crop yield and qualitym and weed control. Investigators and other advisors, however, report that soil balancing claims are unsupported by the data (at minimum) and potentially injurious to farms (at worst). That disconnect is both a problematic trend and important opportunity. As part of a larger effort to understand the use and outcomes of soil balancing as practitioners do while also providing needed data, eight certified-organic main plots (17.1 m × 18.3 m) were established in 2015–18 at the OSU-OARDC in Wooster, OH. Main plots contained two (17.1 m × 9.1 m) subplots based on their having received an annual application of composted dairy manure every year since 2003 or no compost application. Three (5.3 m × 9.1 m) sub-subplots/subplot were created on June 11, 2015 by applying one of three soil amendment treatments: 1) gypsum (1681.5 kg·ha^{-1}), 2) potassium sulfate (560.5 kg·ha^{-1}), and 3) gypsum + potassium sulfate (same rates). Rock phosphate was also applied at 560.5 kg·ha^{-1} to minus-compost subplots. Treatment applications were repeated at the same locations each mid-May 2016–18. Sub-subplots were direct seeded with four rows of both edamame soybean and dwarf popcorn on 12 June 2015, 25 May 2016, and 23 May 2017, with edamame being reseeded on 21 June 2016 and 14 June 2017. Two rows of butternut squash were also direct-seeded into each sub-subplot on 18 June 2015, 31 May 32016, and 26 May 2017. All crops received multiple applications of fish fertilizer (analysis of 2–4–1) each season either by hand (edamame, popcorn) or via fertigation (squash). Percent stand, above-ground canopy development, mass of mature leaves at the onset of reproductive growth, and crop yield (total, marketable) and quality were recorded each year along with measures of soil macro- and micronutrient levels. Treatments have resulted in few significant differences in either plant growth, or crop yield or quality to date. Weed seedbank analysis and comprehensive assessments of grower attitudes and farm economics are also underway.

Specified Source(s) of Funding: USDA OREI

An asterisk (*) following a name indicates the presenting author.