2010 Organic Research Forum – Poster Summaries

http://www.mosesorganic.org/researchforum2010.html

Control of weed size by compost application rate in an organic cropping system

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Choosing the correct application rate for organic nutrient amendments like manure and compost is notoriously difficult due to variation in nutrient content and weather dependent variation in release of nutrients during the growing season. Consequently, risk-averse farmers frequently over-apply these amendments. To develop compost application recommendations and study the consequences of over-application, compost was applied at various rates during the first three years of a corn – soybean – spelt/red clover – corn organic crop rotation. During the fourth year, no plots received compost in order to examine the effects of residual fertility. Two types of compost were used in side-by-side experiments: a highly soluble compost derived from chicken manure, and a high organic matter compost made from chicken manure with an added carbon source. Application rates varied with crop-year but were consistently 0, 0.25, 0.5, 1.0 and 2.0 times the recommended fertility rate for the limiting nutrient for a given crop. Giant foxtail (*Setaria faberi*), common ragweed (*Ambrosia artemisiifolia*), common lambsquarters (*Chenopodium album*), and Powell amaranth (*Amaranthus powellii*) all increased significantly in size in responses to compost rate in two or more years. In most cases, the response was linear, with the height of the weed continuing to increase up to the maximum application rate. In contrast, yield response of the crops to compost rate was either non-existent or asymptotic, with maximum yield achieved in the vicinity of the 0.5 rate. Overall patterns of response of weed height and crop yield to the two types of compost were similar, although in some years a particular weed species only showed a response to one type of compost. Good weed management by the farmer prevented weeds from becoming abundant enough to noticeably affect yield in this experiment. We conclude, however, that over-application of organic amendments potentially favors weeds relative to crops. Since the weeds responded to historical application rates even in the fourth year corn when no compost was applied to any of the treatments, allowing nutrients to build up in the soil appears to endanger long term weed control. This and related experiments indicate that integrated organic weed management programs need to include careful management of nutrient amendments.

SWROC Organic High Tunnel 2009: First Year Results

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Purpose of study

To research best management practices and long-term fertility issues for organic high tunnel vegetable production in Southwest MN.

Experimental treatments

- Management: a) Compared organic vegetable production in a high tunnel, outdoors and, where practical, outdoors under row covers. b) Began documenting best planting dates for extended fall greens production.
- Fertility: a) Soil tests and plant leaf nutrient analyses. b) Initiated a long term green manure trial.

Results and significance of findings

- As expected, our high tunnel extended the harvest season, ranging from six weeks (lettuces, tomatoes) to ten weeks (red bell peppers) earlier than outdoors. More produce was harvested from the high tunnel compared to outside (some of the largest differences were approximately two times as many Diva cucumbers and Ace peppers). There were also varietal differences in production.
- We believe fertility will be a concern for organic production in high tunnels and are currently waiting for our soil and plant nutrient test results. We will have these to comment on by the February conference.
- The main production issues that likely impacted high tunnel yields this year were a) tomato spotted wilt virus, and b) high summer heat.

Conclusions and implications of results

The first year of organic vegetable production inside a high tunnel can be highly successful. However, there could be a learning curve, depending on the experience of the grower. Recommendations from our first year include the need to scout continuously for diseases and pests, and to take quick defensive action when needed. This may include using limited amounts of organic pesticide and pulling diseased plants. In addition, one needs to prepare for high summer temperatures inside the high tunnel, with the use of shade cloth and appropriate variety selection (e.g. slow-bolting lettuce).

Additional applications for growers include a fall greens planting calendar begun this fall as a resource for season extension purposes. Long-term, we believe ensuring sufficient nutrient use will be an important component of organic vegetable production in high tunnels. Our green manure trials, also started this fall, are part of researching the best practices to maintain high soil quality.

Increasing Cover Crop Diversity and Weed Suppressive Potential of Soils in Organic Cropping Systems

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Many studies have demonstrated the weed suppressive potential and fertility contributions of individual cover crop species, but the value of diverse cover crop mixtures and soil biota have received less attention. The objective of this study is to determine the effects of cover crop

diversity and termination method on weed populations, soil microbial community structure, soil nutrient availability, soil water content and grain yield in a certified organic cropping system. A field experiment was initiated in 2009 near Mead, NE. Spring-sown mixtures of 2, 4, 6 and 8 cover crop species were included in a sunflower – soybean – corn crop rotation. Cover crops were terminated in late-May using a field disk or sweep plow undercutter and summer annual crops were planted six days later. Cover crop or weed biomass/cover, soil nitrate and soil microbial communities were sampled three times throughout the season and soil water content was measured four times to a depth of 8 cm. Cover crop biomass was greatest in the 6 cover crop mixture (318 g m^{-2}) and lowest in the 2 cover crop mixture (114 g m^{-2}). Compared to the disked treatment, weed suppression and soil moisture were greater in response to the undercut treatment for cover crop termination. The increased level of weed suppression due to undercutting the cover crops may be explained by two possible hypotheses: 1) physical interference of residue reduced weed seed germination or 2) greater soil moisture increased the competitive advantage of the crop. Despite the use of many cover crop species with demonstrated allelopathic effects, the lack of weed suppression in the disked treatment indicates a lack of phytotoxic activity in the soil. Soil N levels did not affect weed suppression and the influence of the soil microbial community is currently being analyzed. Late in the growing season broadleaf weed cover was greatest in the weed/cover crop free control treatment (28.7%) and lowest in the 8 cover crop mixture (20.0%), indicating a general decrease in broadleaf weed cover as diversity of the cover crop mixture increased. Crop yield was reduced in the disked treatment presumably due to reduced levels of early-season soil moisture and weed suppression.

The Economics of Organic, Grazing and Confinement Dairy Farms
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Ten Land Grant Universities plus Ontario standardized accounting rules and data collection procedures to gather, pool, summarize and analyze actual farm financial performance from many sustainable, small farming systems which currently lack credible financial data that producers need for decision-making, in a project initially sponsored by USDA IFAFS grant project #00-52501-9708.

This effort compares Wisconsin organic dairy farm data to grazing and confinement data since very little organic dairy data was collected from outside of Wisconsin. However, the Wisconsin data is compared to the limited amount of organic data collected in other parts of North America.

This project has over 80 farm years of Wisconsin organic dairy farm data spanning ten years to help understand the level of economic competitiveness of organic dairy farming.

Insights include:

1. Actual farm financial data from organic dairy farms is still scarce.
2. The financial performance of organic dairy farms looks dramatically different from one part of the country to the other.
3. Organic dairy farms in the data were financially competitive with other dairy systems in Wisconsin in the last ten years.
4. The price premium was very important to the financial competitiveness of organic dairy farms.
5. Management intensive rotational grazing (MIRG) appears to enhance profitability of dairy farms more than organic practices do.
6. Organic dairy farms that effectively raise most of their feed tend to be more financially competitive.

The up-to-date conclusions of this project can be accessed at *http://cdp.wisc.edu*.

Participatory Plant Breeding to Improve Sweet Corn for Organic Farmers
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Background: The purpose of this study is to develop new varieties of open-pollinated SE sweet corn for organic systems in collaboration with farmers, university researchers and experts at non-profit organizations. Specifically, this project will develop sweet corn germplasm that has enhanced early vigor and high percent germination under cool soil conditions. Farmers have identified additional traits for improvement, including good eating quality, disease resistance, ear worm resistance, strong stature, and productivity. This is a multi-year project, of which two years have been completed.

Methods: Two breeding populations were derived from commercially available hybrid sugary-enhancer sweet corn backgrounds. In each of the two populations, a recurrent selection program has been undertaken. Trials were planted at organic farms in Farmington, MN in 2008, and in Farmington, MN; Blue Mounds, WI; and Cottage Grove, WI in 2009. Approximately 100 single row plots, 11.5 feet long by 2.5 feet wide, were planted per population. Percent germination and early vigor were visually rated around the time that the fourth leaf was fully emerged (V4 – three to four weeks after planting). At harvest, populations were evaluated for quality traits like ear size, ear shape, tip fill and husk protection, tenderness and flavor, as well as the degree of disease present. Selections were made on the best 10-30 rows. Seed saved from the same ears that planted the selected rows were inter-mated at a winter nursery in South America to form the next cycle of selection.

Results: Conclusive results have not yet been obtained, as this project has three more years before completion.

Implications of Results: This project is being conducted in coordination with four other breeding projects known as NOVIC (Northern Organic Vegetable Improvement Collaborative). As the breeding populations progress to more finished stages in the later years of this project, samples of these populations will be shared and trialed at regional hubs. The trialing process will allow the collaborative to identify either a) germplasm that is widely adapted for organic farms across the represented regions, or b) germplasm that shows outstanding potential in specific regions outside of where it was selected.

The tangible results from this project will be new varieties and breeding populations with general and specific traits making them better adapted to organic production. In addition, we will gain invaluable knowledge about breeding methodology as well as experience breeding in organic systems.

Adoption of Organic Agriculture by Hispanic Farmers in Michigan
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According to a recent study the demand for locally grown organic fresh produce continues to grow (Dimitry and Obelholtzer, 2009). In the Midwest and Michigan, wholesale and retail traders have expressed their interest in sourcing more fresh produce from organic farmers in the region (Martinez, Bingen, Conner 2009). However, supply remains limited. Hispanic farmers have become an important segment of producers in Michigan. According to the 2007 Census of Agriculture, Michigan has over 650 Hispanic farmers, mostly operating family farms (Census, 2009). However, the Michigan Department of Agriculture does not report any Hispanic farmer as

operating certified organic farms (MDA, 2009). Although several studies have placed economic factors as important motivations for farmers to certify their farms (Klonsky, 2000; Kuepper, 2002; Klonsky and Green 2005), preliminary results from Michigan show that in many cases Hispanic farmers lack information about organic practices. Information that focuses specifically on understanding the perspective of small-scale Hispanic farmers and their current strategies to transition to organic agriculture is currently nonexistent.

The purpose of this study is to examine the main reasons Hispanic farmers in Michigan have not make more progress to certify their operations, and to explore what they see as opportunities and constraints to certify. In order to address these objectives, personal interviews and group meetings with more than 50 Hispanic farmers were conducted around the state. During these interviews, farmers provided information about their production and demographic characteristics, opinions about organic agriculture and reasons to "go organic".

Preliminary results show that most respondents fear problems such as pest infestation or market conditions are not suitable to transition to organic agriculture. Some of these farmers struggle to make their farms viable. Usually, they take on another job to support their families. For many of these farmers, organic represents a practice that could require more time and dedication than they are willing to allocate. On the other hand, for those farmers interested in organic agriculture, limited technical support and knowledge about alternative markets are the main constraint to certify their land.

This study provides important information to understand the challenges Hispanic farmers face in Michigan with regard to transition to organic agriculture and the best alternatives to effectively help them make the decision to utilize more sustainable agricultural practices. For agricultural educators and extension agents it represents an opportunity provide up-to-date tools for farmers interested in organic practices, and can also help manage some of the risks involved in transitioning and growing organic products.

Integrating Pork Production with Organic Crop Production

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In today's organic food industry, organic meat has been called a "second tier organic product," due to the unavailability of organic feedstuffs. Consequently, non-traditional feedstuffs are being given increasing consideration in animal feeding programs. A pilot study with the goal of integrating organic pork production with organic vegetable production was conducted at the MSU Student Organic Farm (MSU SOF). Observational data was collected daily on behaviors such as rooting, dominance hierarchy within the group, plant/soil disruption and depth, and dunging pattern. Pre/post wet weight of feedstuff and days to complete consumption was collected. Animal weight gain was recorded. Five crossbred barrows were raised from 40 to 240 lb. live weight in a modified, open front facility. At that weight, they were conditioned to being outside on grass in full sunlight (about 2 hr/d for 1 wk) to prepare them for the change to outdoor dwelling 24 hr/d. In mid-September the pigs were transported to the MSU SOF and place in a 150 x 75 ft post-harvest brassica plot. A three-strand electric fence was used to contain the pigs and a wooden hut (10 x 15 ft) with bedding was provided. At d 29, the pigs were moved to an 80 x 54 ft post-harvest squash field. Throughout the study, the pigs were supplemented with a corn-soybean meal diet (6 lb./d from d1-32; 9 lb./d d33-49; 50% in AM and PM). On d 43 of the study, the pigs were taken to harvest. Hogs were sold in advance at a price several times greater than that which was available in the open commercial market.

Pigs gained an average of 58.8 lb. (approximately 1.37 lb. average daily gain). There was no evidence of internal parasites at harvest. Grazing activity increased slowly over the first 7 to 10 d. An estimated 850 lb. (wet weight) of plant material was consumed per pig. A defined dunging pattern and wallowing area were observed. After pigs were removed and fall tillage of the plots occurred, compaction of soil was observed. The effect of this soil structure change and nutrient deposits of phosphorous, nitrogen, and ammonia thru waste will be studied in the 2010 growing season. Future studies are planned to better understand the importance of the maturity of grazing pigs, acclimation of pigs when moved from indoor to outdoor settings, plot size, amount of supplemental feed needed, input budgeting, and ultimate profitability of post-harvest organic garden grazing systems.

Impact of Organic Management on Dairy Animal Health and Well-being, a progress report

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The objective of this study is to identify management practices that influence dairy animal well-being and farm profitability. Unique methods used by organic farmers to define, detect, monitor severity, treat, and judge efficacy of disease interventions will be contrasted with similar data collected from likesized conventional farms. Data will be assessed to identify management-related risk factors for disease.

A total of 200 organic and 100 conventional farms will be visited across New York (n = 100 farms), Wisconsin (n = 150 farms), and Oregon (n = 50 farms). Eligible organic farms have at least 30 cows and have been shipping certified organic milk for at least 2 years. Eligible conventional farms have a similar size and geographic area to enrolled organic farms, and have been dairying for at least 2 years.

During a single herd visit, a questionnaire is administered to collect data on farm description, management practices, and disease detection and treatment strategies. Cows on each farm are observed and scored for body condition, hock lesions, lameness, and udder hygiene. Calves are observed and scored for presence of selected diseases. A bulk tank milk sample is collected to be used for culture and to identify selected diseases (BVD, Johnes and several other pathogens). Data about animal disease, treatments, culling and veterinary visits is collected for 60 days before and after the farm visit. Individual milk samples are collected from cows that develop mastitis during the 60 days after the visit. To date, approximately 60 herds have been visited and preliminary descriptive data will be presented about milk production, milk quality, occurrence of selected diseases and reproductive performance. Results of this study will be used to develop recommendations for cost-effective, preventive health strategies and will help increase sustainability by improving cow longevity and well-being.

Weed Management, Environmental Quality and Profitability in Organic Feed and Forage Production Systems

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The overall goal of this project, initiated in 2007, is to identify production strategies that balance pest management, crop productivity, environmental quality, and profitability in an organic livestock feed and forage system (small grains, alfalfa, corn, and soybeans). We are testing the hypothesis that alternating or "rotating" soil-depleting activities (e.g., tillage with a moldboard plow) for weed management with soil-building activities (e.g., no-till planting into rolled cover crops) will result in acceptable performance as evaluated by pest dynamics, productivity, and environmental and economic indicators at various temporal scales. The legacy of our previous transition experiment is a site with four certified organic systems, each with a well-described weed flora, soil biotic and abiotic characteristics, and economic potential. We are now addressing approaches to pest management in organic systems based on four different starting conditions, and examining the relationship of weed management to broader environmental and production issues during the early post-transition phase (years 1 – 3 after certification). In this presentation, we will summarize results from some of the insect, weed, and soil quality indicators measured during the first two years of the project, and how they relate to organic crop production systems.

Perennial weeds (mainly Canada thistle and field bindweed) were reduced rather quickly by changes in tillage regime (1-2 yrs). However, the systems which had low perennial weed populations at the end of the transition, and in which we subsequently reduced tillage, have now developed high perennial weed populations. As a first step to understand the insect community response to the systems, we grouped insects into functional groups: pollinators, parasitoids, predators and herbivores. Our preliminary results demonstrate differences in insect abundance and composition between the systems. Systems with rye/hairy vetch supported the most balanced proportions of functional groups, as well significantly more pollinators, parasitoids and predators, than herbivores, suggesting that the potential for biological control of pests may be high. Both the size of the extractable nitrate pool and the timing of peak soil nitrate varied among the systems. The highest peak nitrate occurred in the system with the most frequent tillage and the lowest peak nitrate in the system with the least tillage.

Veggie Compass – A Tool for Whole Farm Management

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A key aspect of sustainable farming is ensuring financial stability and profitability. "Veggie Compass", a system of whole-farm management for diversified fresh market vegetable growers, aims to assist growers in achieving this measure of sustainability. The project came to the University of Wisconsin-Madison from Jim Munsch, an organic beef farmer in Wisconsin. Following discussions concerning the challenges of business management with farmers, Munsch began developing a cost accounting spreadsheet to help fresh market vegetable growers improve their farm profitability. UW-Madison joined forces with Munsch to develop a

tool for improved farm profitability and management. The resulting product, Veggie Compass, is a comprehensive financial spreadsheet designed to analyze farm records for a holistic picture of farm finances. Using cost and sales data collected by the farmer for their specific operation, the spreadsheet calculates the cost of production for each crop and the profitability of each market channel. The tool can also be used to predict different farm scenarios for the future and to retrospectively assess the farm's progress. Such cost of production information can help farmers identify their efficiencies and establish prices based on actual cost of vegetable production for each market, thus increasing profitability. However, during the development of this system, several issues were identified that prevent diversified vegetable growers from taking full advantage of this resource. Many diversified fresh market vegetable growers tend to sell their produce through a variety of market channels (e.g., CSA, farmer's market, wholesale, retail), thus tracking the costs and sales associated with each channel can be cumbersome. In addition, pricing produce is often based on trends instead of on the farmer's actual costs of production. To ease the burden of collecting labor hours spent growing, harvesting and packaging each crop, the UW research team developed two types of labor data sheets for farmers to collect data on their own farms. In 2009, a group of volunteer farms used the two labor data sheets for the growing season to test the data collection method and provided feedback. Despite most growers finding the labor sheets easy to use, it was difficult to maintain data recording on the farms through the season. Ongoing research and outreach efforts continue to evaluate and improve the tool in order to allow farmers to easily adopt the system on their farm while still providing accurate and useful information to the farmers.

Production of healthy seed potatoes on organic farms

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Many potato diseases can be transmitted in seed potatoes. Certified seed potatoes, which are inspected to ensure that pathogen levels are below a specified threshold, provide effective control of most tuber-borne diseases. In Wisconsin, the aphid- and tuber-borne disease *Potato Virus Y* (PVY) is the most significant disease in seed potato production. Organic growers face a shortage of organically-grown certified seed potatoes in the Midwest, and limited access to certified seed potatoes for specialty and heirloom varieties. The purpose of our on-going research is to determine the feasibility of seed potato production on Wisconsin organic farms.

In 2007 we planted virus-free seed potatoes for several varieties in replicated plots on six organic farms: four in southern Wisconsin, isolated from potato production; one in central Wisconsin, surrounded by conventional potato production; and one in northern Wisconsin, surrounded by conventional seed potato production. Samples of harvested tubers were tested to determine PVY incidence. At the 4 southern farms, the majority of samples (100%, 85%, 93% and 100%) met certification standards for PVY (less than 5% incidence). At the central Wisconsin farm, only 36% of samples met standards, and at the northern Wisconsin farm, 100% of samples met standards, with the majority having no detectable PVY. In 2008, trials at four locations compared PVY incidence in PVY-susceptible Yukon Gold and PVY-resistant Red Norland. At 2 southern locations and one central WI location, all Red Norland samples and most Yukon Gold samples (94%, 92%, 83%) met certification standards. At the northern Wisconsin location, 94% of Red Norland lots but only 28% of Yukon Gold lots met certification standards.

Although the majority of samples in both years met certification standards, suggesting that seed potato production in Wisconsin is feasible, the variation in PVY incidence at the northern Wisconsin site underlines the need for organic control strategies. As disease pressure and aphid incidence vary yearly, trials will be repeated to determine long-term feasibility of seed potato production on Wisconsin organic farms. We will assess strategies including mulches,

mineral oil sprays, and presprouting for their effect on PVY incidence. We are continuing work initiated in 2009 to assess aphid landing patterns across potato fields, to determine optimum placement of seed potato plots within fields to minimize exposure to aphids that may carry PVY.

Performance Advantages of Flaming Hood

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Utilizing a hood in flaming equipment has several advantages that can be readily observed in the field. A flaming hood can offer a higher quality and more consistent level of weed control by better utilizing the combustion heat, and when compared with a common open torch, a flaming hood can obtain the same level of weed control with less fuel. In addition, utilizing a hood in flaming equipment increases safety and enables weed control even under relatively windy conditions. These advantages in the field were observed in our previous studies. In order to gain a better understanding of the flaming hood characteristics, a laboratory study was performed in 2008. The objective was to collect a range of temperature measurements in order to describe how the new hood design compared to a common open torch in temperature distributions and maximums. Based on the results, the new hood design maintained higher maximum temperatures and a larger high temperature core over a significantly longer and wider path. For example, 80 cm away from the torch exit the hood maintained an almost uniform temperature of 800°C over the entire hood cross-sectional area, while the open torch had only a small region at 600°C and the perimeter temperatures had fallen below 400°C.

Response of Corn Types to Broadcast Flaming

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Propane flaming has the potential to be included into an integrated weed management systems of both conventional and organic productions. Previous experiments tested flaming mostly in vegetable crops. In order to incorporate flaming as a weed control tool in major agronomic crop such as corn, it is important to collect baseline data on the tolerance of different corn types to broadcast flaming. Field experiments were conducted on two locations at the Haskell Agricultural Laboratory in 2008 utilizing six doses of propane and three corn types, including field corn (*Zea mays* L.*)*, popcorn (*Zea mays* L. *var everta*), and sweet corn (*Zea mays* L.*var rugosa*). Propane doses were 0, 12, 31, 50, 68, and 87 kg/ha, corresponding to 0, 2.5, 6.5, 10.5, 14.4, and 18.4 gal/acre. Flaming treatments were applied utilizing an ATV mounted flamer moving at a constant speed of 6.5 km/h (4 m/h). Corn species response to propane flaming were estimated on the basis of visual injury and dry matter loss, and described by log-logistic models for each corn type. Overall response to propane flaming varied among the corn types, growth stages, and propane doses. Preliminary data suggested that all corn types presented high levels of tolerance to broadcast flaming. Sweet corn was the most tolerant while popcorn was the least tolerant regardless of the growth stages. Additional studies are needed to test the relationship between the injury level by flaming, and corresponding crop yields and yield components.

Response of Selected Crop and Weed Species to Propane Flaming as Influenced by Time of Day

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Time of day influences the relative water content (RWC) in the leaf, which is the ratio of the water volume in a leaf to the maximum water volume at full turgor. To determine the influence of RWC in plant response to propane flaming, greenhouse experiments were conducted during spring of 2009. Two weeds (velvetleaf and green foxtail) and two crops (corn and soybean) were treated with four propane doses (0, 30, 60, and 90 kg/ha) at four different times of a day (6AM, 10AM, 2PM, and 6PM). The RWC was measured before treatment application. Flaming treatment was conducted utilizing a hand flamer with one VT-2-23C vapor phase burner positioned 20 cm above soil surface and angled at 30˚. The propane pressure was 18 PSI (100,000 BTU/hour) and the application speeds were 1, 2, and 3 mph. The plant responses evaluated were visual injury (1, 3, and 7 DAT) and fresh weight (7 DAT). All plant species had lower RWC during the afternoon, which made them more susceptible to flaming. For example, corn flamed with 90 kg/ha at 6 am had 48% injury at 7 DAT compared to 70 % injury with the same propane dose at 6 pm. The same tendency was demonstrated by velvetleaf showing 71% injury when flamed with 90 kg/ha at 6 am and 98% injury at 7 DAT when flamed at 6 pm. Similar trends occurred for green foxtail and soybean suggesting that RWC has an influence in plant response to flaming. Flaming could be more effective if done in the afternoon.

Tolerance of Sweet Corn to Broadcast Flaming at Different Growth Stages

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Propane flaming could be a potential alternative tool for weed control in organic sweet corn production. However, sweet corn tolerance to broadcast flaming must be determined first in order to optimize the use of propane. Therefore, field studies were initiated at the Haskell Agricultural Laboratory, Concord, NE in 2008 and 2009 to determine sweet corn response to five propane doses applied at three different growth stages, including: V2 (2 leaves), V5, and V7. The propane doses included were 0, 12, 24, 42, and 75 kg/ha (0, 2.5, 5, 8.5, and 15 gal/acre). Flaming treatments were applied utilizing an ATV mounted flamer moving at a constant speed of 6.5 km/h (4 m/h). The response of sweet corn to propane flaming was evaluated in terms of visual injury ratings (1, 7, 14, and 28 DAT), plant height reduction, effects on yield components (plants/m^2, tillers/plant, cob/plant, cob length, and numbers of seeds/cob), and fresh marketable yield. The response of different growth stages of sweet corn to propane doses was described by log-logistic models. Based on yield reduction, V7 was the most tolerant and V2 was the least tolerant stage for broadcast flaming. For example, a 5% yield reduction was evident with 23, 25, and 36 kg/ha doses of propane for V2, V5, and V7 growth stages, respectively. These results suggest that flaming has a great potential to be used effectively in organic sweet corn production.

Response of Pigweed and Foxtail Species to Broadcast Flaming

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Propane flaming could be an effective tool for weed control in organic cropping systems. However, susceptibility of major weeds to broadcast flaming must be determined in order to optimize its proper use. Therefore, field experiments were conducted during summer of 2008 at the Haskell Agricultural Laboratory, Concord, NE utilizing six doses of propane and four weed species, including green foxtail (*Setaria viridis*), yellow foxtail (*Setaria glauca*), waterhemp (*Amaranthus rudis*), and redroot pigweed (*Amaranthus retroflexus*) with the objective to collect some baseline information on their tolerance to broadcast flaming. Propane flaming response was evaluated at three growth stages for each weed species. The propane doses applied were 0, 12, 31, 50, 68 and 87 kg/ha corresponding to 0, 2.5, 6.5, 10.5, 14.4 and 18.4 gal/acre. Flaming treatments were applied utilizing an ATV mounted flamer moving at a constant speed of 6.5 km/h (4 m/h). The response of the weed species to propane doses was based on visual injury rating and percent biomass loss recorded at 14 days after treatment (DAT) and described by log-logistic model. Overall response of the weed species to propane flaming varied among species, growth stages, and propane doses. In general, foxtail species were more tolerant than pigweed species. Waterhemp and redroot pigweed did not differ in their response to broadcast flaming and were easily controlled (90% control) with propane dose of about 60 kg/ha when flamed at early growth stages (3-5 leaf stage), however they needed higher propane dose of about 90 kg/ha at later growth stages (9 leaf stage to flowering). Foxtail species differed in their response to broadcast flaming. Green foxtail was more tolerant than yellow foxtail regardless of the growth stage. Propane dose of 110 kg/ha was needed to provide 90% control of green foxtail regardless of the growth stage. In contrast, 90% control of yellow foxtail was achieved with propane dose of 80 kg/ha for any growth stage. It is important to point out that foxtail species started re-growing at about 14 DAT regardless of the growth stage flamed, whereas pigweed species did not re-grow, especially when flamed with doses above 60 kg/ha.

Soil and Weed Management for organic vegetable systems- 3 different approaches from 3 Michigan organic farms

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Good soil and weed management is a critical piece to any successful farm. According to many organic farmers and scientists, these are the two greatest challenges in organic farming. Organic farmers tend to use multiple inputs and approaches for long and short-term gains in soil and crop quality. The common goal amongst each of the farmers is to sustain crops for that year and over the long term. Successful organic farming requires an intense knowledge not only of the crop itself but also of the soil and its biology. Managing weeds in organic farming requires a balance to attain adequate weed control without overworking the soil and reducing crop yield. Through consecutive farm visits with three Michigan "expert organic vegetable farmers" a group of scientists and extension educators gained an insight of the different levels of management that are successful for different farms. So the underlying question is: "Is there a best practice to build soil quality and manage weeds on organic farms, or are there several approaches that each provides some benefits? This research demonstrated how three different approaches with three levels of management are successful for that farm. The research data were collected through several on-farm visits and interviews during the spring (as fields are being prepared and planted with crops) and in the fall (as fields are completing their production of crops and cover

crops and manure is being applied to build the soil and prepare it for the following season), focusing on the management practices occurring during these times. The team included soil scientists, nematologists, weed specialists, vegetable crop specialists, plant pathologists and entomologists to see, discuss, ask questions and learn FROM the FARMER. This was not a team of educators going to the farms to teach but rather a team of researchers and educators going to learn. We went to gain information of; "How does this farmer manage his soil to produce the vegetable crops needed and to keep the farm sustainable?" This study describes and discusses three levels of intensity of management to meet the expectations of that farmer.

Do neutral nutrition information and negative food safety information affect consumer demand for organic produce?

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Information can largely affect consumers' buying behavior. However, literature on the effects of information on organic products is sparse. Recently, studies found that evidence is lacking to support that organic foods are superior to conventional foods in terms of nutritional value. Systematic literature review of studies conducted over three decades has demonstrated that the differences in nutrient levels of organically and conventionally grown foods are neither consistent nor meaningful. Several studies reported that the use of animal wastes for fertilization of produce plants significantly increased the risk of certain disease-causing bacterial contamination in organic produce. In our study, we investigate consumer response to positive pesticide information, neutral nutrition information and negative food safety information about organic produce by applying a hypothetical open-ended choice experiment. By aggregating demand across participants, we explore how consumer demand for organic produce changes when prices change, own-price elasticity of organic produce, and the associated consumer surplus. Based on survey data, we use a multilevel mixed-effect linear regression model to estimate how consumers' willingness-to-pay for organic produce change when they are given various information related to pesticide, nutrition and food safety of organic produce. We find that positive information about pesticide level does not significantly affect willingness-to-pay, while neutral information about nutrition and negative information about food safety significantly affect consumers' willingness-to-pay in a negative way. Comparing neutral nutrition information and negative food safety information effects on willingness-to-pay, we found that negative food safety information has a larger negative effect. However, despite the decrease in price premiums, the price premium consumers are willing to pay for organic produce are still positive after they are given the neutral nutrition information or negative food safety information. Our study shows that even though perceived higher nutritional value or safety add value to the price premium for organic produce, they are not the major driving force for consumers' purchase of organic produce.

Evaluating Neem Oil as a Systemic Soil Drench to Protect Cucurbit Transplants from Cucumber Beetle Feeding

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The Resource Guide for Organic Insect and Disease Management (Cornell University, 2005) suggests that some active components of neem oil can be absorbed by plant roots and that the efficacy of neem oil absorbed by roots may last longer than when applied to foliage. However, it also states that plant species vary in their ability to absorb neem from the soil. The scientific purpose of this study was to evaluate soil drenches with neem oil as a means of protecting

transplanted cucurbit seedlings from feeding by adult cucumber beetles. These experiments were conducted largely by two undergraduate students at the UW Marathon County, as part of an Undergraduate Organic Research Internship. Seedlings of cucumber ('Marketmore 76'), muskmelon ('Amish Heirloom'), summer squash ('Goldbar'), winter squash ('Chicago Warted Hubbard'), and zucchini ('Black Beauty') were started in the greenhouse at UW Marathon County in Wausau, WI. A neem oil solution (0.5% neem oil in water, with a few drops of Dawn dish soap to get the oil into solution) was applied as a soil drench to the potted transplants 48 hrs, 24 hrs, and 1 hr before transplanting to the field. This experiment was conducted with one planting at Stoney Acres Farm in Athens, WI on 7/14/09, then again at Stoney Acres and the Neighbor's Place Community Garden in Wausau, WI on 8/12/09. Cucumber beetle feeding damage was rated for each plant using a numerical scale, at approximately 5 and 10 days after planting. Unfortunately, cucumber beetle populations in northern Wisconsin were much lower than usual during the summer of 2009, and feeding damage was not very severe on any of our plants. As a substantial differences in feeding damage were not observed between treated and untreated plants in any of our three plantings. However, both students plan to return to Wausau during the summer of 2010 to continue and expand upon this work through their research internships. The use of neem oil as a soil drench, if it proves effective, will provide organic growers with an easy-to-use tool for protecting cucurbit seedlings from cucumber beetles. In addition, using neem as a soil drench for seedlings in the greenhouse would not only minimize the amount and cost of product needed, but also any possible non-target effects associated with foliar neem applications.

Choice of bedding material affects production of pestiferous stable flies and house flies in dairy calf housing

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Filth flies harm dairy cattle, annoy farmers, and reduce farm profitability. Blood feeding stable flies slow calf growth and cow milk production. Non-biting house flies spread pathogenic bacteria. Both kinds of flies develop as maggots in moist organic debris, especially soiled calf bedding. Mature maggots transform into non-motile pupae before becoming adult flies. The purpose of our study was to see if hardwood sawdust, pine shavings and small-grain straw differ in their potential to produce flies, and their compatibility with beneficial insects that provide biological fly control. The study was conducted in a 20-pen, naturally ventilated dairy calf grower barn with curtain-side walls at University of Minnesota's Southern Research and Outreach Center, Waseca. Nine pens with 7 calves each were cleaned in June and then bedded with sawdust, shavings, or straw (3 replicated pens each). Fresh bedding was added as needed to maintain calf health and comfort. Edges and centers of bedding packs were sampled every other week for 12 weeks to quantify fly production. Matching samples were either reared to count emerging adult flies, or extracted to see how many pupae were killed by beneficial wasps. Pens bedded with straw averaged 155 pupae per ft^2 over the 12 weeks, and produced 31 adult flies per ft^2. Pens with shavings averaged 33 pupae and produced 18 adult flies, and pens with sawdust averaged 21 pupae and produced 11 adult flies. Although pens with straw had 5-fold more pupae than shavings and sawdust, straw pens produced only twice as many adult flies. Much of the difference was attributable to beneficial wasps, which killed a higher percentage of fly pupae in straw than in shavings and sawdust. Results indicate that barns lacking beneficial wasps, calf pens bedded with sawdust or shavings will produce fewer flies than pens bedded with straw. However, beneficial wasps can compensate by killing more flies in straw. Choice of bedding material may be one way that organic dairy producers can keep harmful flies to a minimum. Further studies of the economics of calf bedding choices are planned.

New University of Minnesota Organic Dairy Research and Extension Project
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A new program of organic dairy research is being established at the University of Minnesota, West Central Research and Outreach Center, Morris. The current resource base includes > 400 dairy cattle in 4 genetically diverse groups. The groups are Holstein selected on the USDA net merit index; crossbreds of Holstein, Swedish Red, and Montbeliarde; Holstein (restricted to 1964 genetics); and crossbreds of Jersey, Scandinavian Red, and Normande selected to be productive, fertile and long-lived under low input conditions with desirable milk composition. There will be a conventional control herd and a certified organic herd. The conventional dairy facility for winter housing is a composting barn, with a tie-stall barn available for intensive data collection. The organic herd is outwinter in a lot with a bedded pack. Young stock > 400 lb are outwintered on pasture. A swing-over milking parlor and an extensive set of pastures are being utilized for both herds. The land being transitioned is 160 acres of cropland which will grow primarily alfalfa and corn for forage and approximately 300 acres of pasture for intensive grazing management. Transition of crop land will be nearly complete in 2010. Anticipated date for certification of the herd is June, 2010. Research during transition relates to changes during the transition period. A goal of this research is to benchmark mammary health and fertility changes in a transitioning dairy herd of 70 cows with a contemporary convention herd of 90 cows. Mammary health will be determined by microbiological evaluation of individual cow milk samples at 3 month intervals from before initiation of organic management to the end of the transition period. Focus will be on staphylococcus and streptococcus organisms and incidence of clinical mastitis. Breeding is conducted in two seasonal windows December to March and June to August. Ovarian activity will be assessed at 42, 49, and 56 days postpartum by level of circulating progesterone. Days to first service, pregnancy rates, and ultrasound evaluation of ovaries and uterus, body weight and condition changes will be compared. Both groups will be bred by artificial insemination, but the conventionally managed herd will utilize synthetics as heat detection aids and synchronizers. A multi disciplinary team is planning the project and a search for a project leader is underway.

Tomato and zucchini production using straw mulch, plastic mulch, or living mulch
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This research compared production systems for vegetables using replicated trials on a university farm in Wanatah, Indiana. The purpose was to document and identify viable systems suitable for the production region, and note factors that limit viability. One trial compared using straw mulch to using plastic mulch following a conventionally tilled cover crop of hairy vetch and winter rye. The 'living mulch' trial compared short (4-6 in.) and tall (10-12 in.) mowing heights for clover between tilled strips in which vegetables were transplanted and mulched with straw. Weed management effectiveness, surface soil nitrate, plant tissue nutrient content, and yield of three tomato varieties and two zucchini varieties were evaluated. Trials were on non-certified ground managed using organic practices since 1993 (straw/plastic trial), or under transition to organic management (living mulch trial). In 2006, yield of tomatoes harvested Aug. 9 – Sept. 1 did not differ between plastic and straw mulch treatments (4.9 vs. 4.8 lbs./plant) or between mowing heights (2.8 lb./plant for short and 3.1 lb./plant for tall). Total marketable yield harvested Aug. 9 – Sept. 15 averaged slightly higher with plastic mulch than with straw. Weed control was acceptable with either straw mulch or black plastic mulch. With clover living mulch, the tilled area between clover and straw mulch supported too much weed growth. Crop management was easier with the low mowing height. In 2007, yield of marketable squash 6 to 11 in. long harvested between July 7 and Aug. 31 did not differ between plastic and straw mulch (7.3 vs. 7.7 lb/plant) or between short (6.4 lb/plant) and tall (6.6 lb/plant) mowing heights. Weed control

was acceptable with either straw or plastic mulch. The living mulch did not work well for squash because mowing equipment damaged squash plants. In both 2006 and 2007 surface soil nitrate levels tended to be higher under plastic mulch than under straw. Data from 2009 for both tomatoes and squash are still being analyzed. The results demonstrate that in a tilled system, either straw or plastic mulch can be a viable option for organic production of tomatoes and squash. Straw suppressed weeds sufficiently in the row and did not adversely affect marketable yield. Best nitrogen management practices may differ between straw and plastic mulch. The living mulch system appears to be less viable because of lower yields, but potential benefits of the system make it worth additional study to improve it.

Effects of organic and conventional management on plant health and soil biology in Michigan blueberries

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Michigan has 19,000 acres of cultivated blueberries and ranks as the number one blueberry producing state in the U.S. Market incentives as well as environmental and worker safety concerns have prompted many Michigan blueberry growers to consider transitioning new or existing blueberry plantings to organic. However, many aspects of organic blueberry culture are poorly understood, which is due in part to a paucity of research and reflected by the low percentage (< 0.3%) production area under organic management. A comparison of plant and soil health in organic and conventional Michigan blueberries will aid in targeting future research efforts and provide insights into how contrasting management strategies influence the above- and belowground biology of perennial fruit cropping systems. Here, we report on a survey of eight pairs of organic and conventional blueberry fields matched by age, cultivar, and NRCS soil series. Indicators of plant and soil health included soil carbon (C) and nitrogen (N) mineralization rates, soil enzyme activity, soil fungi and bacteria populations, mycorrhizal colonization, and post-harvest disease incidence. Short-term soil N mineralization and CO_2 evolution, which represent soil N-supplying capacity and labile soil C reserves, were measured in soil mesocosms maintained at constant moisture and temperature for 30 days. The activity of enzymes that catalyze the breakdown of cellulose, chitin, peptides, and lignin was assessed by adding fluorescent-tagged substrates to soil suspensions and measuring the resultant fluorescence after incubation for 1-24 hours. Soil fungi, bacteria, *Trichoderma* spp., *Bacillus* spp., fluorescent *Pseudomonas* spp., and *Streptomyces* spp. populations were estimated by recording the number of colony-forming units on semi-selective media. Ericoid mycorrhizae, a mutualism between fungi and blueberry roots, enhance plant capture of nitrogen, phosphorus and other nutrients in exchange for photosynthate-C transferred to the fungal symbiont. We assessed mycorrhizal colonization of roots at 400-1000x magnification on an inverted compound microscope. Lastly, post-harvest disease incidence was recorded on 50 berries stored for 14 days at room temperature and 100% relative humidity. We observed a consistent trend of higher mycorrhizal colonization, enzyme activity (particularly chitinase), labile C, and bacterial populations in soils under organic management, which suggests that biological activity in soil is enhanced by organic practices and may play a greater role in plant nutrition on organic blueberry fields. A lower percentage of marketable fruit and higher incidence of anthracnose (ripe rot) on organic blueberries indicates that development of effective strategies for control of post-harvest diseases should receive priority in future research efforts.