Development and Early Assessment of an Organic Land Care Extension Program for Landscapers

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SUMMARY. This article presents findings from the first 3 years of implementing an organic land care training program for landscapers, including landscaper attitudes, lessons learned, and the potential role of extension. Results of a needs assessment as well as discussions with organic practitioners provided evidence that New Jersey lacked in-depth training needed to assist practitioners in determining acceptable practices when offering organic services to their clientele. As a result, Rutgers University convened an organic land care working group and developed a certificate program for professionals with the long-term goal of promoting healthy soil, enhancing biodiversity, and reducing polluted runoff from managed landscapes. Thus far the program has been attended by 63 landscapers with 48 fulfilling the program requirements. Follow-up surveys with participants of the first 2 years showed that 38% of the 1163 acres (470.6 ha) under their management are either in transition or have been completely converted to organic management. Respondents reported a significant decrease in use of synthetic fertilizers and significant increase in use of organic fertilizer. Median synthetic pesticide usage decreased by 40%. Respondents reported since attending the program they were more effective at a number of practices including removing invasives and installing native plants, installing rain gardens, reducing stormwater runoff, and reducing irrigation. Focusing on the science, patience in transitioning, and understanding there are no "one size fits all" organic programs have been important lessons learned by experienced practitioners. Clientele acceptance, product efficacy, and finding skilled staff were cited as consistent challenges. These results indicate that extension can play a lead role in conducting applied research and providing relevant, effective educational programming for landscapers in the organic land care field.

Increasingly in New Jersey and the surrounding region, lawn and land care professionals are offering organic options to their clientele. This may be because of a number of reasons. The organic food industry is one of the fastest growing agricultural sectors and it is possible this is now expanding into land care services (Dettmann and Dimitri, 2010). In addition, pesticides are increasingly being restricted or even eliminated on public properties (Marshall et al., 2015). For example, New Jersey School Integrated Pest Management (IPM) Program encourages minimal pesticide use and the use of low impact pesticides in addition to strict 72-h notification requirements when more toxic pesticides are used [New Jersey Department of Environmental Protection (NJDEP), 2002]. Connecticut has banned the use of any U.S. Environmental Protection Agency registered pesticide at day care centers and kindergarten to eighth grade (K–8) school properties (State of Connecticut, 2009). New Jersey, Connecticut, New York, and other states in the region have recently enacted strict fertilizer laws that restrict the type, amount, and timing of fertilizer applications to turf (NJDEP, 2010). Finally, landscaping is a competitive industry and offering environmentally friendly or organic services may be a way to distinguish one company from others (Michelson, 2014).

Background

The federal government through the U.S. Department of Agriculture (USDA), National Organic Program (NOP) developed national organic standards for agriculture and a certification program that certifies that agricultural products were produced using approved organic practices (USDA, 2014). Currently, there are no federal standards for organic lawn and land care. The lack of universally accepted standards for organic land care has led to confusion in the landscaping industry and the general public over what organic land care actually means. The prevailing notion in the industry and among residents is that "going organic" is only about the type of fertilizer or pesticide applied and that one can simply "product swap" from a conventional product to an organic one.

In the absence of federal standards, a few organizations have developed program standards to provide organic professionals with credibility and to specify practices professionals can abide by when offering organic services. These include the Northeast Organic Farming Association’s Organic Land Care program, Oregon Tilth, and the Society for Organic Urban Land Care in Canada (NOFA, 2011; Oregon Tilth, 2013; SOUL, 2013). The New York Department of Environmental Conservation developed the “Be Green Organic Yards NY” program as well as terms and conditions that apply to businesses that use the program’s service mark. Practitioners may choose to adhere to the standards offered by local programs where they have been developed. Many of these
organizations use the USDA, NOP (USDA, 2014) practices as the basis of their program standards, with additional considerations for addressing issues such as tree and shrub care, lawn management, native and invasive plants, and water management.

A few definitions have been put forth for organic land care (NOFA, 2011; SOUL, 2013). In general, these definitions promote the concept of landscaping as a system of sustainable practices that restores, enhances, and protects the local and surrounding environment. These practices should promote diversity, restore and improve soil biology, use local materials, and reduce waste, including reducing energy use, material products, and water. The goal is to create a holistic approach to land management where the soil, plants, and animals within the system are interdependent and should sustain each other.

Generally, in an organic program, synthetic pesticides, synthetic fertilizers, and synthetic soil amendments are not used. Rather, organic landscaping focuses on emulating natural conditions by using fertilizer from natural materials (manure, plant, and/or meal based) and compost in addition to focusing on cultural practices such as returning grass clippings as a nitrogen source, mowing at an optimal height, and proper planting and pruning of trees and shrubs. Practitioners incorporate native and pest-resistant plants into landscape designs and place plants in areas that optimize the sunlight, soil, and moisture requirements of that species; i.e., “right plant, right place.” A strong emphasis is placed on promoting soil health by increasing soil organic matter and enhancing the biological community (bacteria, fungi, protozoa, roundworms, insects, earthworms, etc.) through the use of composted materials. Many organic landscapers brew compost teas, a liquid product of compost, in an effort to transfer microbial biomass, fine particulate organic matter, and soluble chemical components to plants and soils in ways not economically feasible with solid compost (USDA, 2004).

Organic landscapers use slow-release fertilizers with ingredients that come from natural sources such as plant or animal by-products (i.e., fish, feather, or blood meal), rock powders, and seaweed. Some practitioners will use a bridge product, which is a mix of synthetic nitrogen (most likely urea) with a natural organic fertilizer. Bridge products are often used while transitioning a landscape but use of these products would not be consistent with true organic management because of the inclusion of synthetic nitrogen.

Pest and disease management in an organic system is similar to an IPM approach. This approach focuses on creating a landscape that is unfriendly to pests and diseases (using right plant, right place concepts, and other cultural practices), monitoring, and using allowed pesticides, usually from a natural source such as insecticidal soaps, horticultural spray oils, botanical insecticides such as neem- (Azadirachta indica) and BT- (Bacillus thuringiensis) based products, as a last resort. Some synthetic substances are allowed in an organic program and these are listed in Section 205.601 under “The National List of Allowed and Prohibited Substances” of the USDA, NOP (USDA, 2014).

Ongoing debate and discussion continue to exist in the field of organic land care around certain topics. These include the efficacy of compost teas as truly improving the soil microbial community as well as its ability to suppress plant pathogens (St. Martin and Brathwaite, 2012); the most appropriate use of “emergency treatments” of conventional products when certain landscape problems arise, for example to save the life of a specimen tree; the over use of phosphate-rich natural fertilizers and composts, which may impact water quality through stormwater runoff (Cheng et al., 2014; Easton and Petrovic, 2004); and the effect of organic management programs on arthropod diversity and pests in turf (Marshall et al., 2015). Further collaborative research is needed to shed light on these issues.

Methods

NEEDS ASSESSMENT. In 2012, in response to inquiries from land care practitioners and regulatory agencies, Rutgers University began to assess the industry need for a formal extension program on organic land care. A 14-question survey was conducted at industry training events attended by landscapers as well as public employees. Landscapers were asked if they were interested in becoming a certified organic landscaper, how this certification would help their company, and whether they had already received training in organic techniques. They were also asked how many of their customers had requested organic services and if practitioners believed their clients would pay more for these services. Additional demographic questions were included, including the company type and how many properties they managed.

PROGRAM DEVELOPMENT AND IMPLEMENTATION. To assist with program development, Rutgers University assembled an organic land care working group made up of landscaping professionals, extension faculty and staff, regulatory representatives, and industry experts. This group helped review other existing programs and guidelines, and developed the program curriculum and educational support materials.

Rutgers University developed the Organic Land Care Certificate Program to educate and assist practitioners in determining what is acceptable under organic land management and deliver research-based information that will help the industry be successful in their organic endeavors. To be clear, this is not a “regulatory” certification program and there is no credential earned that can be revoked. The USDA, NOP practices are used as guidelines, and properties managed in accordance with these practices are considered to be organically managed. The basis of the program is a 1-weeklong certificate course offered on an annual basis, usually in January. Over 20 extension and industry professionals help teach the course. Since 2013, this course has been offered three times and attended by 63 individuals with 48 fulfilling the program requirements, which include attending the weeklong training program and passing an open-book exam.
Participants who pass the exam receive a certificate of completion and are listed on the program website in a searchable database by county. At the end of each course a 2-h, moderated panel discussion is held with four experienced, organic land care professionals. Each panelist is given 5 min to describe their background in organics and then audience members ask questions.

One-day introductory courses and half-day advanced field trainings with experienced practitioners have also been offered. Condensed programs have been presented to over 100 homeowners and Rutgers University Master Gardeners to educate residents who do not use professional landscapers.

A major objective of the program is for land care professionals to learn to treat their landscapes holistically and to restore and enhance biological cycles involving soil microorganisms, plants, and animals. Therefore, the course covers a wide range of topics including the history of organics in the United States; pesticide risk and environmental contamination; soil health; compost and compost tea development and application; incorporating native plants into landscapes and removing invasive exotics; turf installation, renovation, and management; lawn alternatives; sustainable landscape design; water resource protection, rain gardens, and rainwater harvesting; pest and disease management of trees and shrubs; planting and plant care; wildlife management; cultural practices for program synthesis; and business management and customer communications.

There were a number of challenges that presented themselves in the program development stage. Organic lawn and land care is an emerging field, with limited research having been conducted on its effectiveness (Alumai et al., 2009; Caceres et al., 2010; Kaminski et al., 2004; Miller and Henderson, 2012). There is much anecdotal evidence from organic practitioners and it has taken time and discussion to determine how to present the information in an unbiased manner. Discussions with working group members revealed that across the northeastern United States, Cooperative Extension is not perceived as a resource for organic turf and land care professionals but rather as a resource for those employing conventional or IPM techniques. This challenge presented a focal point for the working group to encourage extension professionals to get involved with educational outreach and applied demonstration trials to bridge the current information gap and address this perception.

**Program evaluation and impact.** A 20-question follow-up survey was administered to 41 landscapers of the Jan. 2013 and 2014 classes to determine preliminary program impact and best practices adopted thus far. The survey was administered via e-mail in Mar. 2015 on Rutgers University’s Qualtrics internet survey system (Qualtrics, Provo, UT). This survey, as well as other evaluation tools for the program, were reviewed by the university’s internal review board (IRB) and approved for exemption from IRB review. Questions were included to determine the area of turf currently in transition to organic as well as the area that had been completely converted to organic management. One retrospective question asked respondents how effective they are at conducting specific practices in comparison with before they completed the Rutgers University Organic Land Care Certificate course; i.e., using native plants in the landscape, reducing stormwater runoff, mulching, aerating a lawn, applying compost top-dressing, etc. Two questions were also included to quantify how their use of pesticides and fertilizers, including conventional, organic, and bridge products, had changed. A number of questions focused on assessing how useful the course was for successfully conducting and marketing organic land care.

Wilcoxon signed-rank tests were performed using the Real Statistics Resource Pack in Excel 2007 (Microsoft, Redmond, WA) to determine differences in types of fertilizer products used before vs. after the course. Wilcoxon signed-rank tests were also used to determine before and after course differences in self-assessed effectiveness at implementing specific practices. A significance level of $P < 0.05$ for all statistical tests was considered significant.

**Results and discussion.**

**Needs assessment.** Two hundred needs assessment surveys were administered, yielding 173 responses. Fifty-four percent of respondents answered yes or maybe when asked if they would want to become a certified organic landscaper. Only 18% had already attended trainings on organic land care techniques. When public works, parks and recreation, and academic professionals were excluded from the dataset the number was reduced to 105, which included those in the turf, shrub, and tree care, golf course, schools, and nursery industries. Of these 105 individuals, those interested in becoming certified increased to 64%, but results were similar for those who already had organic training. Forty percent stated “a few” and 6% stated “many” of their customers had already expressed interest in “organic” or “all natural” landscaping products and techniques. Only 6% believed their customers would be willing to pay more for organic landscaping. Thirty-two percent answered “maybe” to the same question.

These results are supported by national industry surveys. For example, a national survey of 356 landscaping companies showed 30% offer organic lawn care services and 13% offer what was termed “green/sustainability services” (Palmieri, 2013). Although it did not specifically address organic services, another national survey of over 2000 adults investigating consumer spending habits on lawn and landscape services showed 9% felt offering sustainable practices was the most important trait when selecting a landscaping company (National Association of Landscape Professionals, 2013).

In addition to the needs assessment survey, there was anecdotal evidence that contributed to the program’s development. Discussion with New Jersey organic practitioners indicated that they were traveling to other states for education because they could not find local, organic-focused trainings. In addition, a 1-d, annual Rutgers University organic turf care course was well attended and showed potential for expansion to other horticultural topics. A number of other state extension programs have developed fact sheets focused on organic lawn management in response to increased interest from their clientele (Bruneau et al., 2008; Fresenburg et al., 2007; Soldat et al., 2011). Finally, Rutgers University
Master Gardeners indicated an increase in helpline phone calls from the general public with questions about how to manage their landscapes organically.

Based on these results, it seems organic land care is an emerging industry sector about which New Jersey professionals were interested in receiving further training. A small percentage of their clients were expressing interest in organic services, which seems to follow national trends.

**Program Evaluation and Impact.** Results of the program evaluation given at the course (n = 49) indicated many of the landscape professionals already offered organic services (66%) as part of their businesses and had previously received some organic training (58%). Participants came into the program with some knowledge about curriculum topic areas as indicated by preprogram surveys showing almost half the questions were answered correctly by 50% or more of the participants. Ninety percent of the participants were owners or managers of private landscaping companies focusing on turf, and tree and shrub care. The rest were Master Gardener volunteers, private estate managers, and state employees. Participants thus far have come from all parts of the state with the highest participation being in Morris, Monmouth, and Middlesex counties in central New Jersey. This is the most likely a result of geography rather than interest as the class is held annually in a central New Jersey location.

Participants rated the overall teaching and program content as a 4.6 based on a Likert scale from 1 (poor) to 5 (excellent). They also indicated a strong likelihood they would use what they learned in their business activities [4.7 out of 5 (1 = strongly disagree, 5 = strongly agree)].

The landscaper follow-up survey resulted in 20 responses for a response rate of 49%.

A total of 25% of the 1163 acres of turf in their management at that time was in transition to organic and an additional 13% had been completely converted since attending the program (Table 1). It is anticipated that these numbers will increase over time since it has only been, at most, 2 years since respondents attended the program. Since the survey was designed to document changes made since taking the course, these numbers do not account for properties already in organic management and future surveys should be modified to document this information.

Respondents were asked to estimate percent of synthetic, bridge, and organic fertilizer used before and after attending the course. Respondents reported a significant change in types of fertilizers used with the median percent synthetic fertilizer decreasing from 45% to 0% and median percent organic fertilizer increasing from 12.5% to 35% from before to after the course (Table 2). There was no significant difference in use of bridge products (Table 2). There was a large range of responses with the greatest change in synthetic use being an 80% reduction and the smallest change being a 20% reduction (Fig. 1). Fifty-five percent of the respondents indicated no change in synthetic fertilizer use [11 out of 20 respondents (data not shown)], with 27% of these individuals being in organic management since attending the course. The greatest change in organic fertilizer use was a 100% increase and the smallest change was a 1% increase (Fig. 2). Fifty-five percent of the respondents indicated no change in organic fertilizer use [11 out of 20 respondents (data not shown)], with 63% of these individuals already using organic fertilizer before the course. These data are consistent with previous information showing that landscapers coming into the program already had offered organic services as part of their businesses.

Survey respondents reported reducing their synthetic pesticide usage by a median of 40% since taking the course. Based on individual responses, 45% reduced their synthetic pesticide usage by 41% or more (Fig. 3). This includes herbicides, fungicides, and insecticides. Anecdotally, landscapers have reported that it is easier to move away from synthetic pesticides than fertilizers as once they have mastered their cultural practices, many of the disease and insect pests are less of an issue. For example, one landscaper indicated he had completely eliminated synthetic fungicides from his business by focusing on proper mowing heights, irrigation timing, and incorporating turf varieties with better disease tolerance.

### Table 1. Total turf area managed by survey respondents that is in transition, completely switched to organic, or still in conventional management since attending the Rutgers University Organic Land Care Certificate course (n = 20).

| Management type | Total turf managed (acres) | Turf managed (%) |
|-----------------|---------------------------|-----------------|
| In transition   | 288                       | 25              |
| Organic         | 152                       | 13              |
| Conventional    | 723                       | 62              |
| Total area      | 1,163                     | 100             |

*1 acre = 0.4047 ha.

The majority of respondents indicated the course had been very helpful or somewhat helpful for assisting them in successfully practicing organic land care as well as marketing organics to their clientele (Table 3). More than 50% were not sure if the course had helped them increase their profit. Continued assessment will be important as little information is available on whether incorporating organic management into a business plan can help increase company profit.

Changes in median self-assessed scores for 15 specific practices taught in the course, as well as 95% confidence intervals for the medians are shown indicating the range of data values (Table 4). Since taking the course respondents reported they were more effective at reducing stormwater runoff from properties, installing rain gardens, removing invasive plants and using native plants on their properties, reducing water usage for irrigation, top dressing with compost, aerating a lawn, and using low-maintenance grass varieties. Based on this information, the program may provide more in-depth training on these topics in the future since those are the areas where the majority of landscapers felt there was the greatest change in their effectiveness. Nearly 50% of the respondents still felt they could not effectively use compost tea after the course as part of their landscaping practices as indicated by the median only changing from 1 to 3. This is to be expected as making compost tea requires special equipment and training to fully understand how it should be brewed and applied on a large scale. Based on their self-assessments, practitioners were already
effectively conducting many of the lawn care practices (overseeding, use of lawn seed with beneficial bacteria or fungi, leaving grass clippings, and increasing mowing height), as well as reducing overuse of mulch (i.e., “volcanoes” at the base of a tree), and applying fertilizer based on a soil test.

**Results of Moderated Discussion Groups.** Three years of moderated discussions with a panel of experienced organic land care practitioners have revealed consistent themes that may help when landscapers begin transitioning to organic land care.

Practitioners emphasize there are no boiler plate, one-size-fits-all organic programs similar to a conventional “five-step” program most landscapers and their clients have used previously. Rather, programs should be customized based on specific conditions in the landscape. The panel also noted that attending continuing education training provided by various institutions is necessary for practitioners to understand the science behind organic land care.

Allowing for trial and error and experimentation is an important part of getting started in organics. It is wise to ease into an organic program to see if it is a viable alternative for the specific site conditions; for example, adding core aeration and compost top dressing on a portion of turf sites and then monitoring turf performance over time. Easing into a program also prepares customers for the transition into an organic system, which often takes longer than with conventional management. Another goal of eliminating synthetic fungicides on properties within a certain time period may be feasible. Consistently it has been emphasized that successful organic practitioners work for years to hone their craft and must be creative and flexible in solving challenges through small, manageable changes.

Practitioners emphasize that organic products work differently than conventional products. For example, organic fertilizers need to be broken down by soil microorganisms and converted into a usable form for plant uptake (Parnes, 1990). This is a slow process and it takes time to understand how to best incorporate these products into current land care activities when practitioners (and their clients) are accustomed to instant results. These comments are supported by our survey results showing respondents slowly increasing their use of organic fertilizers on their properties (Table 2).

Anecdotally, New Jersey landscapers agreed that their clients were willing to pay 10% to 15% more for organic land care. Experienced practitioners warned others not to focus too much on costs with new clients but rather on what is being provided; a beautiful, healthy landscape for them and their family.

Landscapers advised against forcing organic programs on clients who...
will not be accepting of conditions that may be encountered during the initial transition phase (weeds, etc.). Much discussion focused on understanding audiences, and the types of clients a landscaper would want to attract to their organic business.

Practitioners emphasized that creating a relationship with their clients based on trust, informing them when there are problems, and being honest about nonorganic treatments is paramount for success and running a business with honesty and integrity.

These discussions have also revealed consistent challenges landscapers face in the field.

The biggest challenge practitioners face is clientele acceptance of

Fig. 3. Histogram of the percent reduction in synthetic pesticide usage reported by survey respondents since taking the Rutgers University Organic Land Care Certificate course (n = 20).

Table 3. Summary of responses to the Rutgers University Organic Land Care Certificate course follow-up survey questions (n = 20).

| Question                                                                 | Responses (%) | Very helpful (%) | Somewhat helpful (%) | I do not know (%) | Somewhat unhelpful (%) | Very unhelpful (%) |
|-------------------------------------------------------------------------|---------------|------------------|----------------------|------------------|------------------------|------------------|
| How helpful do you feel the course was for assisting you in providing successful organic lawn and/or land care? | 65            | 24               | 12                   | 0                | 0                      |                  |
| How helpful do you feel the course was in assisting you with the marketing of organic practices to your clientele? | 47            | 18               | 29                   | 0                | 6                      |                  |
| How helpful do you feel the course was for assisting you in increasing your profit margin? | 6             | 35               | 53                   | 0                | 6                      |                  |

*Percentage values may not total 100 because of rounding errors.

Table 4. Summary of changes in landscaper self-assessed effectiveness for best practices from before and after the Rutgers University Organic Land Care Certificate course (n = 20). Responses were based on a Likert scale from 1 (ineffective) to 5 (very effective). The median and 95% confidence limits are shown.

| Practice                                                                 | Before | After | Lower confidence limit | Upper confidence limit | Lower confidence limit | Upper confidence limit | P      |
|-------------------------------------------------------------------------|--------|-------|------------------------|------------------------|------------------------|------------------------|--------|
| Removing exotics and/or plants known to be invasive                     | 2      | 4     | 1                      | 4                      | 4                      | 5                      | ≤0.01  |
| Installing a rain garden                                                | 2      | 4     | 1                      | 4                      | 4                      | 5                      | ≤0.01  |
| Reducing stormwater runoff from properties                              | 2      | 4     | 2                      | 4                      | 4                      | 5                      | ≤0.01  |
| Using native plants in landscape plantings                              | 3      | 4     | 2                      | 4                      | 4                      | 5                      | ≤0.01  |
| Reducing water usage for irrigation                                     | 3      | 4     | 1                      | 4                      | 4                      | 5                      | ≤0.01  |
| Top dressing with compost                                               | 4      | 5     | 3                      | 5                      | 5                      | 5                      | ≤0.05  |
| Using compost tea                                                       | 1      | 3     | 1                      | 4                      | 3                      | 5                      | ≤0.05  |
| Aerating a lawn                                                         | 4      | 5     | 3                      | 5                      | 5                      | 5                      | ≤0.05  |
| Use of low-maintenance lawn grasses                                     | 3      | 5     | 3                      | 5                      | 4                      | 5                      | ≤0.05  |
| Use of lawn seed with endophytes                                        | 3      | 5     | 3                      | 5                      | 4                      | 5                      | ≤0.05  |
| Overseeding a lawn                                                      | 4      | 5     | 4                      | 5                      | 5                      | 5                      | ≤0.05  |
| Applying fertilizer based on soil test results                          | 4      | 5     | 4                      | 5                      | 4                      | 5                      | ≤0.05  |
| Reducing overapplications of mulch on properties                        | 3      | 5     | 3                      | 5                      | 4                      | 5                      | ≤0.05  |
| Leaving grass clippings on the lawn                                     | 4      | 5     | 4                      | 5                      | 5                      | 5                      | ≤0.05  |
| Mowing high [≈3 inches (7.6 cm)]                                        | 5      | 5     | 4                      | 5                      | 5                      | 5                      | ≤0.05  |

*NS indicates not significant at the 0.05 significance level based on Wilcoxon signed-rank tests.
the amount of time it takes transition to a landscape most would find acceptable under organic management. This is consistent with findings by Ingram et al. (2008) based on discussions of barriers to client adoption of IPM practices by landscapers in Wisconsin.

Consistency in product efficacy is an additional challenge with landscapers noting that more organic products are on the market now than in the past but little research has been done on their effectiveness under different conditions. Landscapers note that there are few effective organic postemergent weed controls for turf and therefore focus more on preventative strategies through cultural practices such as mowing high, reducing compaction, overseeding, and proper irrigation.

Finding quality finished composts for top dressing applications and brewing compost teas is an issue for many landscapers. To deal with this problem, some landscapers are creating compost themselves so they can attest to the quality and use it to brew their own compost teas.

Some landscapers indicated it is difficult to manage a property organically when there are other contractors on that property providing maintenance.

Knowledgeable staff with skills necessary to identify problems before they are out of control was also cited as a challenge. One landscaper indicated it did not matter how often he trained his staff, once they were unsupervised in the field they did what they wanted. This landscaper’s solution was to weld company mower decks so mowing height would always be at 3 inches.

**Role of Extension.** There is much confusion in the industry about how to practice organic land care. Extension is in the unique position to fill the knowledge and research gaps as well as coordinate the necessary industry, regulatory, and academic experts to assist the horticultural industry in successfully delivering organic land care to their clientele. The following are suggested methods for getting started based on Rutgers University’s experience:

Conduct a needs assessment and/or focus groups to determine the current status of organic land care within the state as well as industry needs. Use existing industry conferences and continuing education training sessions as a venue to administer surveys.

Develop a diverse working group with practitioners, regulatory and extension representatives including research staff. Find industry leaders who will be program champions and act as a sounding board for program ideas.

Start slowly and schedule 1-d trainings and workshops on topics identified by the working group. Most likely, turf issues will be the biggest draw but do not shy away from offering other programs such as incorporating native plants, lawn alternatives, tree and shrub care, and stormwater management.

Develop a multifaceted program that educates homeowners, Master Gardener volunteers, and practitioners about the current state of our understanding.

Avoid promotion from the philosophical standpoint. Provide researched-based education, but allow for anecdotal evidence and case studies for discussion as part of the learning process.

Research and explain how organics supports or may possibly be in conflict with local regulations. For example, corn gluten meal applied at recommended efficacy rates for weed control is in conflict with New Jersey’s fertilizer law because of its high nitrogen content.

Be clear that there are no federal standards for organic land care and that it is up to the landscaper to run their business with integrity.

Be consistent and clear with the message and be sure educators/speakers provide consistent information.

The organic land care research has not caught up with the practice. Traditional plant scientists have avoided research in organic systems due to lack of funding and interest in these alternative systems. There is a great need for in-depth soil microbial studies to examine the overall impact of organic land care practices on soil ecosystems and to test the efficacy of specific organic products on soil and plant health. The analysis of an effective organic land care system needs to be examined as a long-term process of rebuilding depleted soil ecosystems and establishing a more sustainable environment for all of the plants in the landscape. A whole systems analysis is atypical of current research where variables are limited to test the impact of specific inputs as with disease or insect studies. In addition, it will be necessary to set up long term (over 5 years), replicated turf trials in various geographic regions that document management practices, costs, and the best turfgrass varieties for organic systems. Some short-term trials already exist, but there is a need for more data (Alumai et al., 2009; Caceres et al., 2010).

**Conclusion**

There is a growing interest in organic land care methods among landscapers and their customers. Follow-up surveys taken by the first 2 years’ participants of the Rutgers University program show promising results for helping landscapers convert their properties to organic management. Switching to an organic land management system regimen does not yield overnight results and patience must be emphasized with the landscapers, their clients, and the general public. Any extension program on this emerging sector will have to be flexible to address the needs of practitioners while assessing applied data generated by researchers. Lack of national standards and replicated, long-term research trials with organic systems are needed by the industry. Researchers may need to enhance typical protocols to allow room for a more comprehensive and holistic analysis of organic land care. Practitioners working together with extension professionals and other university scientists can overcome challenges as a team.

**Literature cited**

Alumai, A., S.O. Salminen, D.S. Richmond, J. Cardina, and P.S. Grewal. 2009. Comparative evaluation of aesthetic, biological, and economic effectiveness of different lawn management programs. Urban Ecosyst. 12:127–144.

Bruneau, A.H., F. Yelverton, L.T. Lucas, and R.L. Brandenburg. 2008. Organic lawn care: A guide to maintenance and pest management for North Carolina. North Carolina Coop. Ext. Serv. Publ., Raleigh, NC. AG-562.

Caceres, V.A., C.A. Bigelow, and D.S. Richmond. 2010. Aesthetic and economic impacts associated with four different cool-season lawn fertility and pesticide programs. HortTechnology 20: 418–426.
Cheng, Z., E.L. McCoy, and P.S. Grewal. 2014. Water, sediment, and nutrient runoff from urban lawns established on disturbed subsoil or topsoil and managed with inorganic or organic fertilizers. Urban Ecosyst. 17:277–289.

Dettmann, R.L. and C. Dimitri. 2010. Who’s buying organic vegetables? Demographic characteristics of U.S. consumers. J. Food Prod. Mktg. 16(1):79–91.

Easton, Z.M. and A.M. Petrovic. 2004. Fertilizer source effect on ground and surface water quality in drainage from turf grass. J. Environ. Qual. 33:645–655.

Fresenburg, B.S., T. Teuton, D. Day, and J. Zimmerschied. 2007. Natural lawn care. Univ. Missouri Ext. Publ. G6749.

Ingram, M., J. Stier, and E. Bird. 2008. Relax! It’s just a dandelion: Perceived benefits and barriers to urban integrated pest management. J. Ext. 46(1). FE4A. 4 June 2015. <http://www.joe.org/joe/2008february/ad.php>.

Kaminski, J.E., P.H. Dernoeden, and C.A. Bigelow. 2004. Soil amendments and fertilizer source effects on creeping bentgrass establishment, soil microbial activity, thatch, and disease. HortScience 39:620–626.

Marshall, S., D. Orr, L. Bradley, and C. Moorman. 2015. A review of organic lawn care practices and policies in North America and the implications of lawn plant diversity and insect pest management. HortTechnology 25:437–446.

Michelson, A. 2014. Follow these turf trends towards profit—economy and environment are two words driving lawn care product trends. 4 June 2015. <http://www.turfmagazine.com/services/follow-these-turf-trends-toward-profit/>.

Miller, N.A. and J.J. Henderson. 2012. Organic management practices on athletic fields: Part 1. The effects on color, cover, and weed populations. Crop Sci. 52:890–903.

National Association of Landscape Professionals. 2013. National survey on consumer spending on landscape services. 4 June 2015. <http://landscapeprofessionals.org/nalp/media/consumer-survey.aspx>.

New Jersey Department of Environmental Protection (NJDEP). 2002. NJ school integrated pest management act. 1 Apr. 2015. <http://www.nj.gov/dep/enforcement/pcp/ipm-laws.htm>.

New Jersey Department of Environmental Protection (NJDEP). 2010. New Jersey fertilizer law. 1 Apr. 2015. <http://www.nj.gov/dep/healthylawnshealthylawrwater>.

Northeast Organic Farming Association (NOFA). 2011. NOFA standards for organic land care: Practices for design and maintenance of ecological landscapes. 5th ed. 4 June 2015. <http://www.organiclandcare.net/accreditation/standards>.

Oregon Tilth. 2013. Organic land care policies and standards. 2nd ed. 4 June 2015. <https://tith.org/resources/organic-land-care-policies-and-standards/>.

Palmieri, M. 2013. Industry overview: Ahead of the curve. 4 June 2015. <http://landscapemanagement.net/industry-overview-ahead-of-the-curve/>.

Parnes, R. 1990. Fertile soil: A grower’s guide to organic and inorganic fertilizers, 2nd ed. agAccess, Davis, CA.

Soldat, D., J. Stier, J. Kerns, and C. Williamson. 2011. Organic and reduced-risk lawn care. Univ. Wisconsin Ext. Coop. Ext. Publ. A3959.

Society for Organic Urban Land Care (SOUL). 2013. Organic land care standard. 6th ed. 4 June 2015. <http://www.organiclandcare.org/soul-organic-landcare-standard.html>.

State of Connecticut. 2009. CT P.A. 09-56. An act concerning pesticide applications at child day care centers and schools. 4 June 2015. <http://www.cga.ct.gov/2009/ACT/Pa/pdf/2009PA-00056-R00SB-01020-PA.pdf>.

St. Martin, C.C.G. and R.A.I. Brathwaite. 2012. Compost and compost tea: Principles and prospects as substrates and soilborne disease management strategies in soil-less vegetable production. Biol. Agr. Hort. 28(1):1–33.

U.S. Department of Agriculture (USDA). 2004. Compost tea task force report. 4 June 2015. <http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5058470>.

U.S. Department of Agriculture (USDA). 2014. National Organic Program. 4 June 2015. <http://www.ams.usda.gov/AMSv1.0/nop>.