Plant Risk Evaluator -- PRE™
Evaluation Report

Hedera helix 'Thorndale' -- Illinois

2017 Farm Bill PRE Project

PRE Score: 16 -- Reject (high risk of invasiveness)
Confidence: 64 / 100
Questions answered: 19 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Submitted

Evaluation Date: October 14, 2017

This PDF was created on June 15, 2018

Plant Evaluated

Hedera helix 'Thorndale'

Image by Midwest Groundcovers LLC

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Hedera helix 'Thorndale'*) in an effort to understand the invasive history, reproductive strategies, and the impact, if any, on the region's native plants and animals. This research reflects the data available at the time this evaluation was conducted.

Summary

Hedera helix is listed as an invasive species in Illinois. A literature review produced no evidence that 'Thorndale' is significantly different than the species aside from improved cold hardiness. 'Thorndale' also produces rampant vegetative growth and can clamber up and endanger trees. However the cold climate of Illinois may limit invasive growth. According to observations in the landscape, climbing plants often die back to the ground in winter and rarely achieve mature form for seed production. Overall, fruiting patterns in Illinois are not well-documented. There were no studies on seed production, viability, or germination of 'Thorndale', which would be helpful. An interesting discovery worth noting is that the parent cultivar of 'Thorndale' ('Baltic') was found to be invasive in the Pacific Northwest by genetic testing of invasive populations. This study also found low genetic diversity among cultivars of Hedera helix and said that cultivars show instability and tendency to revert and mutate. Reversion and hybridization with invasive populations is a risk to consider with any cultivars of an invasive plant.

General Information

Status: Submitted
Screener: Emily Russell
Evaluation Date: October 14, 2017

Plant Information

Plant: *Hedera helix 'Thorndale'*

If the plant is a cultivar, how does its behavior differs from its parent's?
'Thorndale' is more cold hardy than the species (to zone 4). The leaves are slightly larger than the species. 'Thorndale' is derived from 'Baltic' (aka var. baltica).

Regional Information

Region Name: Illinois

Climate Matching Map

To answer four of the PRE questions for a regional evaluation, a climate map with three climate data layers (Precipitation, UN EcoZones, and Plant Hardiness) is needed. These maps were built using a toolkit created in collaboration with GreenInfo Network, USDA, PlantRight, California-Invasive Plant Council, and The Information Center for the Environment at UC Davis.

Click here to see the generated climate matching map for this region. This climate match database is hosted by GreenInfo Network and publicly accessible.

Evaluation Questions

These questions are based in an original article published at the University of California, Davis, and can be found on the PLOS One website, here: https://doi.org/10.1371/journal.pone.0121053

Invasive History and Climate Matching (Questions 1 - 6)

1. Has the species (or cultivar or variety, if applicable; applies to subsequent "species" questions) become naturalized where it is not native?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Hedera helix is naturalized in the Eastern, Western, and Southern United States, as well as Australia, New Zealand, and Hawaii. There is no evidence that 'Thorndale' is different than the species in its ability to naturalize.

Reference(s):

- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).
- U.S. National Plant Germplasm Network (0). Taxonomy - GRIN-Global Web v 1.9.8.2 Hedera helix.

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2. Is the species (or cultivar or variety) noted as being naturalized in the US or world in a similar climate?

- Answer: **Yes**, which contributes **2** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Hedera helix is naturalized in Illinois, as well as the Midwest, Mid-Atlantic, and Northeast, parts of which share a climate with Illinois.

Reference(s):

- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).

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3. Is the species (or cultivar or variety) noted as being invasive in the U.S. or world?

- Answer: **Yes**, which contributes **2** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Hedera helix is listed as invasive in Illinois as well as 17 other states and Ontario. The species is designated a "B" quarantine weed in Oregon. Cultivars 'Baltic', 'Pittsburgh', and 'Star' are Class C noxious weeds in Washington. 'Thorndale' was derived from 'Baltic' and is likely to behave similarly - see Clarke for genetic analysis of invasive Hedera in the Pacific Northwest. The species is also invasive in Argentina, Chile, Australia, and New Zealand.

Reference(s):

- Midwest Invasive Plant Network (2015). Midwest Invasive Plant List.
- Swearingen, J. M., & Diedrich S. (2009). PCA Alien Plant Working Group - English Ivy (Hedera helix).
- CABI (0). Hedera helix (ivy) CABI.
- Clarke, M. M., Reichard S. H., & Hamilton C. W. (2006). Prevalence of Different Horticultural Taxa of Ivy (Hederaspp., Araliaceae) in Invading Populations. Biological Invasions. 8, 149–157.

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4. Is the species (or cultivar or variety) noted as being invasive in the US or world in a similar climate?

- Answer: **Yes**, which contributes **3** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Hedera helix is listed as invasive in Illinois, as well as Ontario, Indiana, Maryland, DC, New Jersey, Pennsylvania, Virginia, West Virginia, Kentucky, and Tennessee, which have climate overlap with Illinois. Observations show that 'Thorndale' often has significant dieback during the winter in Northern Illinois, which limits its invasive potential (Shannon McEnerney).

Reference(s):

- Midwest Invasive Plant Network (2015). Midwest Invasive Plant List.
- Swearingen, J. M., & Diedrich S. (2009). PCA Alien Plant Working Group - English Ivy (Hedera helix).
- CABI (0). Hedera helix (ivy) CABI.

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5. Are other species of the same genus (or closely related genera) invasive in a similar climate?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Hedera hibernica is very closely related and often confused with H. helix. Genetic studies show that H. hibernica dominates invasive populations on the West Coast, and H. helix is more prevalent in the Eastern United States. "The results of our study suggest that sales and use of Hedera hibernica should be discouraged in the Northwest. However, in order to achieve this goal H. helix and H. hibernica, both sold as English ivy, have to be correctly identified and labeled in the trade. Given the difficulty in doing this and the possibility of hybridization or reversion of traits, it is prudent to discourage the use of both."

Reference(s):

- Green, A. F., Ramsey T. S., & Ramsey J. (2013). Polyploidy and invasion of English ivy (Hedera spp., Araliaceae) in North American forests. Biological Invasions. 15, 2219–2241.
- Clarke, M. M., Reichard S. H., & Hamilton C. W. (2006). Prevalence of Different Horticultural Taxa of Ivy (Hederaspp., Araliaceae) in Invading Populations. Biological Invasions. 8, 149–157.

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6. Is the species (or cultivar or variety) found predominately in a climate matching the region of concern?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Hedera helix is a widespread species. 'Thorndale' is more cold-hardy than the species which makes it a popular cultivar in climates similar to Illinois, but it has not shown reduced heat tolerance and should grow in the same range as the species.

Reference(s):

- U.S. National Plant Germplasm Network (0). Taxonomy - GRIN-Global Web v 1.9.8.2 Hedera helix.
- The Ohio State University (0). Hedera helix.

Impact on Native Plants and Animals (Questions 7 - 10)

7. Does this plant displace native plants and dominate (overtop or smother) the plant community in areas where it has established?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

The American Meadows catalogue describes Hedera helix 'Thorndale': "Thorndale is the classic English Ivy groundcover. It'll also scramble up trees to 50 ft. This venerable plant is loved and hated for the same reason--it grows fast and covers everything." It is known to suppress weeds where planted in the landscape (Shannon McEnerney). For the invasive species: "As a ground cover, this ivy chokes out other plants, creating an 'ivy desert' where nothing else can grow. Vines climb and cover trees, starving them of sunlight, causing branch and eventual tree death. Vines become weighted with snow and ice during the winter, causing broken limbs and falling trees" However, "from observations in Northern IL, most vertical growth is frozen and dies back to the snow line." (McEnerney)

Reference(s):

- American Meadows (2017). English Ivy Thorndale.
- Philadelphia Water Department (0). Invasive Species Removal: English Ivy.

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8. Is the plant noted as promoting fire and/or changing fire regimes?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

"Because English ivy is evergreen and has a relatively high water content (230 g of water/100 g dry leaf mass (65-70% wet mass)), it may not readily ignite and may burn slowly. Planting English ivy has been recommended to reduce fire risk in seasonally dry areas such as in Utah, and in chaparral-urban interfaces in California." "In its nonnative range in North America, English ivy occurs in plant communities with variable fire regimes, but at the time of this writing (2010), no information was available on how it responds to or influences fire regimes in these communities."

Reference(s):

- Waggy, M. A. (2010). Hedera helix. In: Fire Effects Information System.

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9. Is the plant a health risk to humans or animals/fish? Has the species been noted as impacting grazing systems?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

"This plant contains saponins, which have caused poisoning in cattle, dogs, sheep, and humans. Two chemicals in the sap can also cause severe contact dermatitis in sensitive humans. Cases of poisoning are found in older European literature; the plant grows naturally in Europe. Cattle that ingested large quantities of the vines were ill for a few days. Humans who ingested the berries have shown symptoms, including coma. Dermatitis is rare but can be severe. Weeping lesions and blisters respond slowly to treatment. Family pets should not be allowed to eat English ivy leaves." (Canada) "Dense mats of ivy on the ground hide puddles and soggy soil, allowing mosquitoes to breed." (PA)

Reference(s):

- Philadelphia Water Department (0). Invasive Species Removal: English Ivy.
- Canadian Biodiversity Information Facility (2013). Canadian Poisonous Plants Information System - Hedera helix (Scientific name).

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10. Does the plant produce impenetrable thickets, blocking or slowing movement of animals, livestock, or humans?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

"On some sites English ivy may form a thicket with other nonnative and native vines" "Clumping (more than one English ivy vine/host tree) was common, particularly on trees in the canopy and subcanopy of the forest, largely due to the greater abundance of support in these layers" "Climbing and older trailing branches may be 4 to 12 inches (10-30 cm) in diameter."

Reference(s):

- Waggy, M. A. (2010). Hedera helix. In: Fire Effects Information System.

Reproductive Strategies (Questions 11 - 17)

11. Does this species (or cultivar or variety) reproduce and spread vegetatively?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

"English ivy spreads vegetatively, either by rooting from stems and stem fragments that contact the soil or from fragmented roots." "English ivy spreads locally through vegetative growth and new plants can grow from cut or broken pieces of stems that are able to root in the soil." Vegetative reproduction for 'Thorndale' appears to be consistent with the species.

Reference(s):

- Waggy, M. A. (2010). Hedera helix. In: Fire Effects Information System.
- Swearingen, J. M., & Diedrich S. (2009). PCA Alien Plant Working Group - English Ivy (Hedera helix).
- CABI (0). Hedera helix (ivy) CABI.

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12. If naturally detached fragments from this plant are capable of producing new plants, is this a common method of reproduction for the plant?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

"English ivy sprouts from stem fragments and cut stumps. Stems and stem fragments root easily when they are in contact with the soil, and plants spread from adventitious roots that develop along the stem. Fragmented roots left in the soil may sprout a new stem." "English ivy spreads locally through vegetative growth and new plants can grow from cut or broken pieces of stems that are able to root in the soil." Vegetative reproduction for 'Thorndale' appears to be consistent with the species.

Reference(s):

- Waggy, M. A. (2010). Hedera helix. In: Fire Effects Information System.
- Swearingen, J. M., & Diedrich S. (2009). PCA Alien Plant Working Group - English Ivy (Hedera helix).

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13. Does the species (or cultivar or variety) commonly produce viable seed?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

"Sexual reproduction typically occurs in climbing adult plants that reach sufficient light, but trailing plants may occasionally produce fruit, especially if they are growing in full sunlight." There are no reports of seed production and viability for the cultivar 'Thorndale', but also no evidence that it's different from the species. Waggy reports that seed production may be inconsistent in colder climates, but 'Thorndale' is known to be hardy to zone 4, which may mitigate this impact. "From observations in Northern IL, most vertical growth is frozen and dies back to the snow line. In managed landscapes where the plant is used as a groundcover, the plant is generally not allowed to climb and therefore does not meet mature state." (Shannon McEnerney).

Reference(s):

- Waggy, M. A. (2010). Hedera helix. In: Fire Effects Information System.
- Swearingen, J. M., & Diedrich S. (2009). PCA Alien Plant Working Group - English Ivy (Hedera helix).
- CABI (0). Hedera helix (ivy) CABI.

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14. Does this plant produce copious viable seeds each year (> 1000)?

Answer / Justification:

No estimates of seed quantity for Illinois. "The black-purple fruits have a thin fleshy outer covering, contain one to three hard, stone-like seeds"

Reference(s):

- Swearingen, J. M., & Diedrich S. (2009). PCA Alien Plant Working Group - English Ivy (Hedera helix).

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15. Is there significant germination (>25%) of seeds the next growing season, with no requirement of an infrequent environmental condition for seeds to germinate (i.e. fire) or long dormancy period?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

"Available evidence suggests that English ivy seed germinates fast and has a high germination capacity. Clergeau reported that about 60% to 100% of English ivy seed germinates in 15 days or less. Nearly 100% of the seed germinated in less than 10 days when fruit pulp was removed from the seed by hand or by bird ingestion" No information available for cultivar 'Thorndale.'

Reference(s):

- Waggy, M. A. (2010). Hedera helix. In: Fire Effects Information System.
- CABI (0). Hedera helix (ivy) CABI.

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16. Does this plant produce viable seed within the first three years (for an herbaceous species) to five years (for a woody species) after germination?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

"Age of first reproduction is variable but can be in the region of 10 years" "A publication from North America suggests that the juvenile period is long, often lasting 10 years or more"

Reference(s):

- Waggy, M. A. (2010). Hedera helix. In: Fire Effects Information System.
- CABI (0). Hedera helix (ivy) CABI.

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17. Does this plant continuously produce seed for >3 months each year or does seed production occur more than once a year?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

"Under sufficient light conditions, terminal clusters of small, pale yellow-green flowers are produced in the fall. The flowers are attractive to flies and bees in search of late season nectar sources. The black-purple fruits have a thin fleshy outer covering, contain one to three hard, stone-like seeds and may persist through the winter if not eaten first." Missouri Botanical Garden and Chicago Botanic Garden Plant Finders both report that Hedera helix flowers in fall and produces berries soon after, which would appear to be less than a 3-month period. Reports of flowering and fruiting times are somewhat variable and could be over a longer period (see Waggy), but this is not well-documented and lowers the confidence for this answer.

Reference(s):

- Waggy, M. A. (2010). Hedera helix. In: Fire Effects Information System.
- Swearingen, J. M., & Diedrich S. (2009). PCA Alien Plant Working Group - English Ivy (Hedera helix).

Dispersal (Questions 18 - 20)

18. Are the plant's propagules frequently dispersed long distance (>100 m) by mammals or birds or via domestic animals?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

"It disperses longer distances via seed which is carried to new areas by frugivorous birds including the Cedar Waxwing, Northern Robin, Stellar Jay, Mockingbird, European Starling, and House Sparrow." "H. helix is bird-dispersed although its berries are mildly toxic. This mild toxicity can prevent consumption of too many fruits in one period of foraging and regulate seed retention time, thus ensuring better seed dispersal"

Reference(s):

- Waggy, M. A. (2010). Hedera helix. In: Fire Effects Information System.
- Swearingen, J. M., & Diedrich S. (2009). PCA Alien Plant Working Group - English Ivy (Hedera helix).
- CABI (0). Hedera helix (ivy) CABI.

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19. Are the plant's propagules frequently dispersed long distance (>100 m) by wind or water?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

There is no evidence of dispersal by wind or water. "Stem fragments may possibly be dispersed by running water but there are no documented cases of local dispersal by these means."

Reference(s):

- CABI (0). Hedera helix (ivy) CABI.

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20. Are the plant's propagules frequently dispersed via contaminated seed (agriculture or wildflower packets), equipment, vehicles, boats or clothing/shoes?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

"Vegetative material which can easily root can be readily dispersed accidentally to new suitable habitats. Careless dumping of surplus trimmings from gardens is a major risk (Auckland Regional Council, 2003) but soil movement or transport of logs bearing H. helix stems may also result in the establishment of new infestations."

Reference(s):

- CABI (0). Hedera helix (ivy) CABI.

Total PRE Score

PRE Score: 16 -- Reject (high risk of invasiveness)
Confidence: 64 / 100
Questions answered: 19 of 20 -- Valid (80% or more questions answered)

PRE Score Legend

The PRE Score is calculated by adding the point totals for each (answered) question.
< 13 : accept (low risk of invasiveness)
13 - 15 : evaluate further
> 15 : reject (high risk of invasiveness)

Questions Answered Legend

It is important to answer at least 16 questions to consider a PRE Score as "valid".
>= 16 : valid (80% or more questions answered)
<= 15 : invalid (not enough questions answered)

Organization Ownership and Content Privacy

Organization: 2017 Farm Bill PRE Project
Content Privacy: Public

Evaluation Reviewers

The PRE approach is to base decisions on science and make decisions by consensus of diverse horticultural stakeholders. The literature review and process of answering PRE's questions are based on science; the decisions of which plants to prioritize are based on consensus. To ensure this process is in place and that PRE is collaborative, volunteer stakeholders are recruited from each region to review evaluations. The following experts in their profession (plant science, conservation, or horticultural trade) have participated as volunteer PRE reviewers for this evaluation:

- Shannon McEnerney December 21, 2017

This evaluation has a total of 1 reviewer(s).

Evaluation Issues

The following section lists all public issues for this evaluation. Issues provide a way for stakeholder reviewers to communicate any concerns or suggestions they might have with the plant or evaluation. Please email PlantRight@suscon.org if additional action is required to resolve open issues.

Issue ID # 6193

Date Created: December 21, 2017 - 1:02pm
Date Updated: January 29, 2018 - 7:33am

Submitted by: Shannon McEnerney

Status: Fixed
Type: Suggestion
Severity: Major
Scope: Q13. Does the species (or cultivar or variety) commonly produce viable seed?

Issue Description

For plants to produce seed they must transition from juvenile to mature state - to do that they must climb vertically and persist over time. From observations in Northern IL, most vertical growth is frozen and dies back to the snow line. In managed landscapes where the plant is used as a groundcover, the plant is generally not allowed to climb and therefore does not meet matue state.

Issue Resolution (Screener's Response to Issue)

Changed answer to "no" and incorparated comments.

Issue ID # 6192

Date Created: December 21, 2017 - 12:57pm
Date Updated: January 29, 2018 - 7:29am

Submitted by: Shannon McEnerney

Status: Fixed
Type: Comment
Severity: Minor
Scope: Q09. Is the plant a health risk to humans or animals/fish? Has the species been noted as impacting grazing systems?

Issue Description

From observations, plants have very seldom shown to produce seed in Northern IL.

Issue Resolution (Screener's Response to Issue)

Incorporated this observation into answers for other questions, but do not find it particularly relevant here.

Issue ID # 6191

Date Created: December 21, 2017 - 12:54pm
Date Updated: January 29, 2018 - 7:52am

Submitted by: Shannon McEnerney

Status: Fixed
Type: Comment
Severity: Minor
Scope: Q07. Does this plant displace native plants and dominate the plant community in areas where it has been established?

Issue Description

When sited correctly, it's use as a horticultural groundcover is desirable to reduce soil erosion and supress weeds.

Issue Resolution (Screener's Response to Issue)

Incorporated weed suppression into the answer text.

Issue ID # 6189

Date Created: December 21, 2017 - 12:44pm
Date Updated: January 29, 2018 - 7:47am

Submitted by: Shannon McEnerney

Status: Fixed
Type: Comment
Severity: Minor
Scope: Q04. Is the species (or cultivar or variety) noted as being invasive in the US or world in a similar climate?

Issue Description

Thorndale has not been observed as invasive in Northern IL due to commonly occuring winter dieback.

Issue Resolution (Screener's Response to Issue)

Did not change the answer since it is listed as invasive in Illinois, but did incorporate this observation for Northern Illinois into the text.

About PRE and this Plant Evaluation Report

The PlantRight Plant Risk Evaluator -- PRE is an online database and platform enabling those involved in non-native, terrestrial plant production to know before they grow if a plant poses a regional invasive risk. This tool offers many benefits, and we encourage you to visit the PRE website (https://pre.ice.ucdavis.edu) for more information.

If you are a nursery trade association, or involved in the research, development or distribution of horticultural plants we invite you to join the PRE community. If you are a plant scientist, affiliated with a horticultural college or botanic garden, and would like to learn more about becoming a PRE Screener, please drop us an email, PlantRight@suscon.org, requesting a PRE Account.

PRE beta funding is provided by Sustainable Conservation (http://www.suscon.org/) and a USDA Farm Bill grant.