**Supplementary Table 1.** Results of the *a priori* contrasts conducted on each of the four models adjusted with the multivariate t-distribution for multiple comparisons. The structure for each model was y = (1|Site) + Origin + Inoculation + Origin\*Inoculation.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Contrast | | Z-Score | P-value |
| Vegetation | % Cover | Native + *V. nonalfalfae* | Native  + control | 0.761 | 0.841 |
| Nonnative + *V. nonalfalfae* | Nonnative + control | 0.876 | 0.776 |
| Native + control | Nonnative + control | 1.323 | 0.484 |
| Native + *V. nonalfalfae* | Nonnative + *V. nonalfalfae* | 1.432 | 0.414 |
| Species richness | Native + Verticillium | Native  + Control | -1.080 | 0.646 |
| Nonnative + Verticillium | Nonnative + Control | -0.353 | 0.980 |
| Native + Control | Nonnative + Control | -2.857 | **0.015\*** |
| Native + Verticillium | Nonnative + Verticillium | -2.192 | 0.096 |
| Seedbank | Count | Native + Verticillium | Native  + Control | -0.774 | 0.832 |
| Nonnative + Verticillium | Nonnative + Control | 0.337 | 0.983 |
| Native + Control | Nonnative + Control | -1.640 | 0.296 |
| Native + Verticillium | Nonnative + Verticillium | -0.575 | 0.922 |
| Species richness | Native + Verticillium | Native  + Control | 0.647 | 0.893 |
| Nonnative + Verticillium | Nonnative + Control | -1.331 | 0.477 |
| Native + Control | Nonnative + Control | 1.492 | 0.377 |
| Native + Verticillium | Nonnative + Verticillium | -0.479 | 0.952 |

**Supplementary Table 2a.** All plant species identified during vegetative surveys in the field.

|  |  |  |  |
| --- | --- | --- | --- |
| **Species** | **Common Name** | **Origin** | **Life Form** |
| *Acer negundo* | eastern boxelder | native | woody |
| *Acer rubrum* | red maple | native | woody |
| *Actaea podocarpa* | mountain black cohosh | native | herbaceous |
| *Actaea racemosa* | common black cohosh | native | herbaceous |
| *Ailanthus altissima* | tree-of-heaven | nonnative | woody |
| *Alliaria petiolata* | garlic mustard | nonnative | herbaceous |
| *Amphicarpaea bracteata* | hog-peanut | native | herbaceous |
| *Andersonglossum virginianum* | wild comfrey | native | herbaceous |
| *Asimina triloba* | pawpaw | native | woody |
| *Asplenium platyneuron* | ebony spleenwort | native | herbaceous |
| *Berberis thunbergii* | Japanese barberry | nonnative | woody |
| *Bidens bipinnata* | Spanish needles | native | herbaceous |
| *Boehmeria cylindrica* | false nettle | native | herbaceous |
| *Botrypus virginianus* | rattlesnake fern | native | herbaceous |
| *Bromus pubescens* | common eastern brome grass | native | herbaceous |
| *Campsis radicans* | trumpet-creeper | native | woody |
| *Carya glabra* | pignut hickory | native | woody |
| *Celtis laevigata* | sugarberry | native | woody |
| *Celtis occidentalis* | common hackberry | native | woody |
| *Circaea canadensis* | enchanter's nightshade | native | herbaceous |
| *Cornus florida* | flowering dogwood | native | woody |
| *Datura stramonium* | Jimson-weed | nonnative | herbaceous |
| *Dennstaedtia punctilobula* | hay-scented fern | native | herbaceous |
| *Dichondra carolinensis* | Carolina ponyfoot | native | herbaceous |
| *Elaeagnus umbellata* | autumn olive | nonnative | woody |
| *Elymus hystrix* | bottlebrush grass | native | herbaceous |
| *Elymus villosus* | hairy wild rye | native | herbaceous |
| *Erigeron canadensis* | horseweed | native | herbaceous |
| *Eurybia divaricata* | white wood aster | native | herbaceous |
| *Fallopia convulvulus* | bindweed | nonnative | herbaceous |
| *Galium aparine* | catchweed bedstraw | native | herbaceous |
| *Galium lanceolatum* | lanceleaf wild licorice | native | herbaceous |
| *Geum canadense* | white avens | native | herbaceous |
| *Geum virginianum* | cream avens | native | herbaceous |
| *Glechoma hederacea* | ground-ivy | nonnative | herbaceous |
| *Hylodesmum glutinosum* | pointed-leaf tick-trefoil | native | herbaceous |
| *Impatiens capensis* | orange jewelweed | native | herbaceous |
| *Juncus tenuis* | path rush | native | herbaceous |
| *Lespedeza bicolor* | bush-clover | nonnative | woody |
| *Ligustrum sinense* | Chinese privet | nonnative | woody |
| *Lindera benzoin* | spicebush | native | woody |
| *Lonicera japonica* | Japanese honeysuckle | nonnative | woody |
| *Micranthes virginiensis* | early saxifrage | native | herbaceous |
| *Microstegium vimenium* | Japanese stiltgrass | nonnative | herbaceous |
| *Mitchella repens* | partridge-berry | native | herbaceous |
| *Morus rubra* | red mulberry | native | woody |
| *Muscadinia rotundifolia* | muscadine | native | woody |
| *Oxalis stricta* | common yellow wood-sorrel | native | herbaceous |
| *Parietaria pensylvanica* | Pennsylvania pellitory | native | herbaceous |
| *Parthenocissus quinquefolia* | Virginia-creeper | native | woody |
| *Persicaria longiseta* | long-bristled smartweed | nonnative | herbaceous |
| *Persicaria perfoliata* | mile-a-minute weed | nonnative | herbaceous |
| *Persicaria virginiana* | jumpseed | native | herbaceous |
| *Phryma leptostachya* | American lopseed | native | herbaceous |
| *Phytolacca americana* | common pokeweed | native | herbaceous |
| *Pilea pumila* | clearweed | native | herbaceous |
| *Potentilla indica* | mock strawberry | nonnative | herbaceous |
| *Prunus serotina* | black cherry | native | woody |
| *Quercus phellos* | willow oak | native | woody |
| *Robinia pseudoacacia* | black locust | native | woody |
| *Rosa multiflora* | multiflora rose | nonnative | woody |
| *Rubus pensilvanicus* | Pennsylvania blackberry | native | woody |
| *Rubus phoenicolasius* | wineberry | nonnative | woody |
| *Sanicula* spp. | snakeroots | native | herbaceous |
| *Securigera varia* | crown vetch | nonnative | herbaceous |
| *Smilax herbacea* | common carrion-flower | native | herbaceous |
| *Smilax rotundifolia* | common greenbrier | native | woody |
| *Solanum carolinense* | horse-nettle | native | herbaceous |
| *Symphoricarpos orbiculatus* | coralberry | native | woody |
| *Toxicodendron radicans* | poison ivy | native | woody |
| *Verbesina alternifolia* | wingstem | native | herbaceous |
| *Verbesina occidentalis* | yellow crownbeard | native | herbaceous |
| *Viola* spp. | violets | native | herbaceous |

**Supplementary Table 2b.** All plant species that emerged from seedbank samples.

|  |  |  |  |
| --- | --- | --- | --- |
| **Species** | **Common Name** | **Origin** | **Life Form** |
| *Ageratina altissima* | white snakeroot | native | herbaceous |
| *Ailanthus altissima* | tree-of-heaven | nonnative | woody |
| *Allium vineale* | wild onion | nonnative | herbaceous |
| *Amaranthus palmeri* | Palmer's amaranth | nonnative | herbaceous |
| *Anthoxanthum odoratum* | sweet vernal grass | nonnative | herbaceous |
| *Barbarea vulgaris* | yellow rocket | nonnative | herbaceous |
| *Boehmeria cylindrica* | false nettle | native | herbaceous |
| *Brickellia eupatorioides* | false boneset | native | herbaceous |
| *Bromus tectorum* | downy brome | nonnative | herbaceous |
| *Cardamine impatiens* | narrow-leaf bittercress | nonnative | herbaceous |
| *Chenopodium album* | lamb's-quarters | nonnative | herbaceous |
| *Cirsium vulgare* | bull thistle | nonnative | herbaceous |
| *Cyperus compressus* | poorland flatsedge | native | herbaceous |
| *Cyperus esculentus* | yellow nutsedge | native | herbaceous |
| *Cyperus lupulinus* | upland flatsedge | native | herbaceous |
| *Cyperus strigosus* | straw-colored flatsedge | native | herbaceous |
| *Digitaria sanguinales* | large crabgrass | nonnative | herbaceous |
| *Elaeagnus umbellata* | autumn olive | nonnative | woody |
| *Erechtites hieraciifolius* | burnweed | native | herbaceous |
| *Erigeron anuus* | annual fleabane | native | herbaceous |
| *Erigeron canadensis* | horseweed | native | herbaceous |
| *Eupatorium capillifolium* | dog-fennel | native | herbaceous |
| *Gamochaeta purpurea* | purple cudweed | native | herbaceous |
| *Geranium carolinianum* | Carolina geranium | native | herbaceous |
| *Hedeoma pulegioides* | American pennyroyal | native | herbaceous |
| *Juncus effuses* | common rush | native | herbaceous |
| *Juncus tenuis* | path rush | native | herbaceous |
| *Lespedeza cuneata* | sericea | nonnative | herbaceous |
| *Liriodendron tulipifera* | tuliptree | native | woody |
| *Lobelia inflata* | indian tobacco | native | herbaceous |
| *Micranthes micranthidifolia* | lettuce saxifrage | native | herbaceous |
| *Micranthes virginiensis* | early saxifrage | native | herbaceous |
| *Microstegium vimenium* | Japanese stiltgrass | nonnative | herbaceous |
| *Mollugo verticillata* | carpetweed | nonnative | herbaceous |
| *Muhlenbergia schreberi* | nimblewill | native | herbaceous |
| *Paulownia tomentosa* | royal paulownia | nonnative | woody |
| *Persicaria longiseta* | long-bristled smartweed | nonnative | herbaceous |
| *Physalis angulata* | cut-leaf ground-cherry | native | herbaceous |
| *Physalis virginiana* | Virginia ground-cherry | native | herbaceous |
| *Phytolacca americana* | common pokeweed | native | herbaceous |
| *Platanus occidentalis* | American sycamore | native | woody |
| *Poa annua* | annual bluegrass | nonnative | herbaceous |
| *Poa trivialis* | rough bluegrass | nonnative | herbaceous |
| *Polypremum procumbens* | rustweed | native | herbaceous |
| *Potentilla indica* | mock strawberry | nonnative | herbaceous |
| *Prunus pensylvanica* | pin cherry | native | woody |
| *Robinia pseudoacacia* | black locust | native | woody |
| *Rubus allegheniensis* | Allegheny blackberry | native | woody |
| *Rubus pensilvanicus* | Pennsylvania blackberry | native | woody |
| *Rumex crispus* | curly dock | nonnative | herbaceous |
| *Solanum ptychanthum* | eastern black nightshade | native | herbaceous |
| *Solidago canadensis* | Canada goldenrod | native | herbaceous |
| *Stellaria media* | common chickweed | nonnative | herbaceous |
| *Verbascum thapsus* | great mullein | nonnative | herbaceous |
| *Verbena urticifolia* | white vervain | native | herbaceous |
| *Verbesina occidentalis* | yellow crownbeard | native | herbaceous |
| *Veronica arvensis* | corn speedwell | nonnative | herbaceous |
| *Veronica officinalis* | common speedwell | nonnative | herbaceous |
| *Veronica peregrina* | common purslane speedwell | native | herbaceous |
| *Veronica persica* | bird's-eye speedwell | nonnative | herbaceous |
| *Vicia tetrasperma* | slender vetch | nonnative | herbaceous |
| *Viola sororia* | common blue violet | native | herbaceous |
| *Vitis vulpina* | frost grape | native | woody |

**Supplementary Table 3.** Top ten species by life form and origin that were observed across treatments. Species are listed in descending order by abundance (vegetation) and count (seedbank). \*Less than ten woody species per treatment germinated in the seedbank assay, so all species are listed there.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Control** | | |  | ***Verticillium nonalfalfae*** | | |
| **Life Form** | **Sample** | **Species** | **Origin** |  | **Sample** | **Species** | **Origin** |
| **Woody** | **Vegetation** | *Elaeagnus umbellata* | nonnative |  | **Vegetation** | *Lindera benzoin* | native |
| *Lindera benzoin* | native |  | *Elaeagnus umbellata* | nonnative |
| *Berberis thunbergii* | nonnative |  | *Rubus pensilvanicus* | native |
| *Ailanthus altissima* | nonnative |  | *Rosa multiflora* | nonnative |
| *Campsis radicans* | native |  | *Rubus phoenicolasius* | nonnative |
| *Symphoricarpos orbiculatus* | native |  | *Asimina triloba* | native |
| *Lonicera japonica* | nonnative |  | *Toxicodendron radicans* | native |
| *Acer negundo* | native |  | *Parthenocissus quinquefolia* | native |
| *Acer rubrum* | native |  | *Berberis thunbergii* | nonnative |
| *Parthenocissus quinquefolia* | native |  | *Ailanthus altissima* | nonnative |
| **Seedbank\*** | *Ailanthus altissima* | nonnative |  | **Seedbank\*** | *Paulownia tomentosa* | nonnative |
| *Rubus allegheniensis* | native |  | *Ailanthus altissima* | nonnative |
| *Paulownia tomentosa* | nonnative |  | *Rubus allegheniensis* | native |
| *Elaeagnus umbellata* | nonnative |  | *Rubus pensilvanicus* | native |
| *Liriodendron tulipifera* | native |  | *Liriodendron tulipifera* | native |
| *-* | - |  | *Prunus pensylvanica* | native |
| *-* | - |  | *Robinia pseudoacacia* | native |
| *-* | - |  | *Vitis vulpina* | native |
| *-* | - |  | *-* | - |
| - | - |  | - | - |
| **Herbaceous** | **Vegetation** | *Verbesina occidentalis* | native |  | **Vegetation** | *Microstegium vimenium* | nonnative |
| *Elymus villosus* | native |  | *Verbesina occidentalis* | native |
| *Microstegium vimenium* | nonnative |  | *Phytolacca americana* | native |
| *Boehmeria cylindrica* | native |  | *Dennstaedtia punctilobula* | native |
| *Potentilla indica* | nonnative |  | *Potentilla indica* | nonnative |
| *Actaea racemosa* | native |  | *Elymus hystrix* | native |
| *Asplenium platyneuron* | native |  | *Persicaria longiseta* | nonnative |
| *Alliaria petiolata* | nonnative |  | *Erigeron canadensis* | native |
| *Impatiens capensis* | native |  | *Asplenium platyneuron* | native |
| *Pilea pumila* | native |  | *Boehmeria cylindrica* | native |
| **Seedbank** | *Boehmeria cylindrica* | native |  | **Seedbank** | *Microstegium vimenium* | nonnative |
| *Stellaria media* | nonnative |  | *Phytolacca americana* | native |
| *Potentilla indica* | nonnative |  | *Potentilla indica* | nonnative |
| *Poa trivialis* | nonnative |  | *Solanum ptychanthum* | native |
| *Poa annua* | nonnative |  | *Persicaria longiseta* | nonnative |
| *Phytolacca americana* | native |  | *Stellaria media* | nonnative |
| *Juncus tenuis* | native |  | *Mollugo verticillata* | native |
| *Lespedeza cuneata* | nonnative |  | *Veronica persica* | nonnative |
| *Microstegium vimenium* | nonnative |  | *Bromus tectorum* | nonnative |
| *Cyperus esculentus* | native |  | *Solidago canadensis* | native |

![A graph with different colored bars

Description automatically generated]()**Supplementary Figure 1.** Basal area of all tree species with stems > 2.5 cm diameter at breast height (DBH) for each inventoried quadrat. The figure on the left contains the three control quadrats, and the figure on the right contains the six treatment quadrats. Two quadrats from plots treated with *Verticillium nonalfalfae* (RAT and WMT) had no trees of the minimum DBH or larger, and only a single stem of *Ailanthus altissima* was found in a treated area (SCT).