Incorporation of Pollinator Plantings to Enhance Ecosystem Functions and Durability of Transportation Right-of-Way Infrastructure

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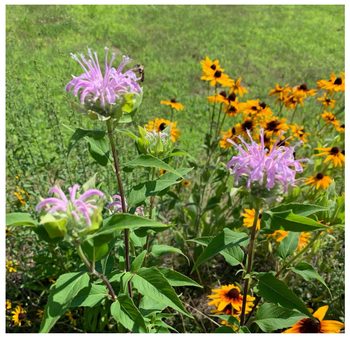
Introduction + Objectives

While most highway right-of-ways (ROWs) are vegetated, few planted roadsides cater to the needs of native pollinators while performing necessary DOT land requirements (dust abatement, erosion control, etc.) ROWs offer ample opportunity for the establishment of native New England grasses and flowering plants. This can increase the lands ecosystem services by providing habitat for endangered native pollinators while improving roadside aesthetics, stormwater filtration, and erosion control.

Regionally native and insect pollinated wildflower species were evaluated for the adaptation of the periodically mowed ROW environment. Methods of establishment were subsequently evaluated for their effectiveness in establishing a pollinator meadow from seed, and existing roadside vegetation was considered regarding its benefits for pollinators. Our objective is to promote the conservation of native pollinator species, assess optimal survival and management strategies, introduce additional native species with demonstrated survival and pollination capabilities, and apply native pollinator establishment techniques along highway ROW environments.



(left) Wild Burgamot (*Monarda fistulosa)* in late June,(right) Yellow Garden Spider (*A. aurantia*) on Virginia Wild Rye (*Elymus virginicus*)

Application and Impacts

This project aims to enhance the capacity of DOT staff and contractors in the establishment of successful ROW pollinator plantings. Expansive medians can play a vital role in providing minimally disturbed early successional habitat, a habitat of which is difficult to come by throughout New England. Implementing best practices for native seed plantings and improved survivability results in optimized methods and increased cost-efficiency for pollinator planting initiatives.

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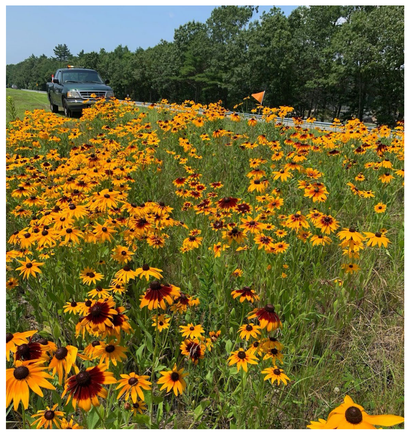

(left) Roadside seeded plantings in early July; (right) Spring Ladies'-tresses (*Spiranthes vernalis*) – a Rhode Island native orchid and species of concern

Methodology

To test growth and survival of insect-pollinated New England native wildflowers, test plots were created along an I-95 ROW. Native wildflowers were identified, and seeds were collected from regional wild plant societies and the local horticulture industry, taking care to include local ecotypes whenever possible. Seeds were grown up to transplantable plugs in URI greenhouses then transplanted into test plots located in the I-95 median in West Greenwich, RI. Species with acceptable performance were recommended for use in roadside plantings. A seed-mix was developed and used to evaluate establishment protocols, which include:

1. No-till seeding with Truax native seed drill into low-mowed (scalped) existing vegetation
2. No-till seeding with Truax native seed drill into vegetation which has been killed with herbicide (glyphosate)
3. Broadcast seeding + tracking on screened loam spread over ground which has been scalped to remove existing vegetation
4. Hydroseeding onto screened loam spread over ground which has been scalped to remove existing vegetation
5. Hydroseeding onto weed-free compost spread over low-mowed (scalped) existing vegetation

Treatments were administered throughout 4 blocks, each separated by 250 ft. Within each block, individual plots measuring 20x40 ft and positioned at least 20 ft from the road, were subject to one treatment per plot. Trials were monitored, and data collected on percent establishment for each species, time to emergence, time to flower, survival, and weed incursion. The most successful establishment method will be recommended to RIDOT for implementation of native New England pollinator meadows along highway ROWs.

(left) Hairy-belted Miner Bee (*A. hirticintca*) On Silverrod *(Solidago bicolor);* (right) Half-Black Bumblebee (*B. vagans*) queen on frost aster (*Symphyotrichum pilosum*)

Results

Treatment 3 (broadcast seed over screened loam then tracking with dozer) and treatment 4 (broadcasting seed over freshly-spread screened loam followed by hydromulching) performed similarly resulted in significantly more species and significantly more insect-pollinated species than other treatments.

Treatment	Total Species	Grasses	Forbs	Bare Ground
1	9.2 cd	6.7 a	1.4 d	9% c
2	9.5 c	5.2 bc	3.2 c	15% b
3	13.7 b	4.9 b	7.8 b	19% a
4	14.6 a	4.9 b	8.5 a	20% a
5	6.7 d	4.2 c	1.7 d	13% bc

Values are means across four replications and five sampling events, estimated using repeated measures ANOVA. Letters indicate significant differences within a column at 95% confidence. Low diversity in treatment 5 may be due to predation by meadow voles attracted to the compost layer.

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