

# Plant Species Recommendations for Green Roofs in Northern Climates-Based on Survey

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The purpose of this survey was to identify plant species which are suitable for green roofs in northern climates, such as Ontario, Canada. In addition to this survey, we have conducted green roof trials on rooftops that also identified suitable plant species for green roofs in northern climates. Below are some of the results of our survey studies.

Plant species listed under either “Recommended” or “Non-recommended” lists below are only suggestions, as this survey was solely conducted towards the end of the 2012 growing season. Just a reminder is that there was a very dry summer in Ontario and some other parts of N. America in 2012. Furthermore, these suggestions are directed at green roofs which match the same (or highly similar) criteria (media depth, lighting, irrigation, etc.) as the green roofs for which the surveys were conducted. However, for green roofs with differing criteria, the lists below may be used as a rough guideline for plant species selection.

Plant species were visually assessed at each green roof site and assigned a performance rating between zero and ten (zero = dead, five = mediocre performance/overall appearance, and ten = exceptional performance/overall appearance). All species recommended in the lists below received a performance rating of five or higher. All species not recommended received a performance rating below five and/or had overly aggressive or weedy growth behaviours.

## **Green roof #1, Toronto, ON**

Green roof details:

- Installed in 1998 (10,000 sq. ft.)
- Extensive (4” media depth)
- Mat system (Sopranature System by Soprema)
- Rooftop height: approximately 3 to 3.5 stories
- Lighting: mixture of full sun and partial shade
- Irrigation: sprinklers irrigate the plants as needed, with the help of a rain sensor
- Maintenance: approximately four times per year, the roof is inspected, garbage is removed, and vegetation is cut back as needed

Recommended plant species (specific for this type of green roof):

- *Allium schoenoprasum* (Wild Chives)
- *Aster ericoides* (Heath Aster)
- *Aster laevis* (Smooth Aster)
- *Aster ptarmicoides* (Upland White Aster)
- *Aster* sp. (other Aster species)
- *Campanula carpatica* (Carpathian Bellflower)
- *Echinacea purpurea* (Purple Coneflower)
- *Festuca* spp. (Fescue species)
- *Fragaria* sp. (Strawberry species)
- *Hypericum perforatum* (St. John's-wort)
- *Lupinus perennis* (Lupine)
- *Monarda* sp. (Bergamot species)
- *Rosa* sp. (Rose species)
- *Rudbeckia hirta* (Black-Eyed Susan)
- *Solidago* sp. (Goldenrod species)

Non-recommended plant species (specific for this type of green roof):

- *Medicago lupulina* (Black medick)
- *Trifolium* sp. (Clover species)
- *Vicia cracca* (Tufted vetch)

## Green roof #2, Toronto, ON

### Green roof details:

- Installed in 2010 (35,000 sq. ft.)
- Mixture of extensive (4¼" media depth) and semi-intensive (6" media depth)
- Module system (LiveRoof® Ontario Inc.)
- Rooftop height: 3 stories
- Lighting: mixture of full sun and partially shaded areas
- Irrigation: during the first two years sprinklers irrigated as needed to aid plant establishment and rain sensors helped to determine the volume of water required for each irrigation – after this point in time, irrigation only occurs during extreme droughts
- Maintenance: during spring, perennials are cut back, and as needed, the green roof is weeded and garbage is removed

### Recommended plant species (specific for this type of green roof):

- *Achillea millefolium* 'Terra Cotta' (Terra Cotta Yarrow)
- *Achillea tomentosum* (Woolly Yarrow)
- *Allium cernuum* (Nodding Onion)
- *Allium schoenoprasum* 'Forescate' (Chives)
- *Allium senescens* var. *glaucum* (Ornamental Onion / Curly Onion)
- *Amsonia hubrichtii* (Arkansas Blue Star) – perform better in partial shade than in full sun
- *Calamagrostis* 'Karl Foerster' (Karl Foerster Feather Reed Grass)
- *Campanula rotundifolia* (Bluebell Bellflower / Harebell)
- *Echinacea pallida* (Pale Purple Coneflower) - perform better in partial shade than in full sun
- *Echinacea paradoxa* (Bush's Purple Coneflower / Yellow Coneflower) - perform better in partial shade than in full sun
- *Echinacea purpurea* (Eastern Purple Coneflower) - perform better in partial shade than in full sun
- *Euphorbia myrsinites* (Donkey Tail Spurge)
- *Gaillardia* 'Oranges and Lemons' (Oranges and Lemons Blanket Flower)
- *Geum triflorum* (Prairie Smoke)
- *Helictotrichon sempervirens* (Blue Oat Grass)
- *Liatris spicata* 'Kobold' (Blazing Star / Gay Feather)
- *Monarda fistulosa* (Bergamot)
- *Nepeta xfaassenii* 'Walkers Low' (Walker's Low Catmint)
- *Panicum virgatum* 'Heavy Metal' (Heavy Metal Switch Grass) - perform better in partial shade than in full sun
- *Penstemon digitalis* (Foxglove Beardtongue)
- *Perovskia atriplicifolia* 'Little Spire' (Little Spire Russian Sage)
- *Rudbeckia fulgida fulgida* (Orange Coneflower)
- *Scabiosa columbaria* (Pincushion Flower)
- *Schizachyrium scoparium* (Little Bluestem)
- *Sesleria autumnalis* (Autumn Moor Grass)
- *Solidago rugosa* 'Fireworks' (Fireworks Goldenrod)
- *Solidago* sp. (Other Goldenrod species)
- *Sporobolus heterolepis* (Prairie Dropseed)
- *Stachys byzantina* (Lamb's-ears)

### Non-recommended plant species (specific for this type of green roof):

- *Aster laevis* (Smooth Aster)
- *Deschampsia flexuosa* (Wavy Hair Grass)
- *Vicia cracca* (Tufted Vetch)

### **Green roof #3, Toronto, ON**

#### Green roof details:

- Installed in 2010 (7,500 sq. ft.)
- Mostly extensive (4" media depth in the butterfly/medicinal green roof garden) - wetland green roof garden is semi-intensive (6" media depth)
- Monolithic system
- Rooftop height: 2 stories
- Lighting: mostly full sun - wetland garden receives partial shade
- Irrigation: irrigation is performed as needed via a hand-held garden hose and/or an oscillating sprinkler
- Maintenance: weeding is performed as needed

#### Recommended plant species (specific for this type of green roof):

- Wetland green roof garden:
  - *Aster* spp. (Aster species)
  - *Carex* spp. (Sedge species)
  - *Eupatorium maculatum* (Joe-Pye Weed)
  - *Rosa acicularis* (Prickly Wild Rose)
  - *Verbena stricta* (Hoary Vervain)
- Butterfly/medicinal green roof garden:
  - *Allium cernuum* (Nodding Onion)
  - *Aster* sp. (Aster species)
  - *Baptisia australis* (False Indigo)
  - *Campanula rotundifolia* (Harebell)
  - *Coreopsis lanceolata* (Sand Coreopsis)
  - *Fragaria virginiana* (Wild Strawberry)
  - *Monarda fistulosa* (Bergamot)
  - *Oenothera biennis* (Evening Primrose) – may need to stake tall plants and/or plant in non-windy areas
  - *Schizachyrium scoparium* (Little Bluestem)
  - *Solidago* sp. (Goldenrod species)
  - *Sporobolus heterolepis* (Prairie Dropseed)
  - *Verbena stricta* (Hoary Vervain)

#### Non-recommended plant species (specific for this type of green roof):

- Wetland and butterfly/medicinal green roof gardens:
  - *Trifolium* sp. (Clover species)
    - Due to their aggressive nature, it is recommended that Clover species not be combined with short species, such as most *Sedum* ground cover species

### **Green roof #4, Toronto, ON**

#### Green roof details:

- Installed in 2009 (5,231 sq. ft.)
- Semi-intensive (6" media depth)
- Monolithic system
- Rooftop height: 5 stories
- Lighting: mixture of full sun and partial shade
- Irrigation: automatic sprinklers irrigate the green roof from April through October for three hours each night (hand-watering occurs during extreme droughts, with the use of a garden hose)
  - Note: at the time this survey was conducted, the entire green roof garden was irrigated, not just 60% (which was the original irrigation protocol)
- Maintenance: weeding is conducted as needed

#### Recommended plant species (specific for this type of green roof):

- *Achillea millefolium* (Common Yarrow)
- *Allium cernuum* (Nodding Onion)

- *Allium schoenoprasum* (Wild Chives)
- *Allium tuberosum* (Garlic Chives)
- *Bouteloua curtipendula* (Side-Oats Grama)
- *Coreopsis lanceolata* (Sand Coreopsis)
- *Gaillardia* sp. (Blanket Flower)
- *Liatris squarrosa* (Ontario Blazing Star / Scaly Blazing Star)
- *Nepeta xfaassenii* 'Walker's Low' (Walker's Low Catmint)
- *Penstemon hirsutus* (Hairy Beardtongue)
- *Phlox subulata* (Creeping Phlox)
- *Rudbeckia* sp. (*R. hirta* or *R. triloba*), (Black-Eyed Susan or Brown-Eyed Susan)
- *Schizachyrium scoparium* (Little Bluestem)
- *Solidago ptarmicoides* (Upland White Aster / Upland White Goldenrod)

### **Green roof #5, Guelph, ON**

Green roof details:

- Installed in 2008 (approximately 19,000 sq. ft.)
- Semi-intensive (6" media depth)
- Mat system (Nedlaw Living Roofs)
- Rooftop height: 4 and 5 stories
- Lighting: mostly full sun – half of the lower green roof receives partial shade
- Irrigation: green roof is not irrigated (hoses would be used if irrigation was ever required)
- Maintenance: tall grasses are cut back each year with a weed-whacker

Recommended plant species (specific for this type of green roof):

- *Bouteloua curtipendula* (Side-Oats Grama)
- *Coreopsis* sp. (Coreopsis species)
- *Erigeron annuus* (Daisy Fleabane)
- *Potentilla simplex* (Common Cinquefoil)
- *Rudbeckia hirta* (Black-Eyed Susan)