

Twin Cities assessment of turfgrass and bee lawn flora

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Lawn selection

Participating properties were chosen to include traditional turfgrass lawns and homeowner-reported bee lawns (Figure 1). Bee lawns include flowering forbs and legumes throughout the lawn as pollinator resources. The pool of properties also reflected a gradient in socioeconomic status and were in each county of Minnesota's Twin Cities Metropolitan Area. A total of 79 lawns were assessed in 2022 and 2023.



Figure 1. (A) The locations of each participating property. (B) An example of a turfgrass lawn and a bee lawn; a common bee lawn mix consists of fine fescue (*Festuca* spp.), white clover (*Trifolium repens*), self-heal (*Prunella vulgaris*), and creeping thyme (*Thymus serpyllum*).

Data collection

Lawn species counts

Plant species or classifications were determined and counted with a quadrat-grid method using 1 m² grid with 20 intersections in 10-30 sampling locations throughout the lawn (Figure 2). Each sampling location was categorized as being in the front yard, backyard, or boulevard at each property.



Figure 2. (A) Researchers collecting species identification data. (B) The parcel of a participating property with boulevard, front yard, and backyard boundaries and sample locations labeled.

Broadleaves in bloom

Broadleaf species in bloom were identified at each 1 m² sampling location. A relationship between this data and bumble bee (*Bombus* spp.) data will be examined in the future.

Property and management data

Soil moisture at each sampling location, lawn height at time of visit, estimated mowing height, yard tree count, soil characteristics, and presence of irrigation were recorded (Figure 3).



Figure 3. (A) A portable soil moisture sensor in a boulevard sampling location. (B) A turfgrass height of cut gauge. (C) A soil sample pulled from a lawn. (D) A portable sprinkler on a lawn.

Results

Lawn species counts

Of the 79 lawns assessed over 2 years, none were monocultures. Species richness ranged from 4-38 species per property. The density of species richness was similar by lawn type, but turfgrass lawns have a slight bimodal distribution, likely due to differences in management intensity (Figure 4). Species richness density varied spatially, with the highest found in a cluster of properties surrounding the Mississippi River between Minneapolis and St. Paul. The most abundant species recorded was Kentucky bluegrass (*Poa pratensis*), which was found in all lawns assessed. Fine fescue (*Festuca* spp.) was found in all but 1 property in 2022 and all but 2 properties in 2023. The lawn species/classifications abundance ranks differed by lawn type (Figure 5).

Broadleaves in bloom

The most abundant broadleaf species in bloom at time of sampling were common yellow wood-sorrel (*Oxalis stricta*), white clover (*Trifolium repens*), dandelion (*Taraxacum officinale*), and black medic (*Medicago lupulina*) (Figure 6). Species ranks of flowering broadleaves differed by lawn type. Benefits to local pollinators of some recorded flowering broadleaf species is unknown.

Property and management data

Due to drought periods in 2022 and 2023, the moisture of all lawns differed throughout the growing season. This likely affected the lawn species counts and the presence of necrotic leaves and bare soil exposure. For example, classifications such as necrotic leaves, bare soil, and prostrate spurge (*Euphorbia glyptosperma*) tended to be in drier areas of lawns, whereas white clover (*Trifolium repens*), annual bluegrass (*Poa annua*), and creeping bentgrass (*Agrostis stolonifera*) were found in wetter lawn areas relative to the property soil moisture average (Figure 7). The average estimated mowing height across 2022 and 2023 were similar by lawn type. "No-mow" areas were found in 7 and 8 properties in 2022 and 2023, respectively, in which mowing height was not measured.

Lawns are not monocultures.

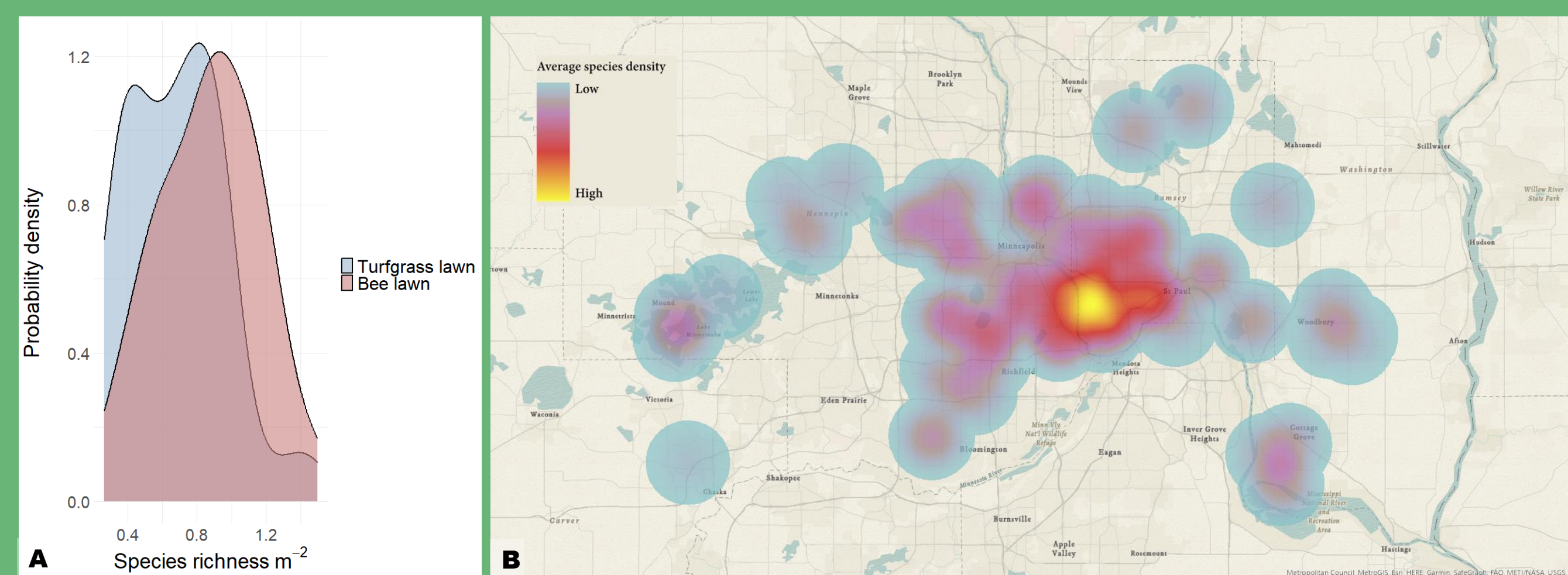


Figure 4. (A) The probability density of species richness density by lawn across 2022 and 2023. (B) A spatial representation of lawn species richness density in the Twin Cities Metropolitan Area across 2022 and 2023.

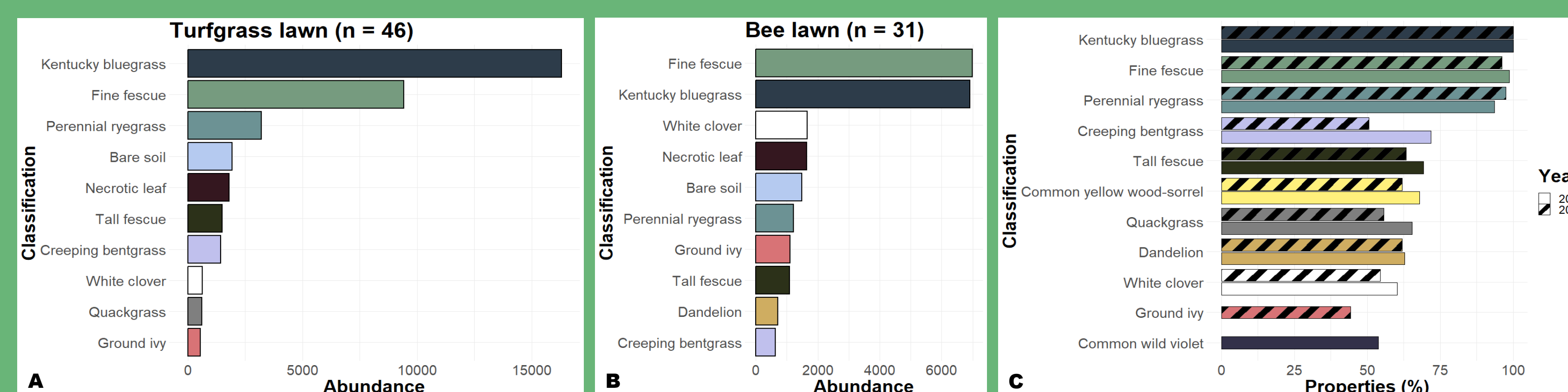


Figure 5. The top 10 most abundant classifications in (A) turfgrass and (B) bee lawns across 2022 and 2023. (C) The top 10 most widespread species each year measured by the percent of properties the species were found.

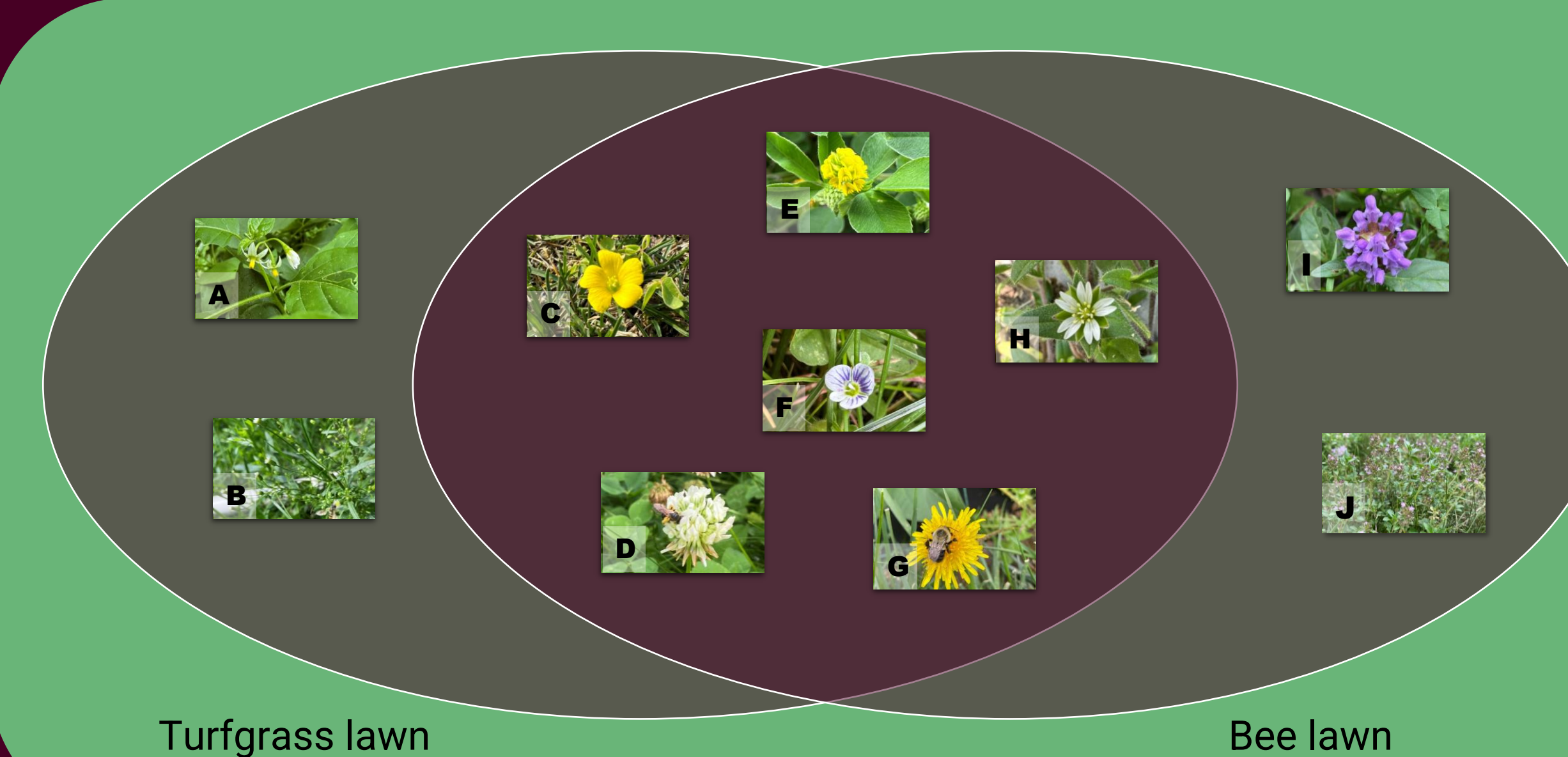


Figure 6. Flowers of the top 8 occurring broadleaves in bloom in 2022 and 2023 in each lawn type. Species on the far left and far right are those that fell in the top 8 for turfgrass and bee lawns, respectively. Top occurring flowers in both lawn types are in the center. Species depicted are: (A) eastern black nightshade (*Solanum ptychanthum*), (B) horseweed (*Coyza canadensis*), (C) common yellow wood-sorrel (*Oxalis stricta*), (D) white clover (*Trifolium repens*), (E) black medic (*Medicago lupulina*), (F) common chickweed (*Stellaria media*), (G) dandelion (*Taraxacum officinale*), (H) Mouse-ear chickweed (*Cerastium fontanum*), (I) self-heal (*Prunella vulgaris*), and (J) creeping thyme (*Thymus serpyllum*).

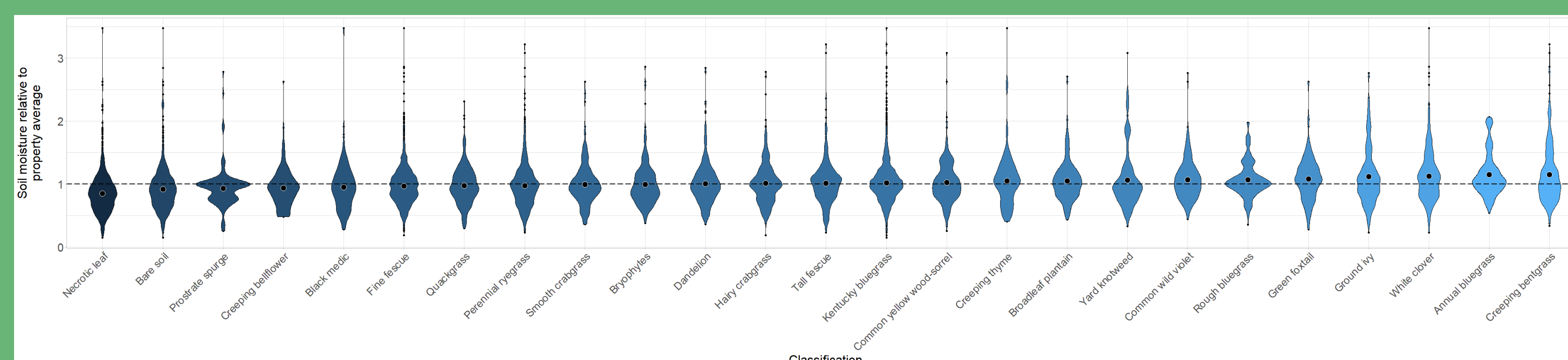


Figure 7. Soil moisture relative to property average of the top 25 most abundant classifications across 2022 and 2023. Values below the dashed line at $y = 1$ represent classifications found in areas drier than the property average soil moisture, and those above the dashed line represent classifications found in areas wetter than the property average soil moisture.

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