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Title:
Bromus tectorum population root and shoot trait responses to differing substrate types

Abstract:

Soil texture has important ramifications on the shape and size of roots as well as impacting how much water is taken up and the distribution of nutrients in the soil. These factors lead to differences in growth characteristics and plant performance. However, what traits and how the plant responds to the differences in soil characteristics differ by species and populations. Here we tested the impact of three different soil types (loam, sand, and Turface – small clay pellets) on the root and shoot growth of two populations of the invasive grass, *Bromus tectorum*. Loam soil had the greatest soil moisture content and held the most water. Sand and Turface held similar amounts of water and 60% less water than the loam soil. The two populations responded similarly to all soil types and traits measured. Plants were taller in loam soil and sand, whereas they were shortest in the Turface. Additionally, plants produced most lateral roots in soil where lateral root production in loam and Turface was similar. These results reinforce that properties of the substrate other than water content explains trait outcomes.

Key words:

Water stress, invasive grass, lateral roots, intraspecific trait variation, sand, gravel, Turface

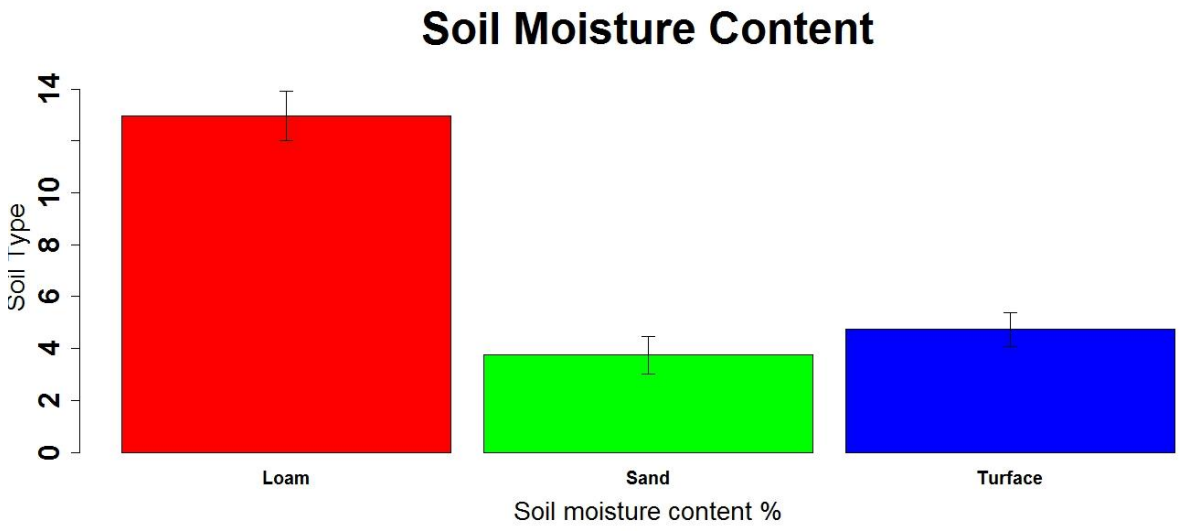
File descriptions & Metadata:
The file "Foxx_and_ Wojcik _data" contains the data collected in this study. The tab "Metadata" contains the description of the data including explanations for the variables and the factor levels used. The "SMC" tab contains data related to soil moisture content assay.

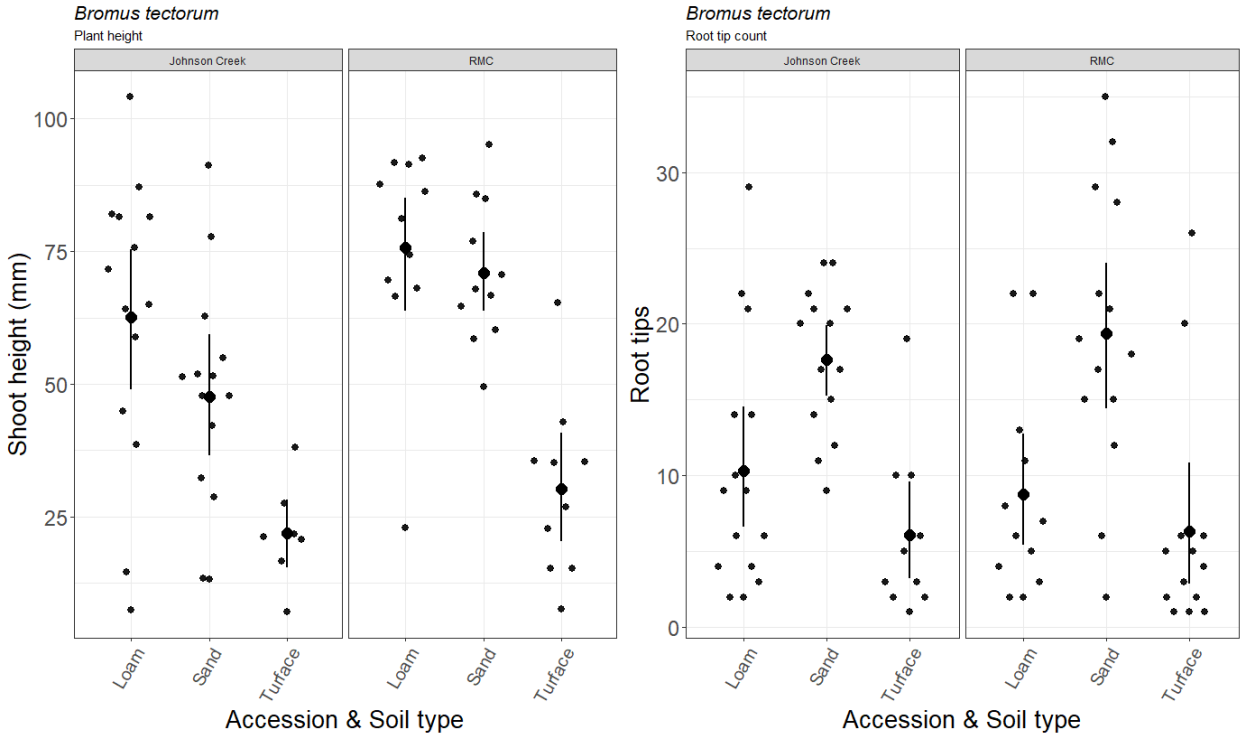
Methods:

Cone-tainers were filled with one of three substrate types: commercial fine sand, loam ((Farfad® germination mix: plug grade Canadian Sphagnum peat moss, plug grade Perlite, wetting Agent, Dolomitic Limestone, Starter nutrient charge with gypsum, Vermiculite), and Turface clay pellets. We surface sterilized the wild-collected seeds of both accessions with 8% bleach solution for 30 seconds followed by a DI water rinse for one minute. Next, we placed seeds of each accession on 90 mm diameter petri dishes filled with 1.5% solidified agar for cold moist stratification at 3°C in a refrigerator at the Chicago Botanic Garden (Glencoe, IL, USA) until we observed radicle emergence (1mm). Cold moist stratification began on 2015-10-24, and seeds were moved to the growth chamber on 2015-10-31 for warm stratification. Plants were planted in the substrates on 2015-11-04. Plants grew for 14 days and we applied MS solution at planting: 4.43g of MS per 2L (for a half strength mix).

We measured plant height.at 7 days. At harvest, we mounted the plants on labeled paper and counted the number of lateral roots and main roots. Soil moisture content: We used a soil moisture probe to assess the soil moisture content (SMC) of each substrate type after wetting the samples.

Figures:


Soil Moisture Content
Soil Type
0
2
4
6
8
10
14
Loam
Sand
Turface
Soil moisture content %


Bromus tectorum
Plant height
Johnson Creek
RMC
Shoot height (mm)
100
75
50
25
Loam
Sand
Turface
Accession & Soil type

Bromus tectorum
Root tip count
Johnson Creek
RMC
Root tips
30
20
10
0
Loam
Sand
Turface
Accession & Soil type