Population Level Response of Downy Brome to Soil Growing Medium

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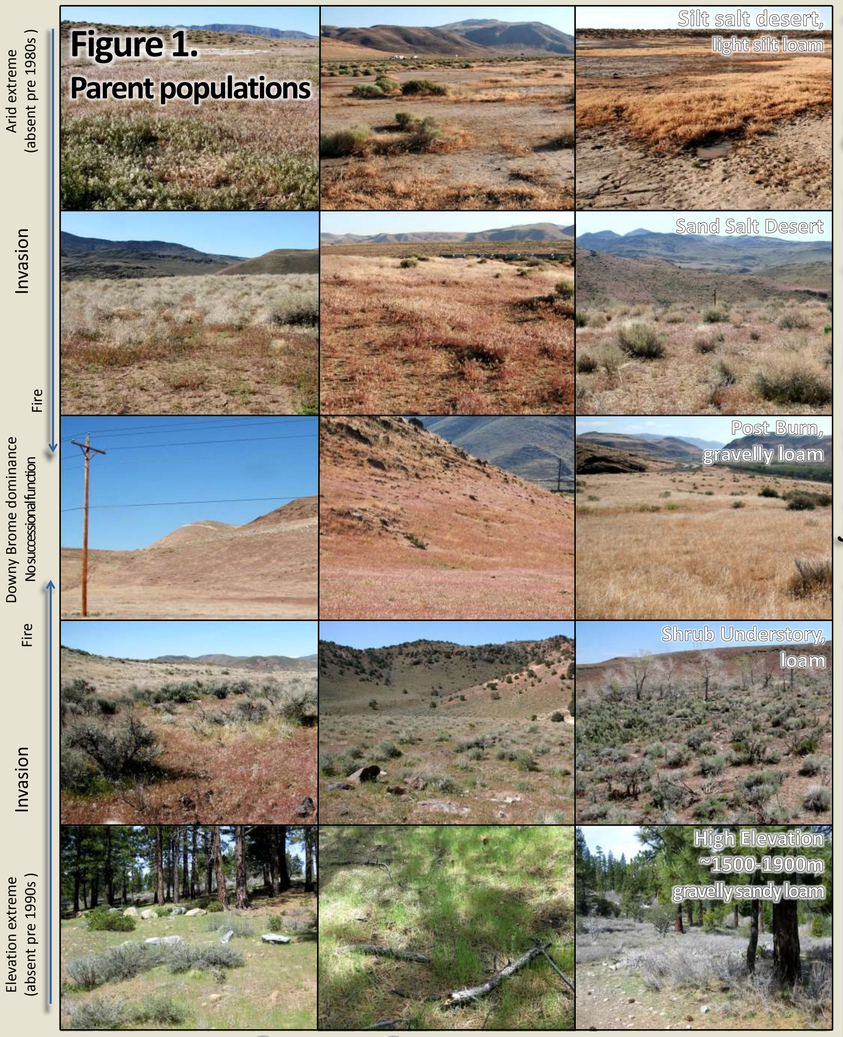
Downy brome (*Bromus tectorum*) is the most ubiquitous exotic invasive weed in the Intermountain West. A major issue for management is the extreme generalist plastic nature of downy brome. It invades from the lowest salt deserts to the upland pine forest.



We hypothesize that soil growing medium will primarily affect response variables such as biomass, representing some degree of plasticity for all downy brome populations sampled.

Figure 3. Left Tag = Seed Source, Right Tag = Soil Type. Both larger plants are in their "own" soil.

Methods

In a greenhouse reciprocal garden we tested two treatment variables 1) seed source population (n=5) and 2) soil type (n=5). We measured four response variables:
1) Biomass 2) Seed to biomass ratio 3) Days to flowering and 4) Total life duration.

Seed was collected from parent populations **(Figure 1)** and then grown for 2 generations in a greenhouse under equal conditions before experiment to avoid any maternal environment effects. Pots were watered equally (100ml/ 3days)

Results

Our results found that biomass differed by soil type and seed source **(Figure 2)**. High elevation populations had the largest biomass irrespective of soil medium. Among the lower elevation populations only the salt desert populations ranked the greatest in its own soil*, possibly indicating adaptation to the harsh salt desert habitat **(Figure 3)**.

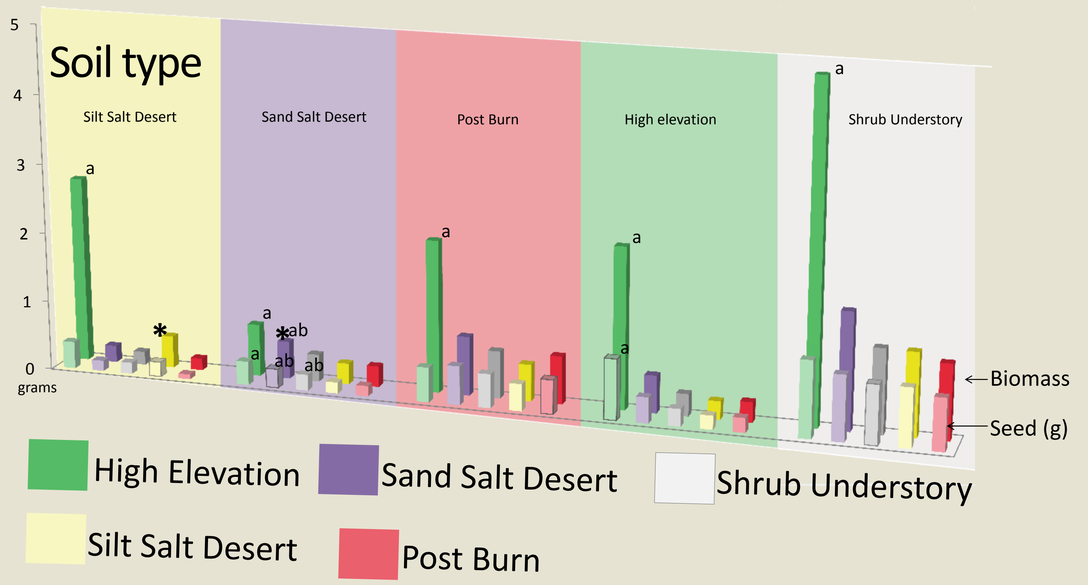


Figure 2. Total and seed biomass. Seed source on the X-axis and grouped by soil type.
- a, ab represent significant differences (p<0.05) from group

Table 1. Reproductive percent of total biomass.

	Soil type	Seed Source
High Elevation	66 a	29 b
Post Burn	63 ab	63 a
Shrub Understory	59 ab	67 a
Sand Salt Desert	50 bc	61 a
Silt Salt Desert	38 c	61 a

Seed to total biomass ratios responded to soil type and seed source **(Table 1)**. Plants exhibited lower resource allocation to seed production when grown in silt salt desert soils. Downy brome seed from higher elevations displayed the lowest percent of seed to total biomass.

Days to flowering differed by seed source **(Figure 4)**. Soil type had little effect on flower timing (sphere size). High elevation seed source exhibited delayed flowering and a long life span. Total life span differed more by soil type than seed source. Salt desert soils lead to shorter life spans.

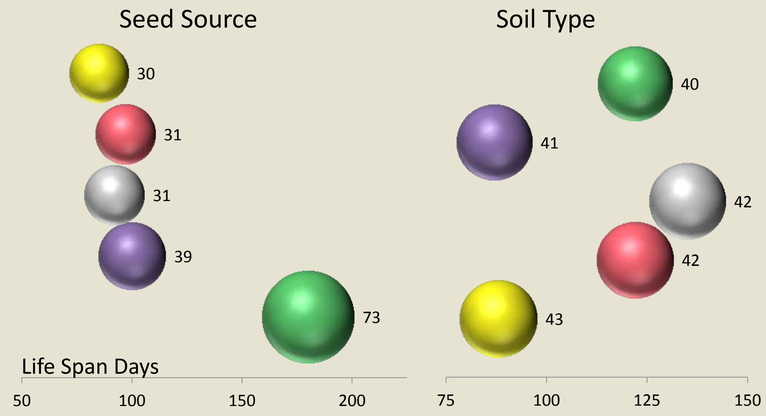


Figure 4. Life span on X-Axis. Data label (Sphere size) is days to flowering.

Discussion

While most of the results concur with previous findings, we also report population level fixed biomass differences. Seed From high elevation populations produced larger plants. The benefit of this is unclear. Larger plants for the most part did not produce significantly more seed than smaller plants. Population level biomass differences could have important wildfire fuels management implications.