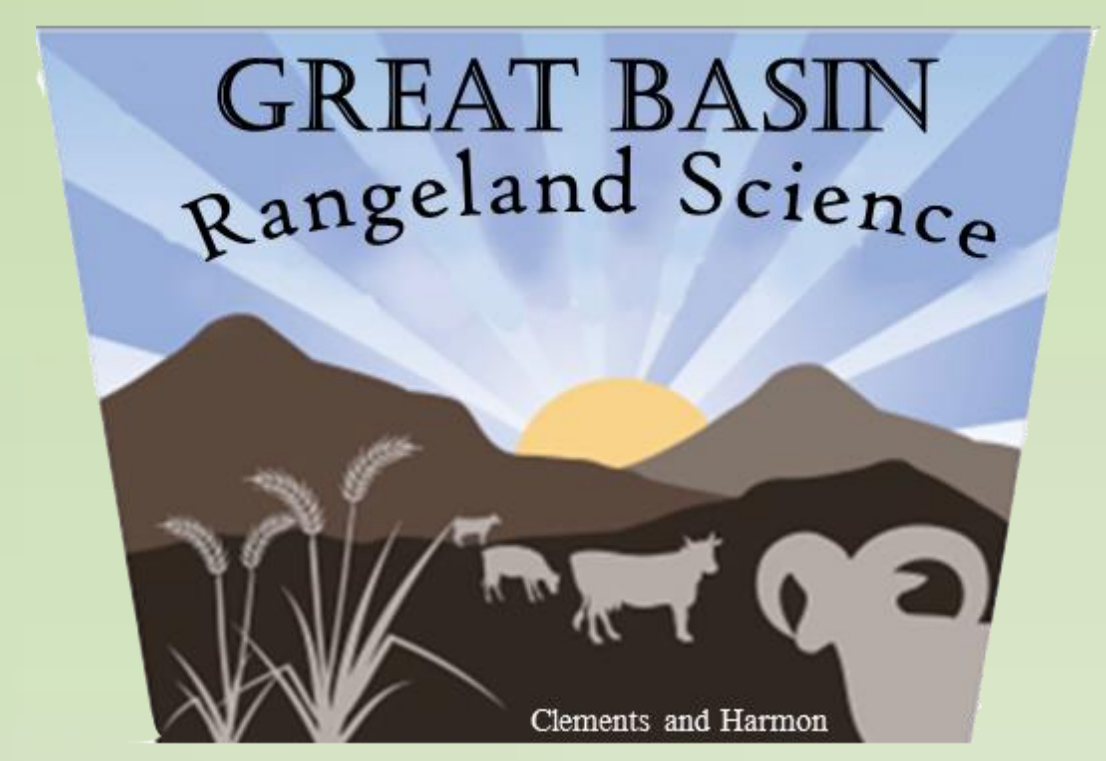




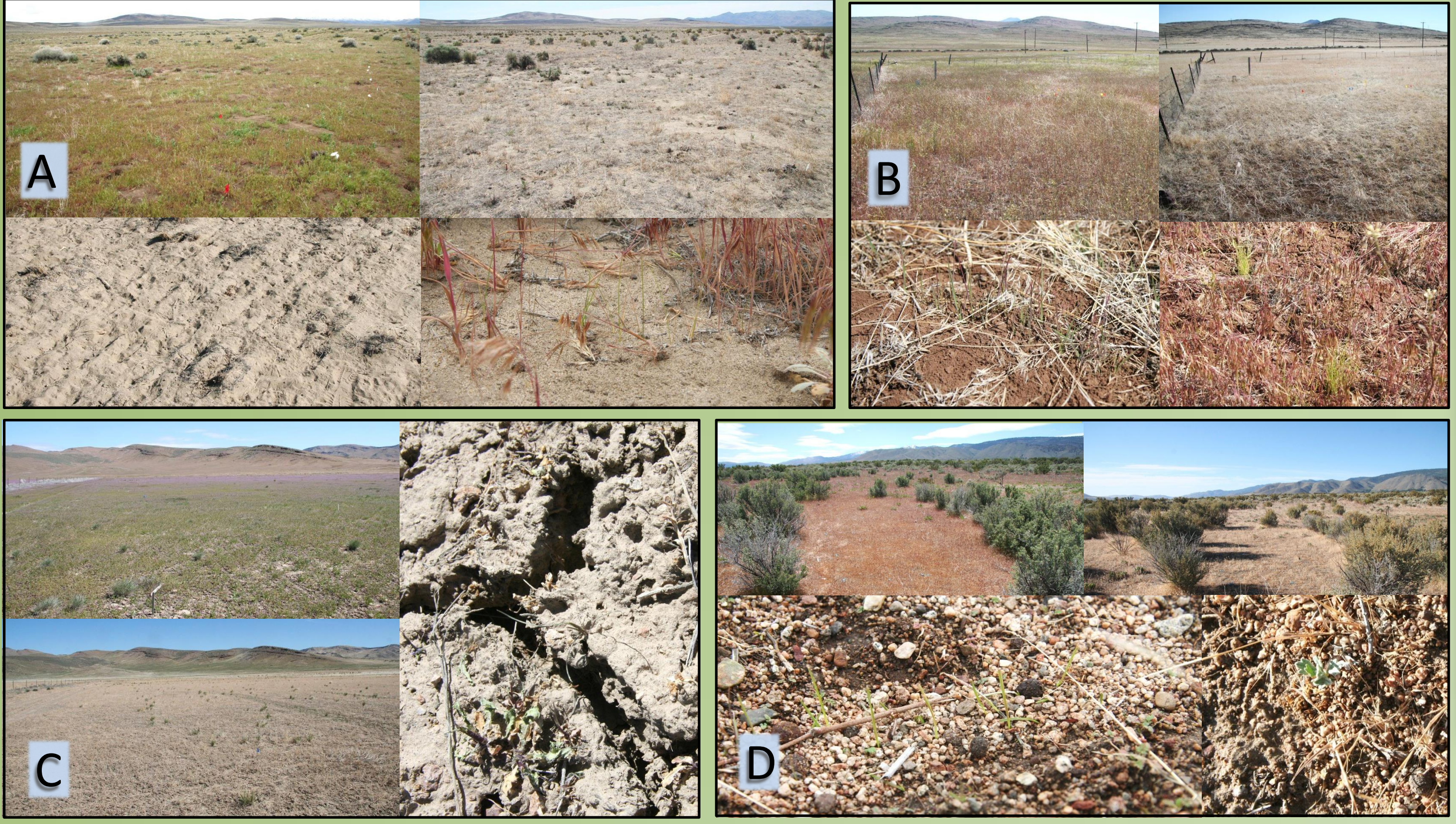
Drought Survival and Perennial Grass Success In The Face Of Cheatgrass Invasion

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Rehabilitation of Great Basin rangelands is an expensive yet largely unsuccessful process. Establishment predominantly falls below requirements for cheatgrass suppression (~10 perennial grass/m²). We hypothesize that April to July seedling die-off is the largest contributor to this failure.

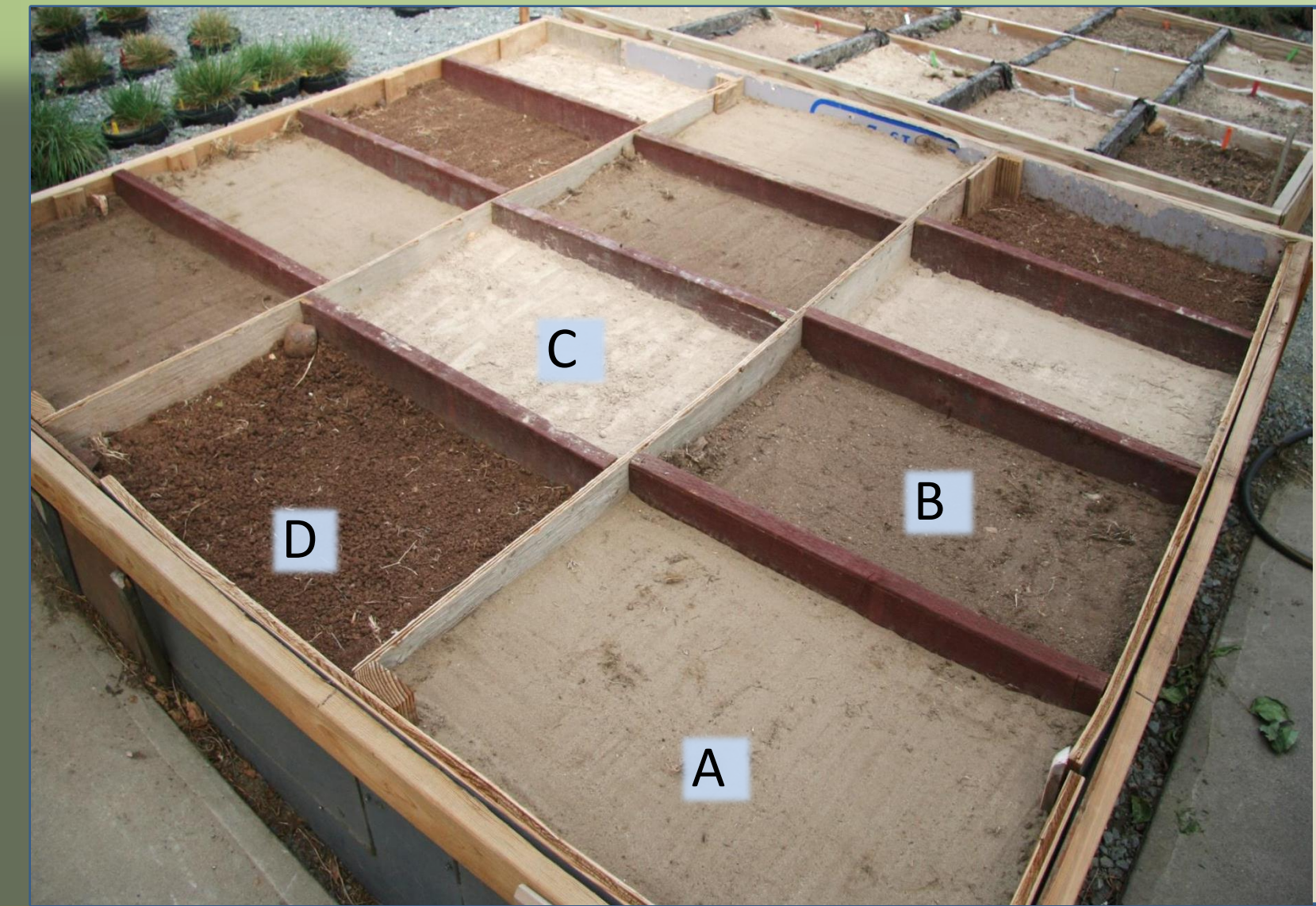
Soil collection sites



Four long term cheatgrass invaded ARS research areas
Perennial grass establishment has been predominantly unsuccessful at these sites.
Soil types differ between sites and likely contribute to failure.

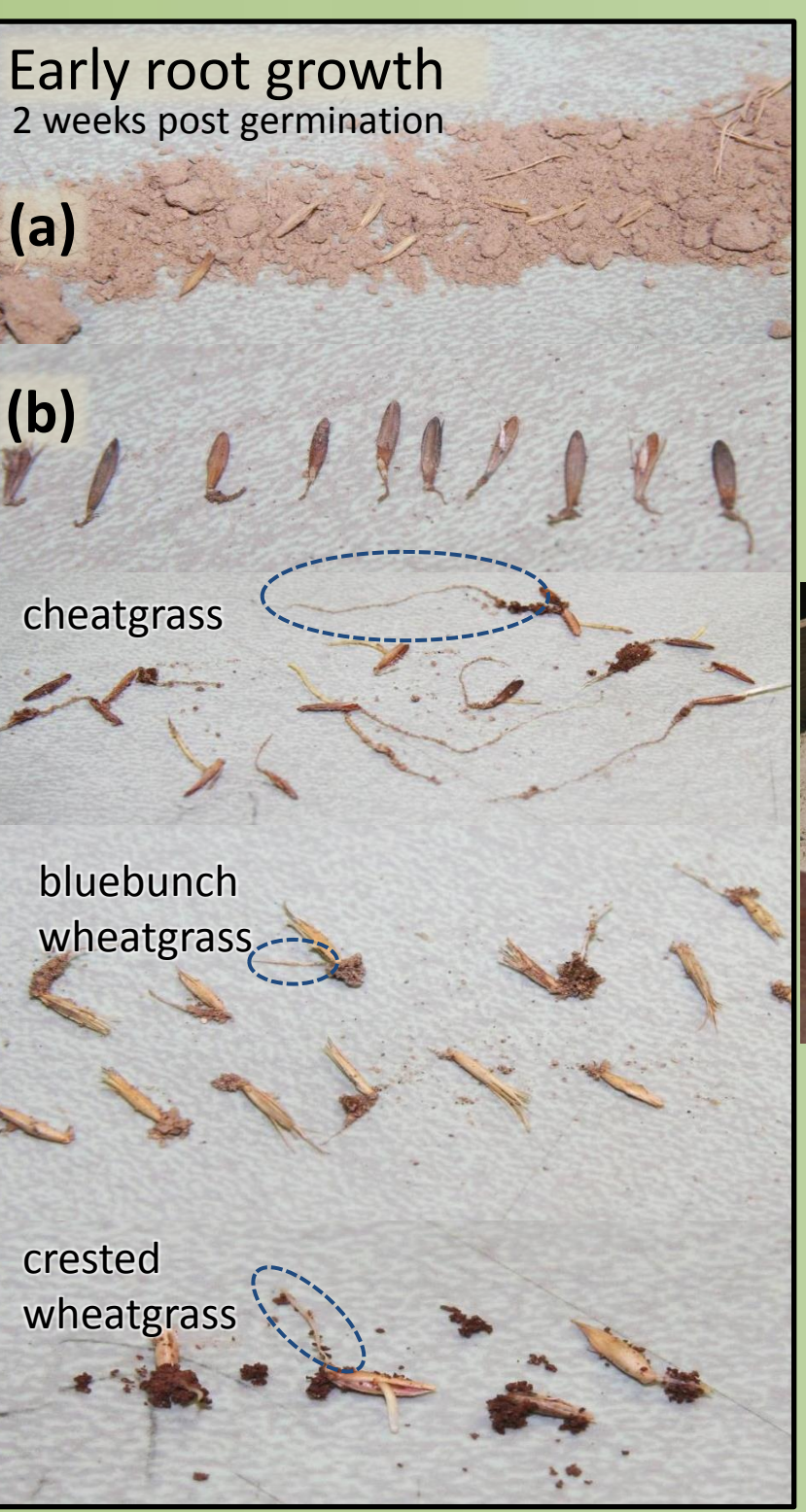
A) Flanigan: deep sand/salt desert **B) Noble:** expanding lattice clay/Wyoming sagebrush **C) Antelope Valley:** fine silt/salt desert **D) Doyle:** coarse granitic/upland brush

METHODS



Using replicated soil boxes (15ft³)(field soil) we designed a test to monitor germination, emergence, and seedling die-off of four grass species
cheatgrass (*Bromus tectorum*)
'hycrest' crested wheatgrass (*Agropyron cristatum*X)
bluebunch wheatgrass (*Pseudoroegneria spicata*)
squirreltail (*Elymus elymoides*)

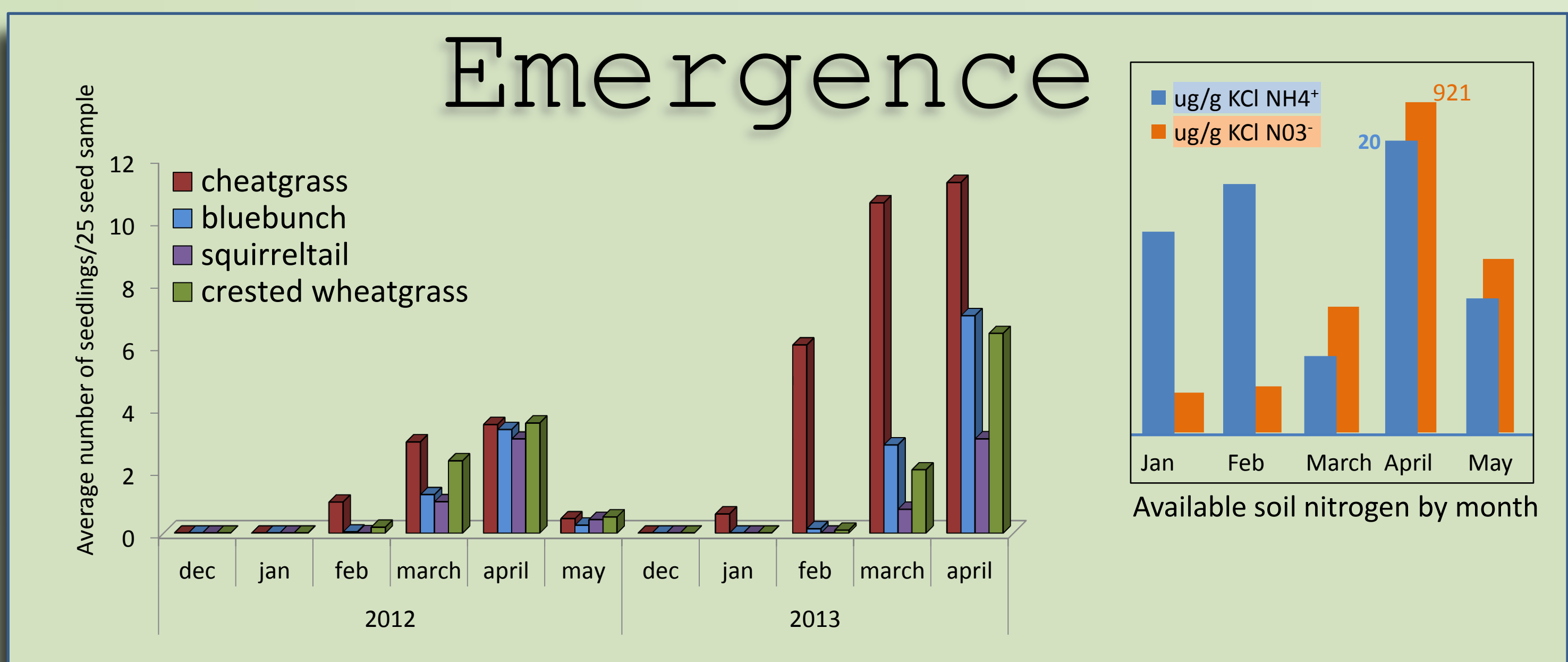
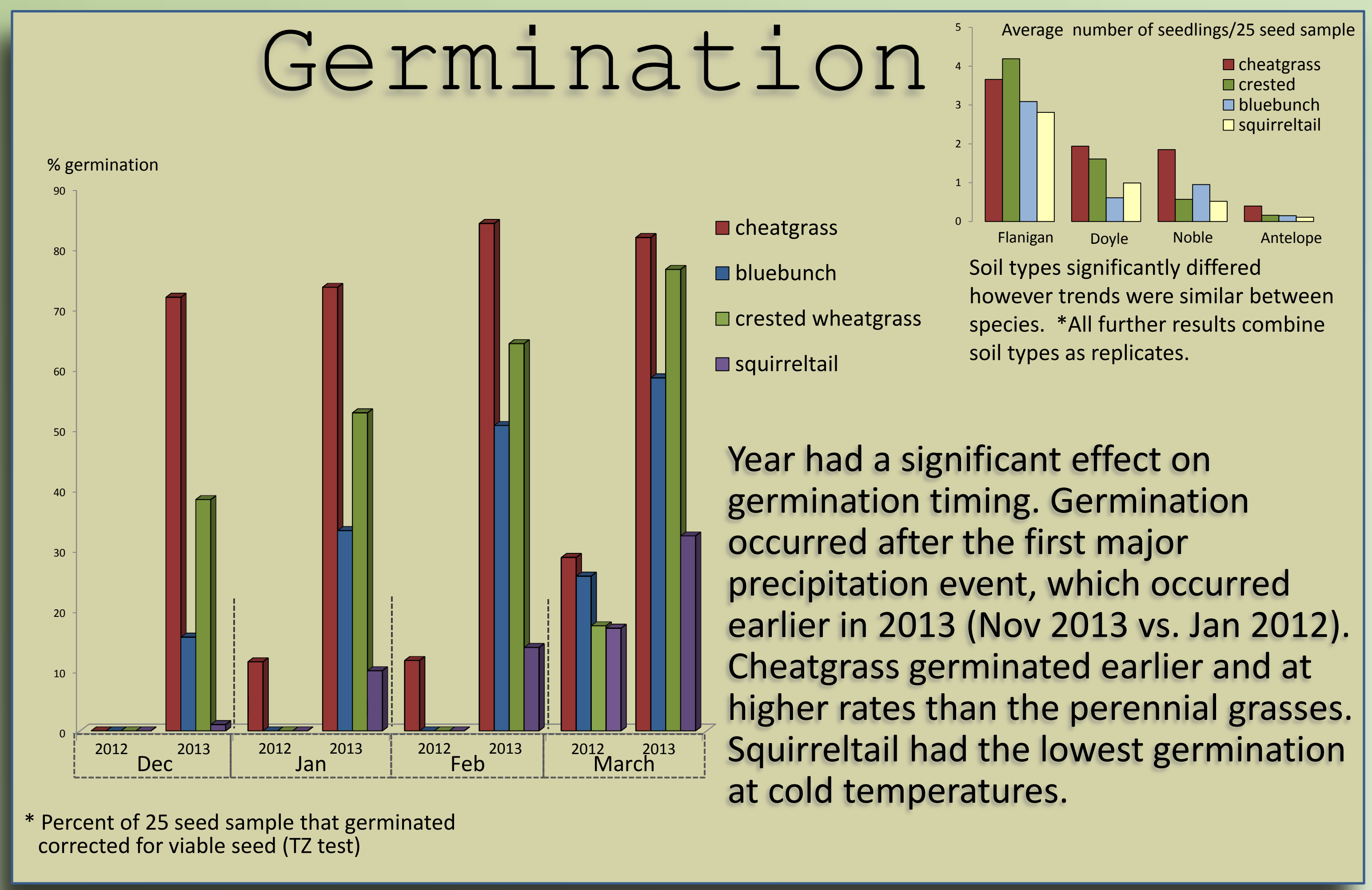
Seeds were planted November 1
Germination, emergence and seedlings were observed every 2 weeks



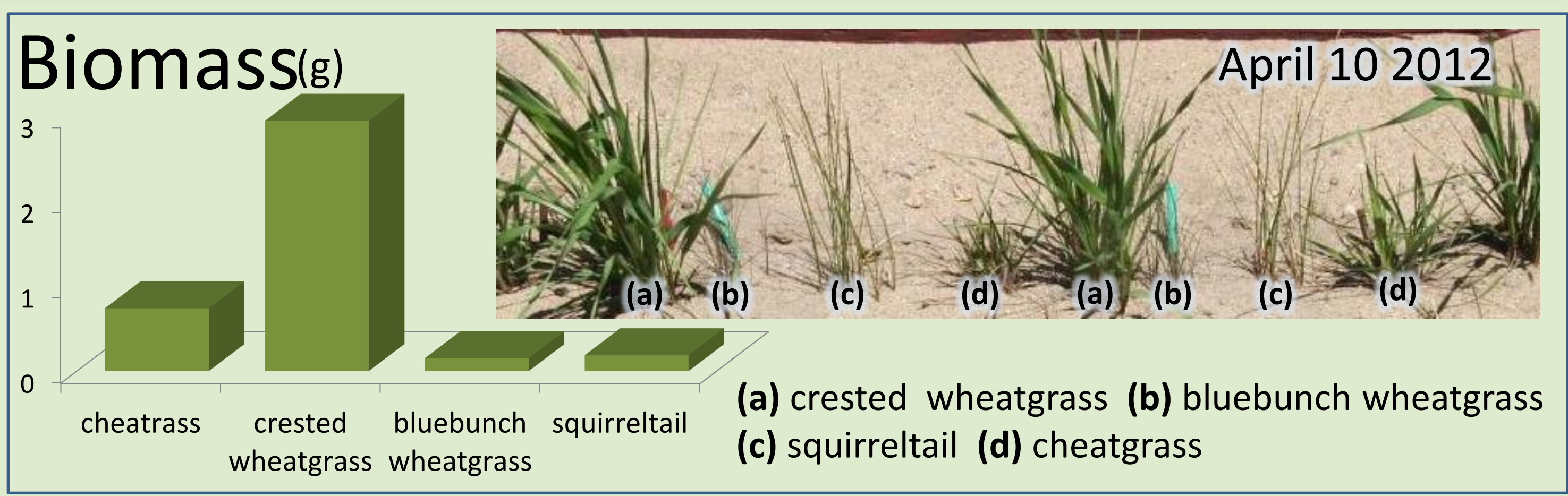
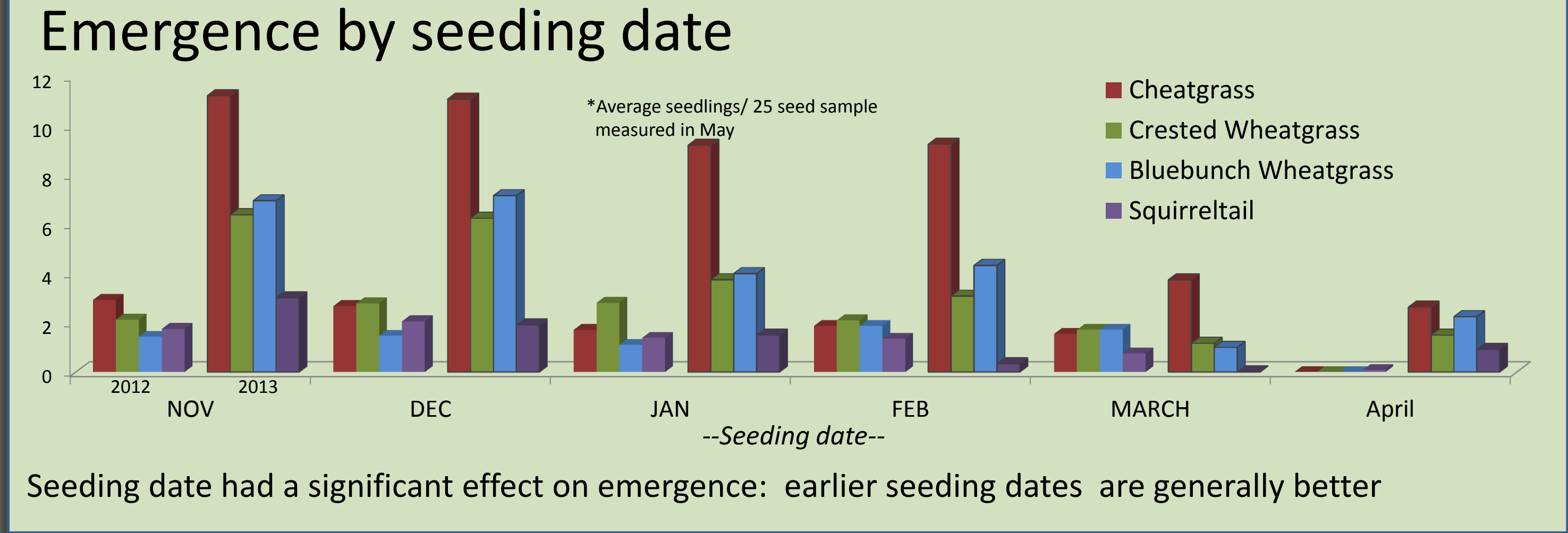
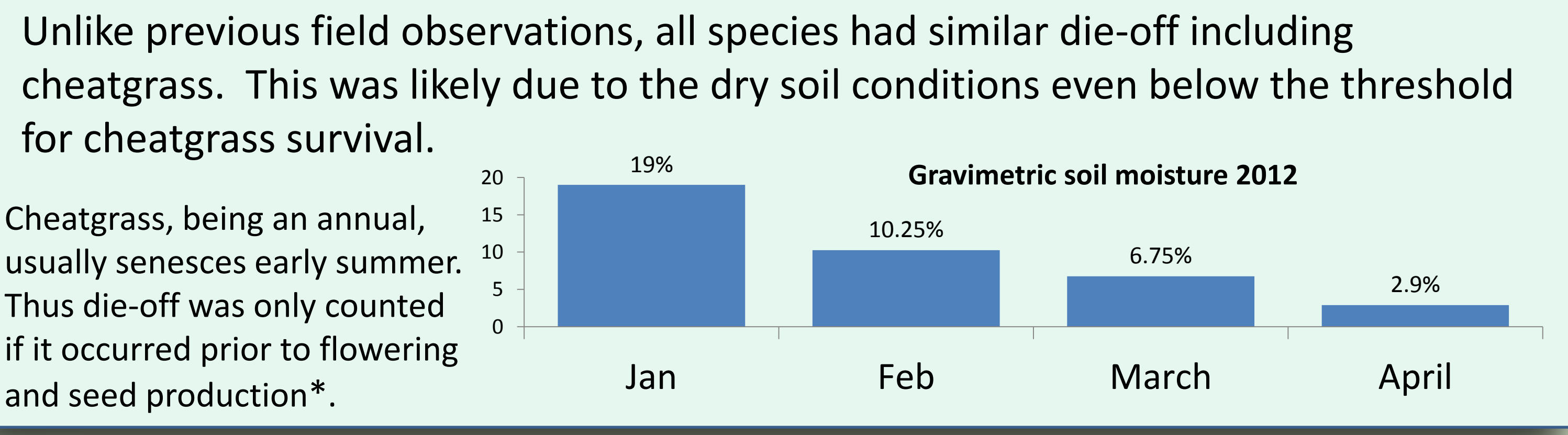
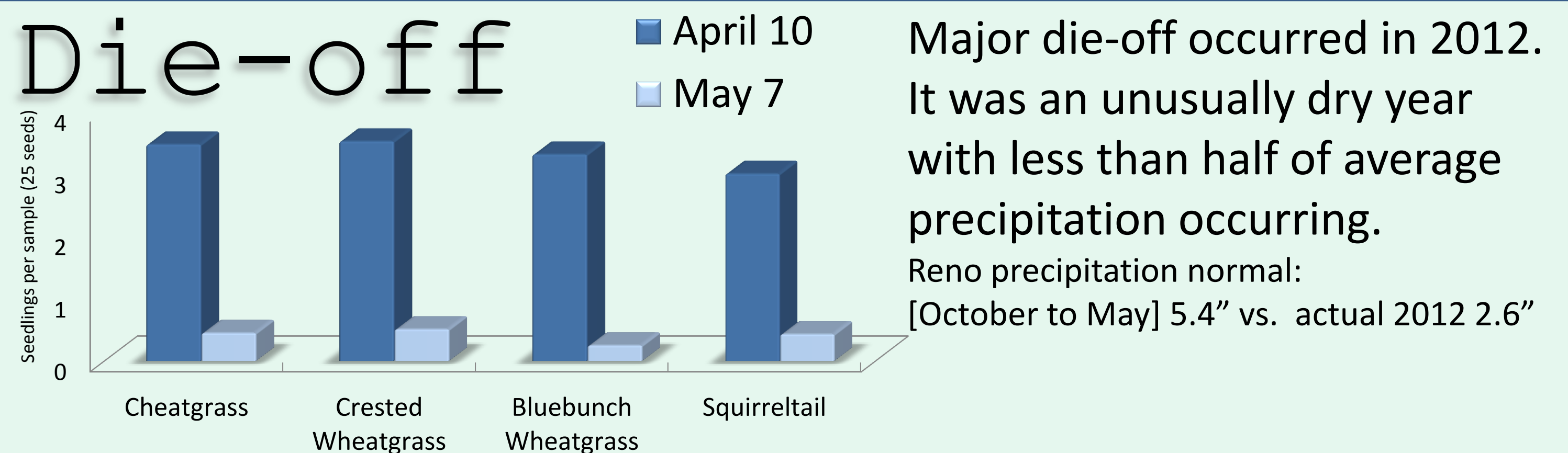
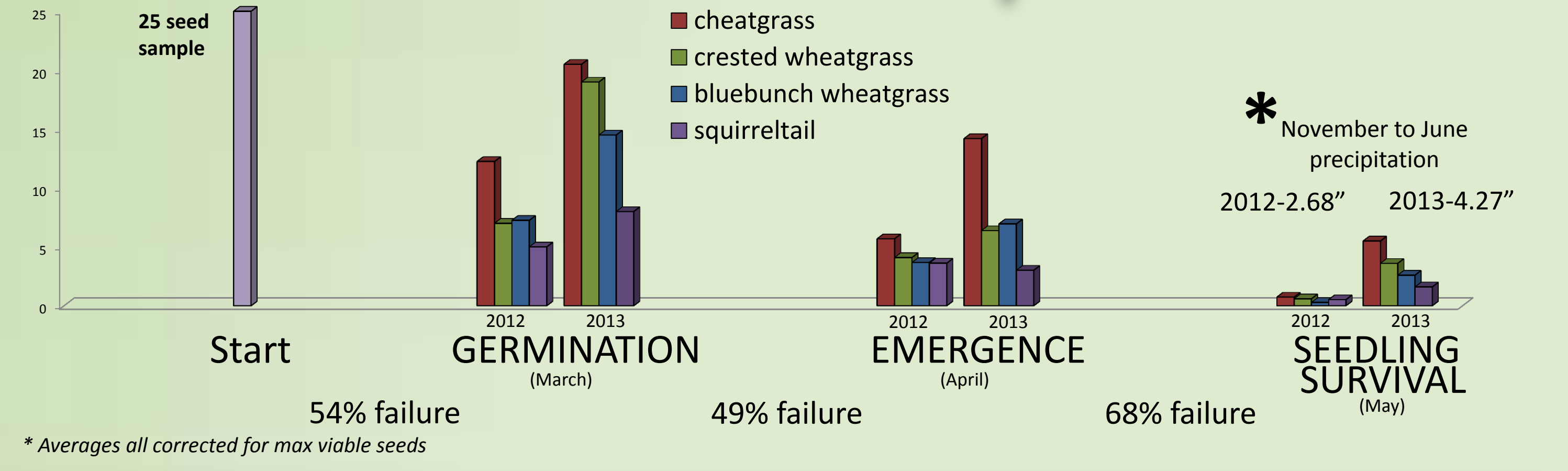
Seeds were planted at a 3cm depth (25 seeds/sample). At 2 week intervals samples were dug up^(a) and checked for germination^(b). Removed seed samples were replaced to test the effect of seeding date on emergence. Soil moisture and temperature were recorded throughout the experiment.



10 samples/soil type(4)x 3 reps=[120 samples per species]
Using species as the dependent variable, germination, emergence and seedling die-off were compared using JMP software.



Success at each phase



Conclusion

Based on the results, we find our hypothesis supported. The largest contributor to failure was seedling mortality ("Success at each phase" Failure percent: Germination 54%, Emergence 49%, Seedling die-off 68%). Even with delayed emergence and a greater emergence failure rate in 2013, due to cold temperatures, germination and seedling survival were greater than 2012 with increased moisture*. This indicates drought survival as the main limiting factor.