Use of Seed Agglomeration Technology for Enhancing Seedling Emergence in the Presence of Physical Soil Crust

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Milford Flat wildfire (2007)

PHYSICAL SOIL CRUST

- Primarily formed by raindrops dispersing aggregates and detaching soil particles
- smaller particles are washed into spaces between the remaining larger fragments, where they occlude soil surface pores
- as drying takes place, surface tension pulls the components together, forming a closely-packed layer with little porosity.

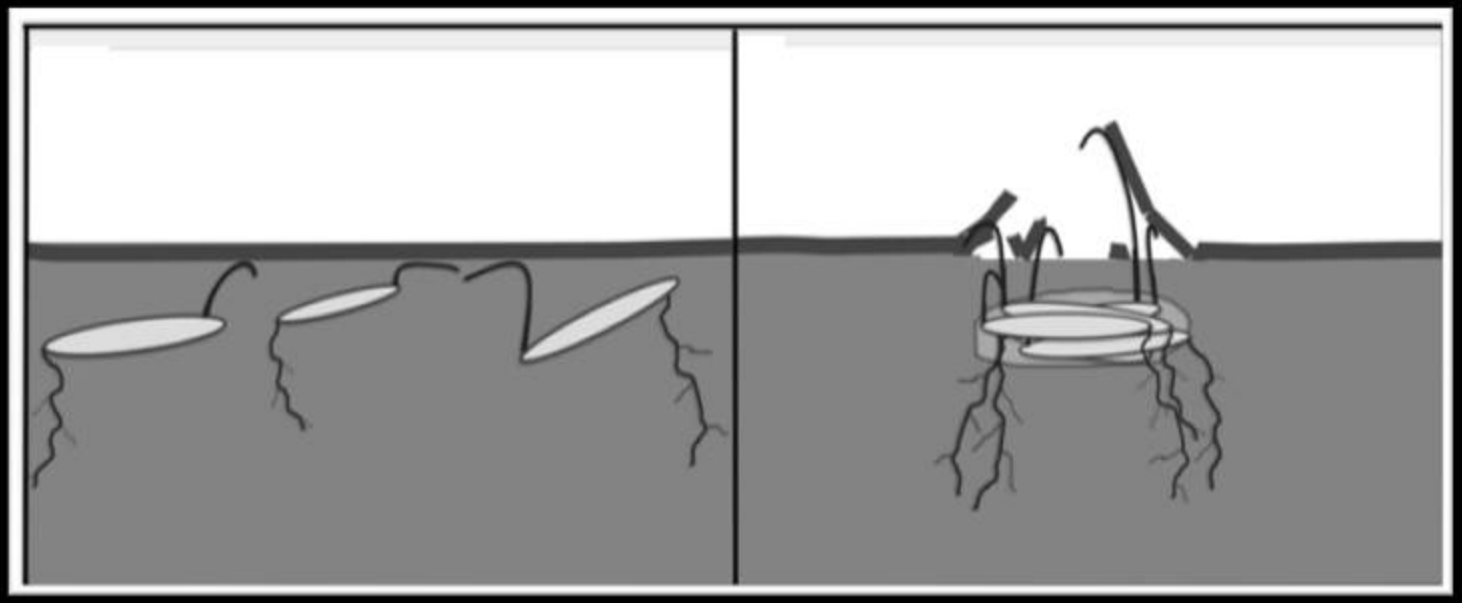
Brady and Weil, 2004

MANAGEMENT PRACTICES TO IMPROVE SEEDLING EMERGENCE

- While these approaches may work in agronomic systems, or locally intensive restoration projects, they are typically not practical for the
- [illegible] emergence


fotolia

Agglomeration Technology



Objective: Determine if seedling emergence of perennial bunchgrass species can be improved by agglomerating multiple seeds into a single pellet

Hypothesis: Agglomerating multiple seeds together within a single pellet will improve seedling emergence, in comparison to single coated seeds, and non-coated seeds, by having seedlings collectively generating sufficient force to penetrate through the soil crust

SEED COATING

- Coating was performed using a RP14DB rotostat seed coater by BraceWorks Automation and Electric (Lloydminster, SK)

GREENHOUSE EVALUATION

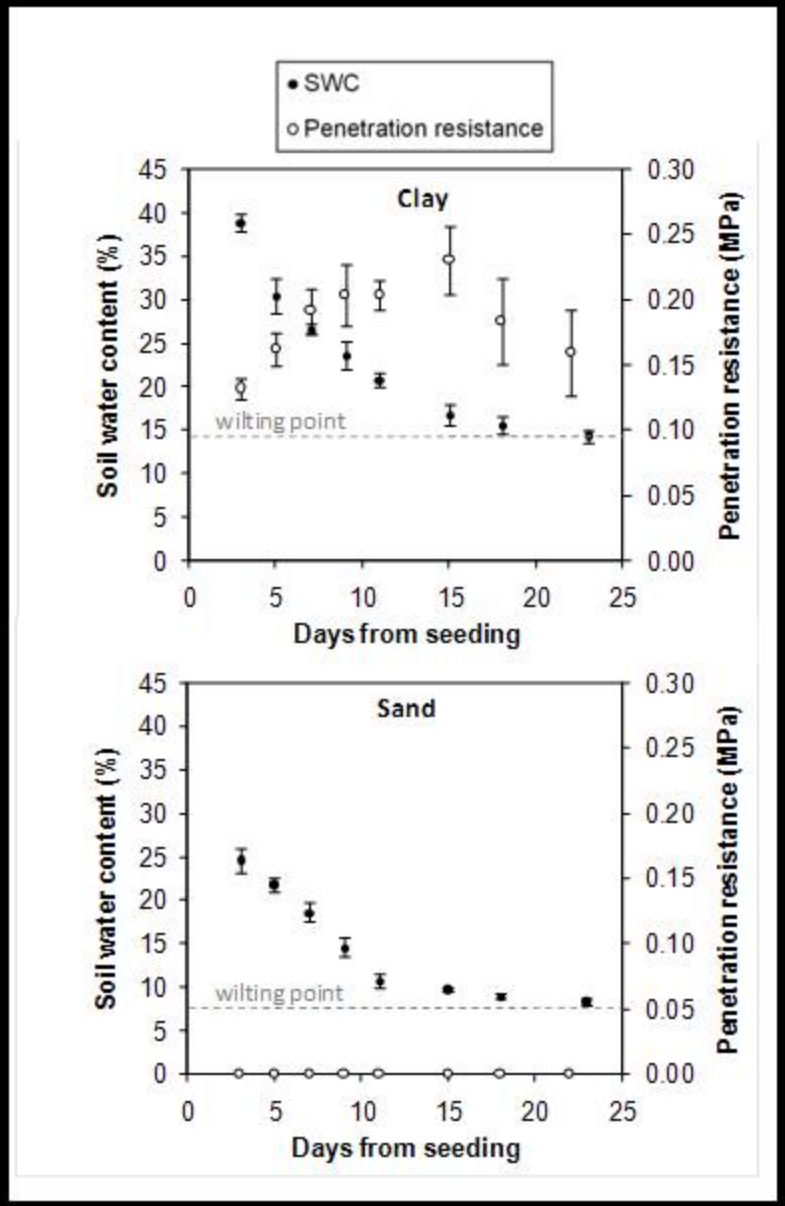
- Randomized block split-plot design, with five replications. Subplots consisted of 0.2 m^2 containers that were filled with either clay-loam or sand soil. In separate rows we sowed bluebunch wheatgrass seeds that were either: 1) uncoated (control), 2) coated, and 3) agglomerated.

SIMULATED RAINFALL

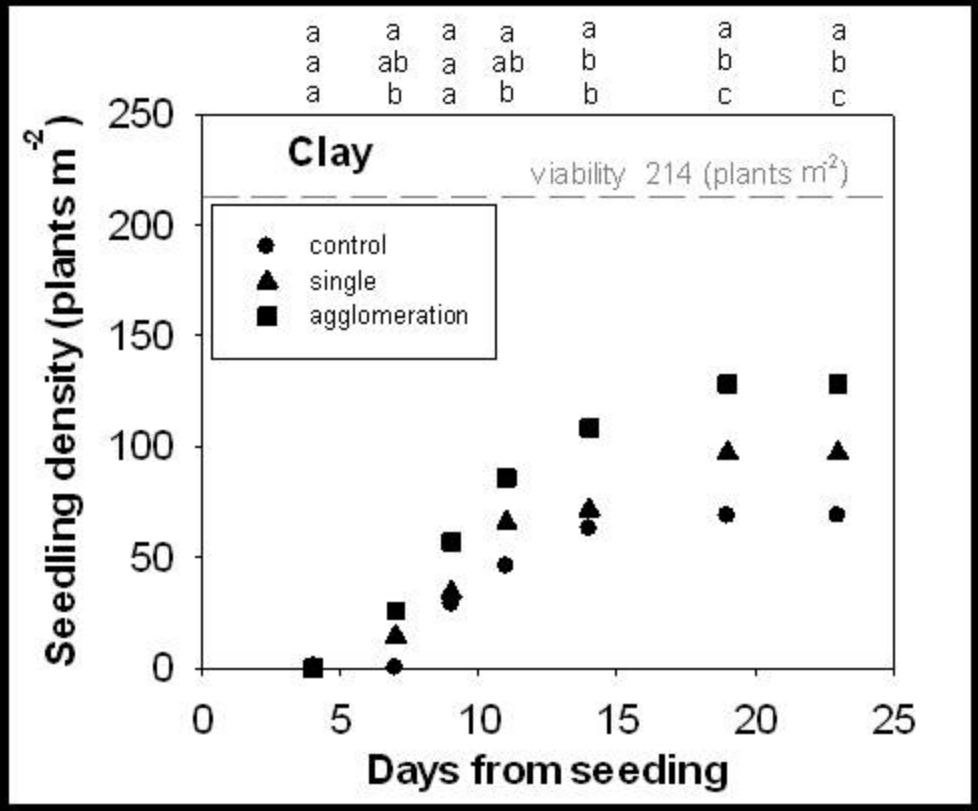
- During the first watering, 15 mm of water was applied using an oscillating-arm rainfall simulator, with an application intensity of 24.7 $mm \cdot hr^{-1}$ (2 year storm)
- Over the remainder of the study, pots were watered using a fine mist sprayer with total amount delivered equal to the average monthly amount of spring precipitation (26 mm)

(Meyer and Harmon 1979).

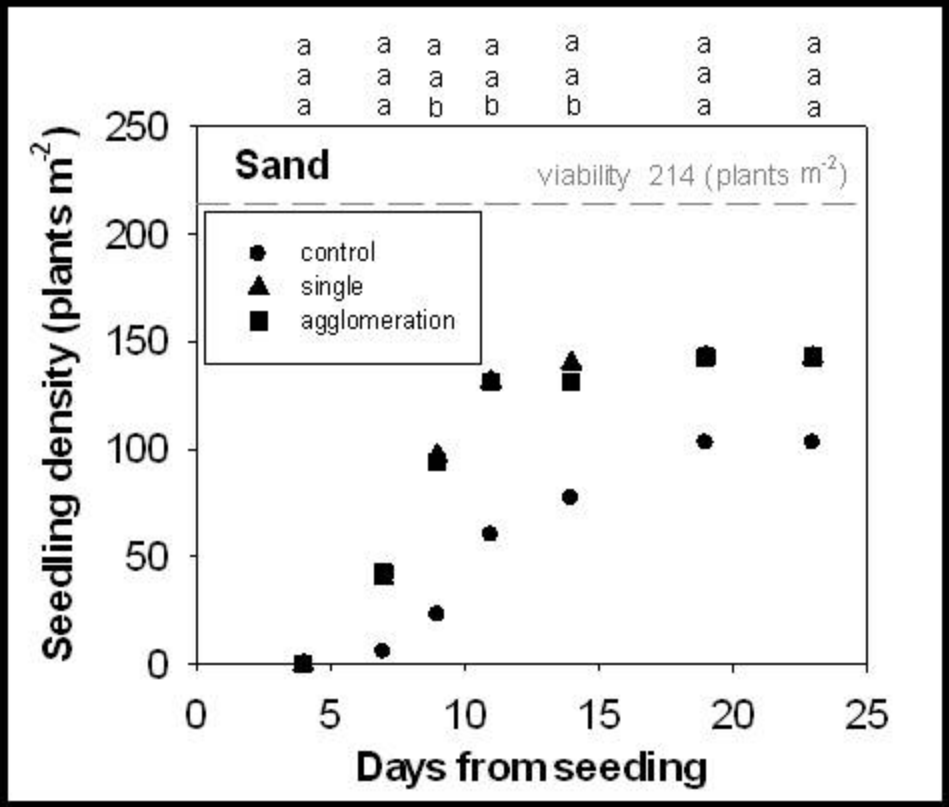
SOIL WATER CONTENT AND CRUST STRENGTH



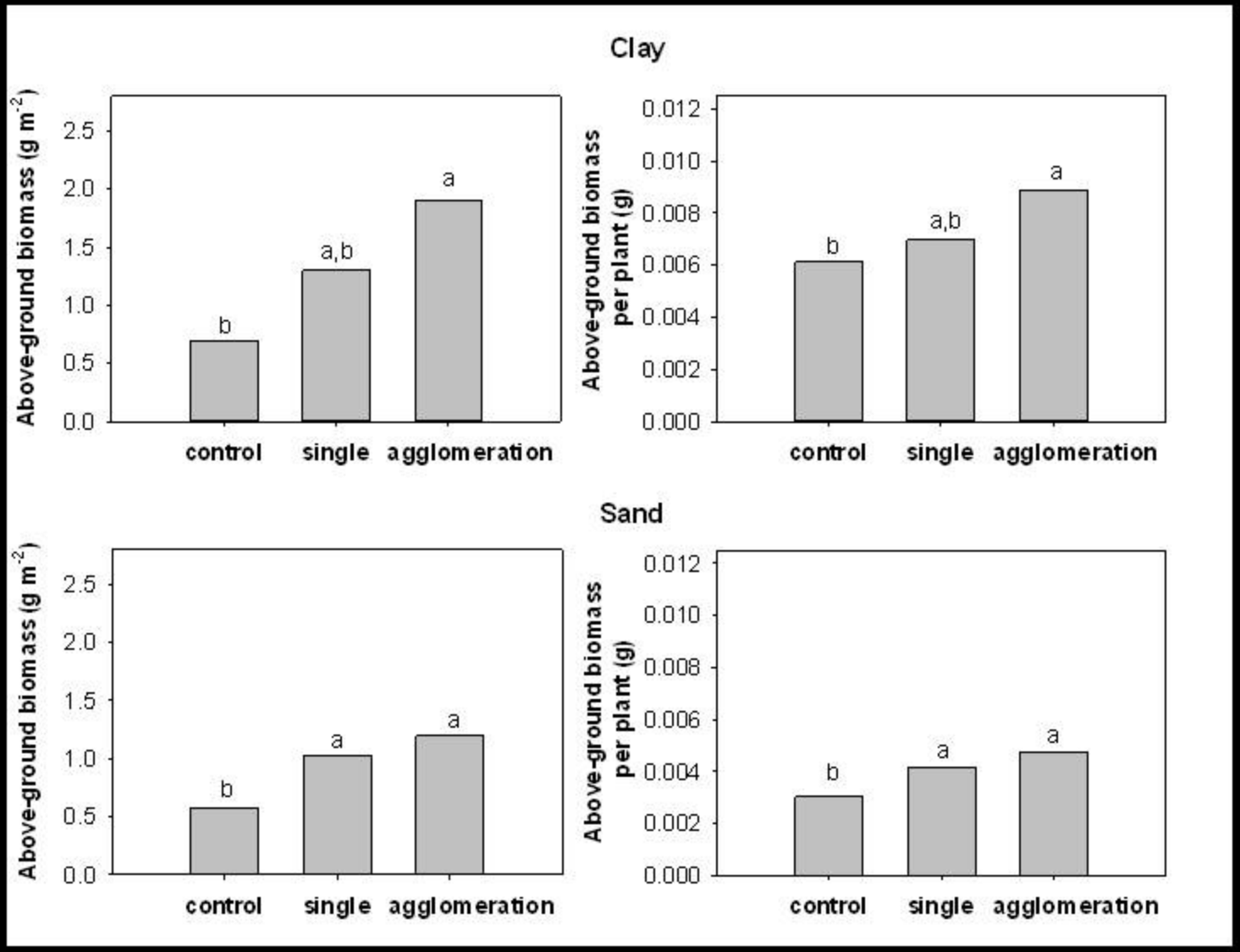
DENSITY


a a a
a ab b
a a a
a ab b
a b b
a b c
a b c
Clay
viability 214 (plants m-2)
control
single
agglomeration
Seedling density (plants m-2)
250
200
150
100
50
0
0
5
10
15
20
25
Days from seeding

DENSITY


a a a a a a a a a a a a a b b b a a a a a a
Sand
viability 214 (plants m-2)
control
single
agglomeration
Seedling density (plants m-2)
250
200
150
100
50
0
0
5
10
15
20
25
Days from seeding

BIOMASS


Clay
Above-ground biomass (g m-2)
2.5
2.0
1.5
1.0
0.5
0.0
b
a,b
a
control
single
agglomeration
Above-ground biomass per plant (g)
0.012
0.010
0.008
0.006
0.004
0.002
0.000
b
a,b
a
control
single
agglomeration
Sand
Above-ground biomass (g m-2)
2.5
2.0
1.5
1.0
0.5
0.0
b
a
a
control
single
agglomeration
Above-ground biomass per plant (g)
0.012
0.010
0.008
0.006
0.004
0.002
0.000
b
a
a
control
single
agglomeration

CONCLUSIONS