

Soil stockpile seed viability is affected by depth and current surface vegetation¹

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Abstract: Stockpiled soil will be used to operationally reclaim approximately half of the area disturbed by oil sands mining in northern Alberta, Canada in the next few decades. However, there are concerns regarding the viability of native seeds in stockpiles relative to directly-placed reclamation soil. To test the germination of seeds from a four-year-old soil stockpile, we took samples at different depths up to 90cm and on three separate surface vegetation treatments (sweet clover, perennial sow thistle, and wheat grass). These samples were placed in a greenhouse on top of potting soil to allow any seeds to germinate for nine weeks. The highest species richness and total plant abundance were found at the surface of the stockpile, with 61% of species and 80% of seedlings occurring at the 0-10cm depth. However, viable seeds were found below the surface, with the 80-90cm depth making up 3% of all seedlings and 9% of species richness. Approximately 75% of the species found in these soil samples were native species, including the most abundant species, *Potentilla norvegica* (rough cinquefoil). Some other abundant native species include *Agropyron trachycaulum* (slender wheat grass), *Agrostis scabra* (ticklegrass), and *Achillea millefolium* (common yarrow). The 3 most abundant non-native species were perennial sow thistle (*Sonchus arvensis*), sweet clover (*Melilotus spp.*), and scentless chamomile (*Matricaria perforata*). Vegetation type affected the abundance of seedlings, with the seed bank reflecting the current vegetation at the surface of the stockpile, but not at the lower depths. Using soil stockpiles for final land reclamation in the future may be problematic because of the low number of viable seeds below the surface and the effect of current vegetation on the surface. Also, although native species may be present in a stockpile, competition with fast growing grasses and non-native species, could prevent their establishment.

Additional Key Words: seed bank, species abundance, species richness, germination.

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