

**Soil Quality Enhancement Activity – SQL05 – Use of deep rooted crops to break up soil compaction**



**Enhancement Description**

This enhancement is for the use of deep rooted crops to break up compacted soils and improve soil quality. Deep rooted crops can be perennial plants like alfalfa or annual plants like forage radish.

**Land Use Applicability**

Cropland

**Benefits**

Soils can have naturally occurring compacted layers (hard pans) or those that have been created through tillage or other farming activities. Deep rooted crops with large taproots can alleviate the effects of soil compaction by penetrating the compacted layer, creating pore space that allows air, water and crop roots to penetrate deeper in the soil profile. Eliminating soil compaction through the use of deep rooted crops increases infiltration, reduces surface

runoff, improves soil tilth and overall soil quality. It also eliminates the need for sub-soiling with a plow, thus saving fuel, reducing erosion and enhancing water quality.

**Conditions Where Enhancement Applies**

This enhancement applies to all crop land use acres.

**Criteria**

1. The selected crop must be one that has been identified as having the capability of alleviating soil compaction. State specific lists are available at your local NRCS Field Office.
2. If perennial plants are used and once established, they must be maintained annually by proper fertilization and mowing/harvesting.
3. Annual crops should be seeded early enough in the fall to allow for adequate growth to occur prior to winter. Follow specifications provide by your local NRCS Field Office.
4. No deep tillage is allowed to remove compacted layer.

**Adoption Requirements**

This enhancement is considered adopted when the selected deep rooted cover crop has been grown in a given rotation on the land use acre.

**Documentation Requirements**

1. Written documentation for each year describing the following items:
  - a. Deep rooted crop(s) used and dated planted.



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- b. Cash crop planted and method used.
2. A map showing fields where the enhancement is applied.
3. Photographs of a representative number of fields showing deep rooted crops.

### **References**

A. Clark (ed.). 2007. Managing cover crops profitably. 3<sup>rd</sup> ed. Sustainable Agriculture Network Handbook Series; bk 9.

Magdoff, F. and H. van Es. Cover Crops. 2000. *In* Building soils for better crops. 2nd ed. Sustainable Agriculture Network Handbook Series. National Agriculture Library. Beltsville, MD. pp 87-96.

Sainju, U.M., W.F. Whitehead and B.P. Singh. 2005. Biculture Legume–Cereal Cover Crops for Enhanced Biomass Yield and Carbon and Nitrogen. *Agron. J.* 97:1403–1412.

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**Reference:**

- **340 – Cover Crop**
- [Midwest Cover Crops Council Decision Tool](#)
- [Managing Cover Crops Profitably, 3<sup>rd</sup> Edition](#)

**Supplemental Minnesota Criteria**

The following are crops that have the capability of alleviating soil compaction and are considered deep rooted crops:

Species	Seeding Rate	Seeding Depth (inches)	Seeding Date	Comments
Alfalfa	12 lbs/ac	¼ to ½	April 15 - June 15 OR Aug 1 - Sept 15	
Radish	8 – 12 lbs/ac	¼ to ½	June 1 - Sept 15	Drilled or broadcast and incorporated. Best suited for early fall growth after small grain, vegetable, corn silage or early soybean harvest.
Sugarbeets	8 lbs/ac	½ to ¾	Late April to Early May	
Red Clover	8 – 10 lbs/ac	¼ to ½	April 15 - June 15 OR Aug 1 - Sept 15	Good on somewhat poorly drained sites and potato fields with moderate pH. Prefers drilling to broadcast.
Safflower	30 lbs/ac	1 to 1½	Early to Mid-May	
Sorghum – Sudan	25 – 30 lbs/ac	½ to 1	May 15 - July 1	Advantageous to use on well drained and droughty sites.

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Sunflower	4 lbs/ac	½ to 1	May 7 – June 15	
Sweetclover	8 – 10 lbs/ac	¼ to ½	Early spring into small grain OR Aug 1 - Sept 15	Advantageous to use on well drained and droughty sites. Prefers drilling to broadcast. May become invasive if allowed to seed out. Hard seed will remain viable in soil for many years.
<b>Species</b>	<b>Seeding Rate</b>	<b>Seeding Depth (inches)</b>	<b>Seeding Date</b>	<b>Comments</b>
Turnips	1- 4 lbs/ac	¼ to ½	July 15 - Aug 15	Fast growing and tolerate cold temperatures. Broadcast or drilled.

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