

Using Forages to Address Soil Compaction

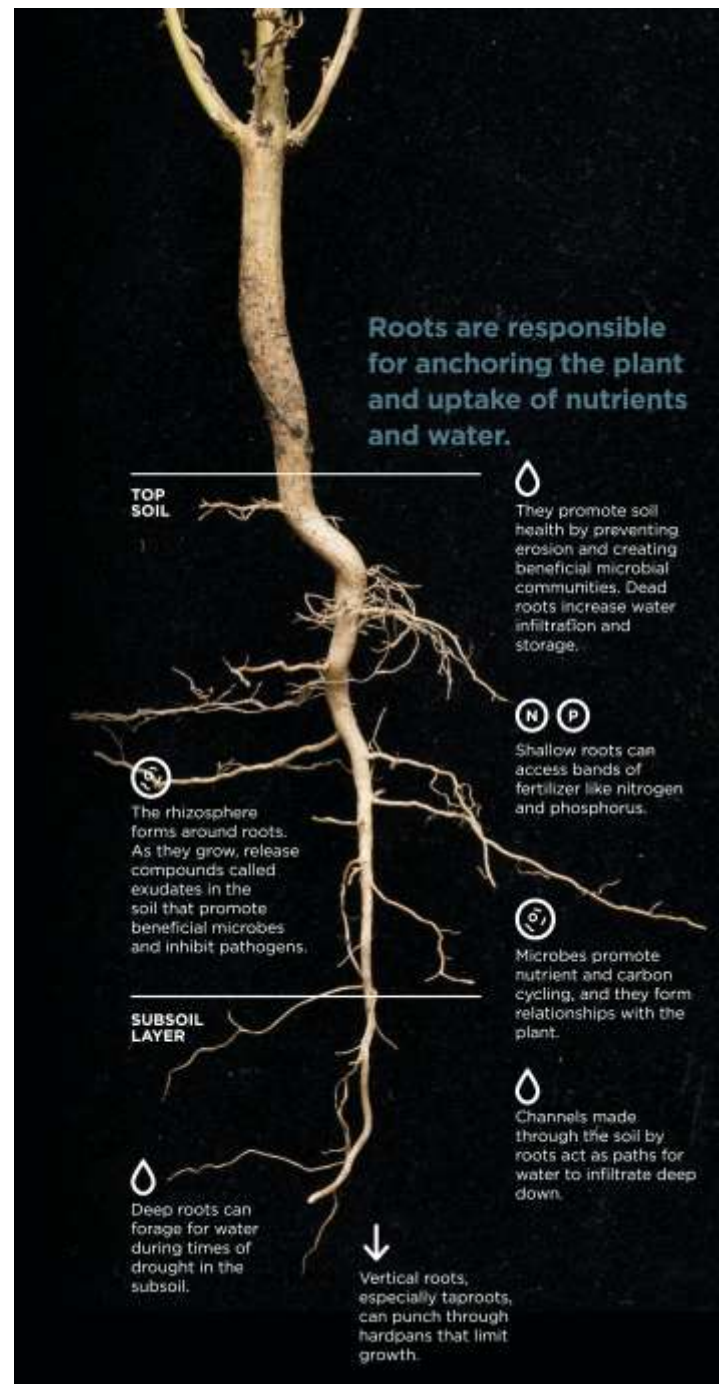
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Compaction can be an issue in annually cropped fields and to some extent hay fields. It can hamper infiltration of water and/or plant root growth either of which can limit production.

Excessive tillage, untimely field operations on wet soils, or wheel tracking can contribute to soil compaction. There are practices available to limit tillage and/or reduce the damage if one has to carry out operations on wet soils. But agriculture today still requires equipment to make many passes across a field during the growing season.

Most of the compaction caused by wheel traffic occurs to a depth of one to three feet on the first pass over a field. The first pass accounts for up to 80 percent of the compaction that four passes would cause on the same spot. When we think of hay fields, the number of passes over a field including cutting, raking, baling and removing the bales adds up quickly. Add in a 2nd cut or additional handling of the hay due to inclement weather and it's not hard to see that a very high percentage of a field could be subject to compaction in any given year.

For annually cropped fields wheel traffic can be a major contributor to compaction given the number of passes equipment makes across a field in a given season. In addition to normal day-to-day operations, the urgency of getting seed in to and the crop off of the field can result in operations being carried out under less than optimum conditions (wet soils) that would increase the likelihood of compaction.



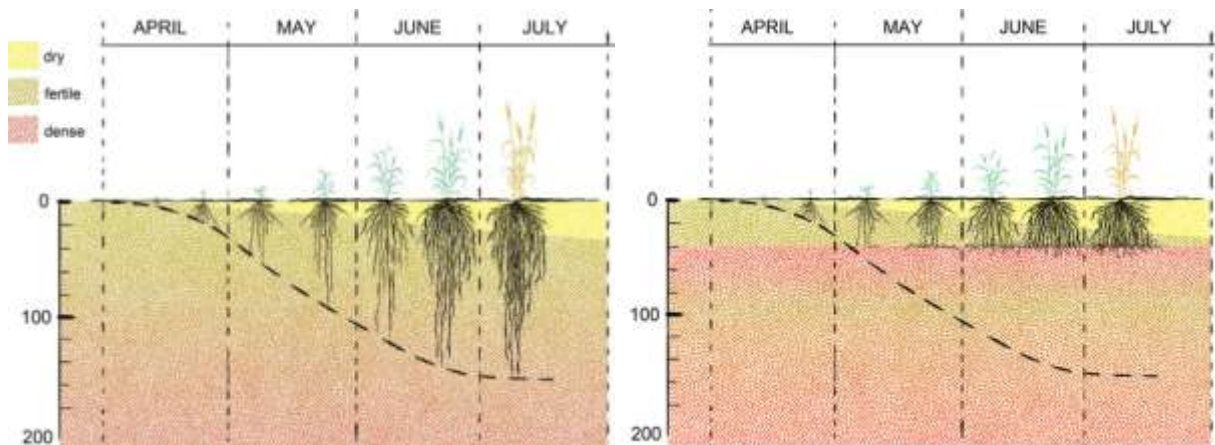
When it comes to dealing with soil compaction there are two extremely different approaches:

- **OPTION 1: develop a system to mitigate compaction** - using alfalfa, sunflowers or other deep rooted crops with taproot systems to penetrate hardpan and dry out soil; minimize the number of tillage passes across the field; minimize the area compacted by equipment traffic on the field (tramlines, common tracks, etc.); use manure to improve soil structure and organic matter levels.
- **OPTION 2: treat compaction using deep ripping/subsoiling** - use tillage equipment capable of penetrating beyond depth of soil hardpan; do not use this method when soils are moist/wet; do not use if deep tillage will bring salts, rocks and carbonates to the soil surface that may negatively impact crop production.

Option one looks more at mitigating the problem of compaction. Crop producers could look to grow deep rooted crops like sunflowers or include cover crops with taproots to open up compacted fields. Combining this with practices that reduce the number of passes over the field and management practices that increase SOM can result in a longer term solution.

Option two can address the problem in the short term but if how we manage the field doesn't change the problem will continue to recur. This practice can be very costly and time consuming and the window for applying the practice can be extremely narrow.

Producers (both forage and crop) that can or do include perennial forages in their crop rotations need to consider the different root types of forages and their benefits when it comes to production and soil health.



Root Development during the growing season due to compaction

Plants with a taproot can create a root channel that penetrates through a compaction layer. Alfalfa is probably the best example but clovers can also do an excellent job of breaking up compaction. Grasses on the other hand have fibrous root systems. Grasses can extend their roots down 3 feet but can have difficulty penetrating a compaction layer. When this happens the roots tend to spread out above the compacted layer, limiting the plants ability to source water from deeper in the soil profile and possibly affecting production during periods of drought.

When including forages as part of your cropping rotation it is important to consider a mix of deep rooted forages like alfalfa to break up compaction layers and grasses to increase SOM levels in and thru the compaction zone which will help prevent or reduce compaction in the future.

If considering a cover crop as a shorter term solution, similar to using forages, consider including a tap rooted plant like turnips or radishes to penetrate deep into the soil and crops like grasses that can help increase SOM levels. Cover crops with an annual grass can be an option over perennial forages as the crop rotations are shorter.

The effect soil compaction has on productions can vary depending on soil type, farming practices and soil health. Having soils that allow water to infiltrate and store water at greater capacity can help reduce environmental stresses from drought and excess moisture. ([Soil Organic Matter and Drought](#)).

Under **favourable conditions**, winter freezing and thawing of the soil can correct some compaction problems up to a depth of two to three feet. If you suspect that soil compaction is affecting crop yields on some of your fields the addition of forages and/or cover crops where possible can go a long way in mitigating the problem and improving your soil's health.

For more information:

[Soil Management Guide -Soil Compaction](#)

[Soil Compaction](#)