

Soil Compaction

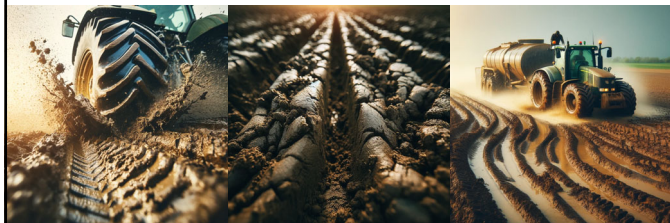
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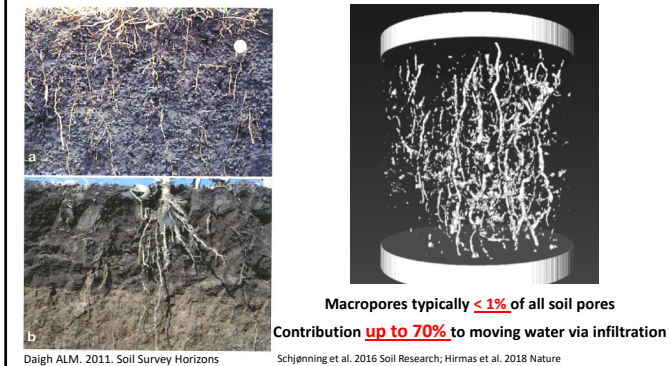
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Over the next 20 minutes...

- Potential soil compaction from field operations
- Level of consequences and timelines



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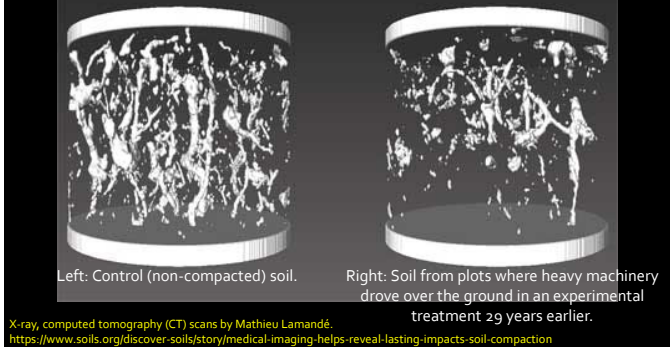


Macropores typically **< 1%** of all soil pores
Contribution **up to 70%** to moving water via infiltration

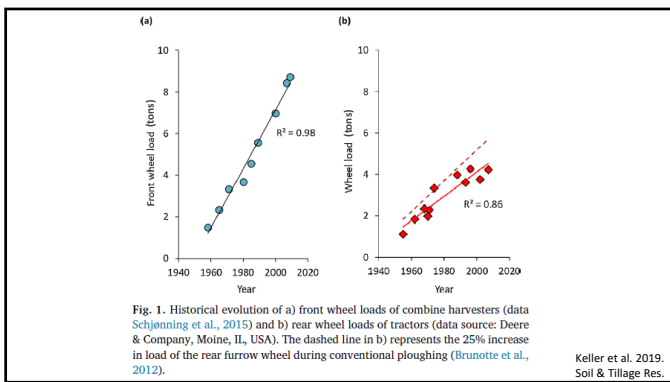
Daigh ALM. 2011. Soil Survey Horizons Schjønenning et al. 2016 Soil Research; Hirmas et al. 2018 Nature

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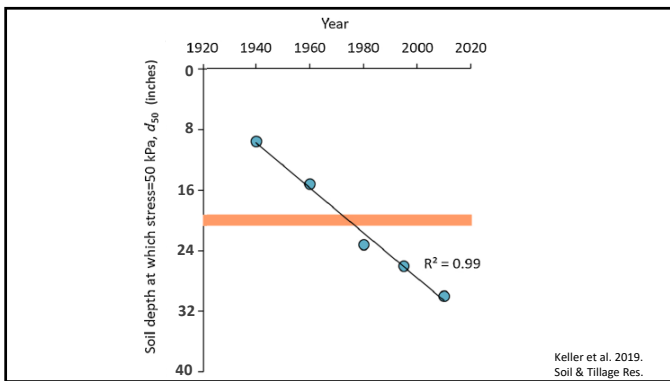
3-D images of the macropore system in soil cores taken from a clay soil in Finland.



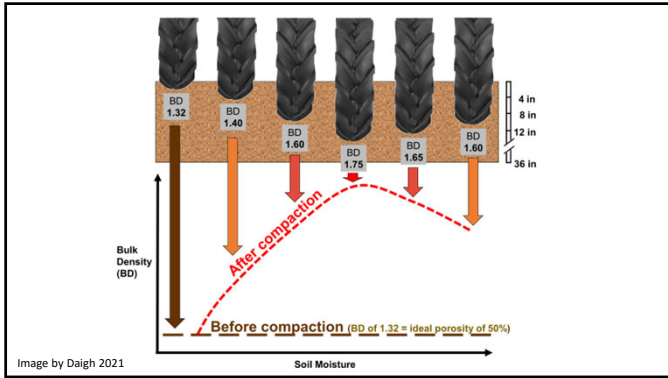
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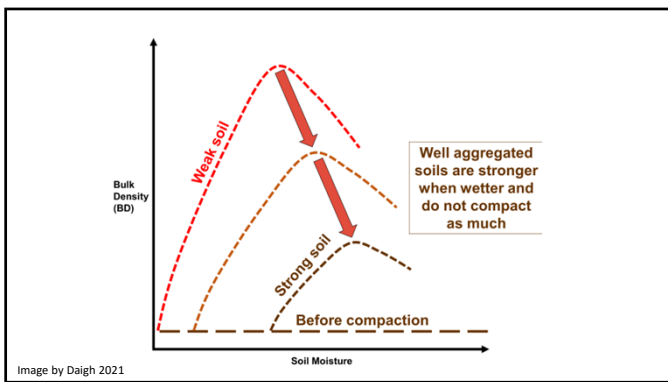
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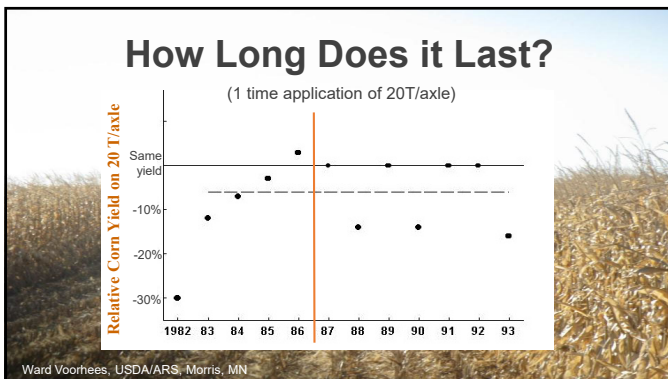
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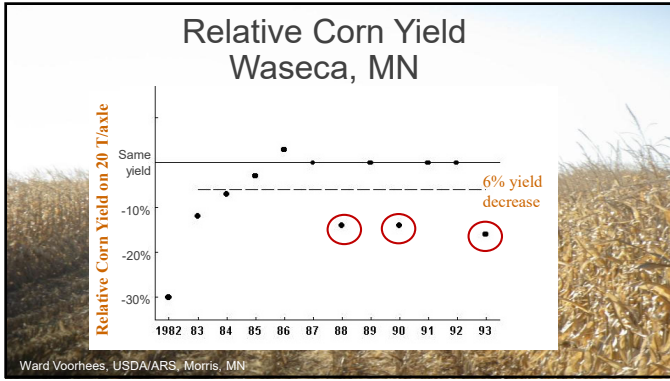
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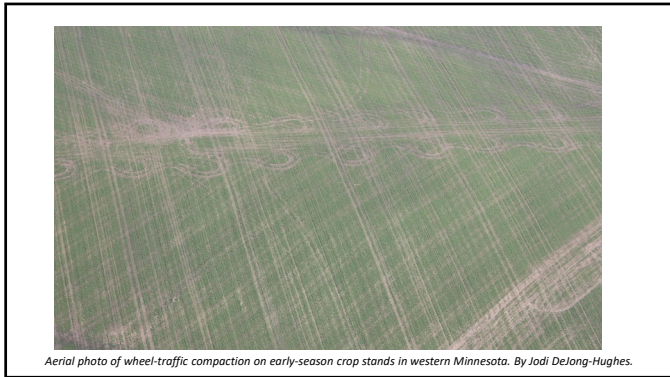
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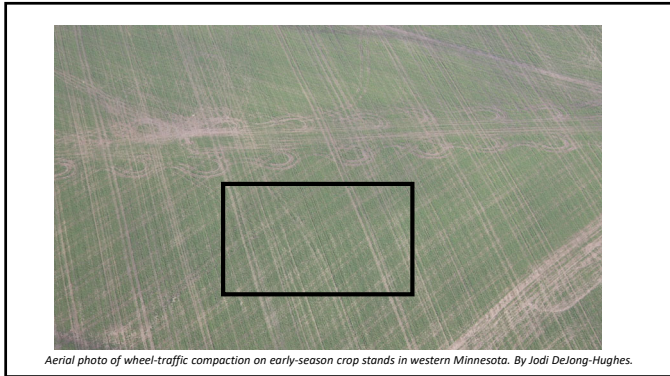
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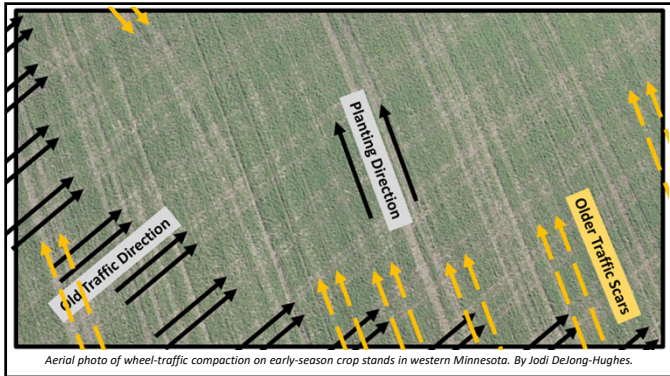
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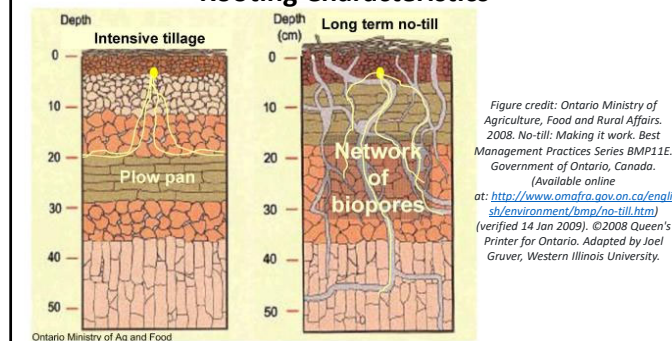
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Options for breaking up compaction?

- Bio-drilling with roots (crop species, root architecture, & genetics matter)
- Natural cracking of clays during mid-summer (clay mineralogy matters)
- Freeze-thaw during winter (*for surface compaction only, not the deep stuff*)
- Deep tillage (*poor odds of working; little gain when it does*)

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Rooting Characteristics

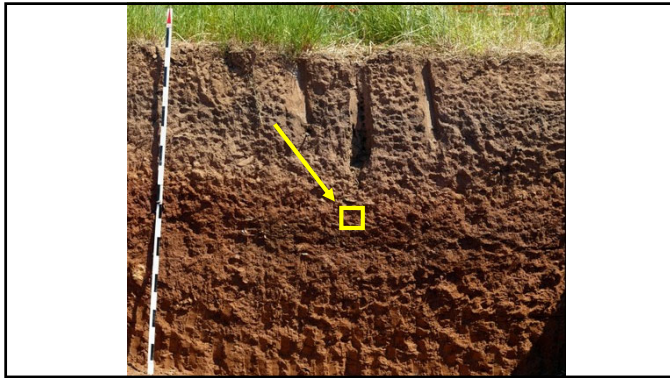


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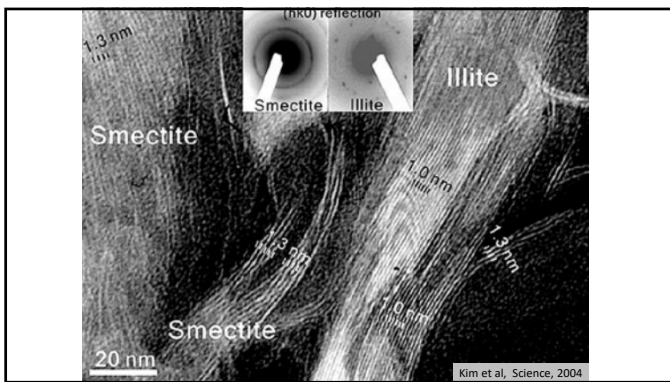
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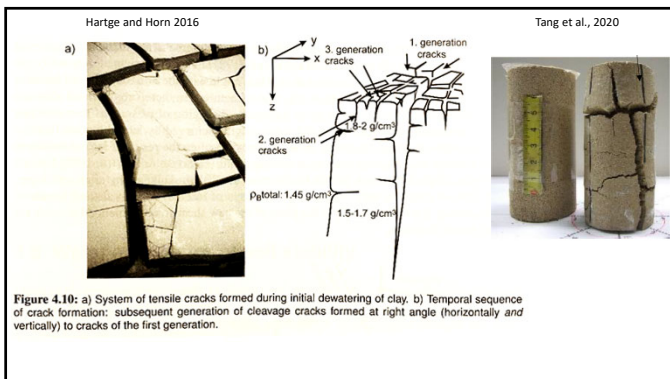
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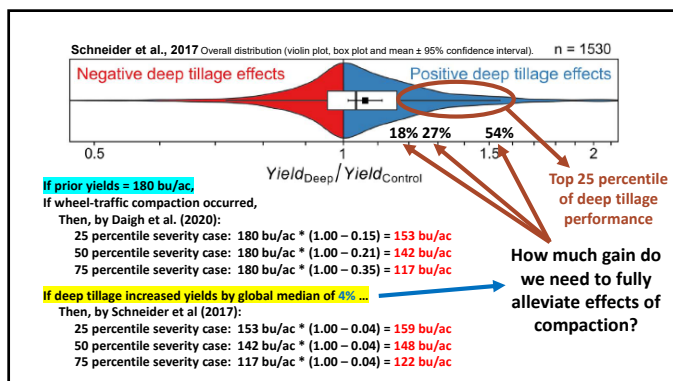


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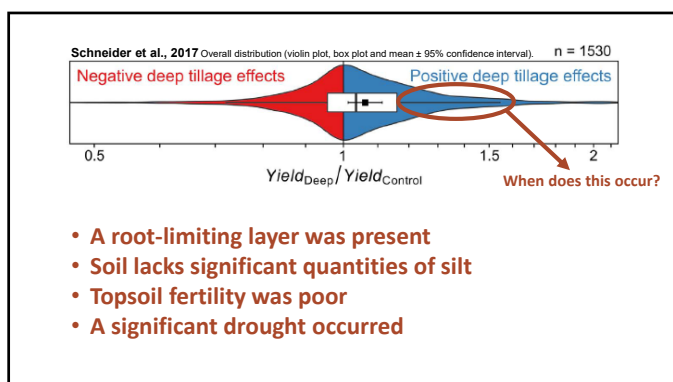
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Take Home Messages:

- Modern wheel loads are high and can push compaction deep
- Avoidance is preferred over relying on alleviation methods
- Keep loads light, adjust tire pressures, and fewer field passes to avoid creating new ruts
- If you have compaction, leverage natural alleviation mechanisms (roots, cracking) to make up for what tillage cannot obtain

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