

# Taking Care of Your Soil

## Tyre Setup

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# Why worry about tyres? -Soil Compaction -Efficiency -Traction

# **Soil Compaction**



"Soil compaction is the consolidation of soil particles into closer proximity with each other. This reduces pore space, soil aeration and natural drainage."

- Two forms of compaction:
  - -Surface compaction
  - -Subsoil compaction



# **Causes of Soil compaction**



- Surface Compaction
  - -Impact energy of rain on bare soils
  - -Contact with light machinery
- Subsoil Compaction
  - -Heavy machinery
  - -High axle loadings
  - -High tyre pressure
  - -Soil type
  - -Soil moisture



### How compaction affects yield in spring barley



Fig. 3. Effect of soil bulk density on grain yield of spring barley.

rophysics, 2001, 15, 9-12. Institute of Soil Science and Plant Cultivation, Czartoryskich 8, 24-100 Pu<sup>3</sup>awy, Poland

### Water Infiltration





# 85% of land is trafficked annually in a plough based system

# Effect of Axle Load

Car

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College of Agriculture, Food & Rural Enterprise







# Effect of Soil Moisture Cal

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Effect of soil moisture on load penetration under a tractor tire. (Tire size 11-28 inches; load 1,650 lb; inflation pressure 12 psi.)



Source: USDA, adapted from Soehne 1958.

# How to reduce compaction <sup>@</sup>



- Adjust tyre pressures to recommended settings
- Keep axle loadings below six tonnes
- Increase organic matter
- Fewer passes
- Wider tramlines
- Controlled traffic farming





#### Footprint size and pressure

- 600/65R38
  - 0.6 bar 397cm<sup>2</sup>
  - 1.0 bar 307cm<sup>2</sup>
  - 1.6 bar 286cm<sup>2</sup>
- Almost 40% larger footprint at 0.6 bar
- Measured on flat surface.
- The difference will be greater in soil.







Tyre Load = 2750 kgs

#### **Ohio State University Field Results**



		Fuel Use		Time	
	Tire	S Jacom R.			
<b>Tractor</b>	<b>Inflation</b>	<u>Lt / Ha</u>	<u>% Improv.</u>	<u>Ha / Hr</u>	<u>% Impr.</u>
JD8960	1.7	15.82		3.70	
	1.0	14.95	5.3	3.73	0.8
JD8960	1.7	21.88		2.46	
	1.0	19.65	10.3	2.63	7.2
JD8960	1.7	13.93		4.05	STAN STAN
	1.0	12.64	9.4	4.22	4.3
<b>JD8640</b>	1.7	20.67		1.95	31230
	1.0	19.19	7.2	2.07	6.2
JD4955	1.7	15.52		2.86	S. V.
- F	1.0	11.39	26.5	3.17	11.0
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# Tyre Technology



- Increased Flexion (IF)
- The same load at 20% lower pressure
- Very Increased Flexion (VF)
- The same load at 40% lower pressure



# **Central Inflation**





## Innovations





# Conclusion



- "Make the most of what you've got"
- Know axle weights with different implements
- Check tyre pressures on current equipment
- Be prepared to adjust pressures for field use
- Use the lightest equipment you can
- Consider options when upgrading tyres
- Assess ground conditions





"The development of agricultural machinery can be considered as almost completed"

The Director of the Agricultural Academy of Hohenheim, Germany, 1893.