34th Annual
NATIONAL NO-TILLAGE CONFERENCE®
January 6-9, 2026 ▪ St. Louis, Mo.

Conquering Compaction with Push of a Button

Ken Brodbeck, Precision Inflation, LLC

Why Change Tire Pressure?

Machinery has become bigger & heavier

Speeds have also increased:

- Planters & disks up to 10 mph
- Tractors & Sprayers at 30 to 35 mph
- Spreader trucks 40+ mph

55 years ago,
This was a big planter


96,000 lbs. Tractor & Planter
25 psi Tractor
90 psi planter

WHY Change Tire Pressure?

Because tire pressure affects:

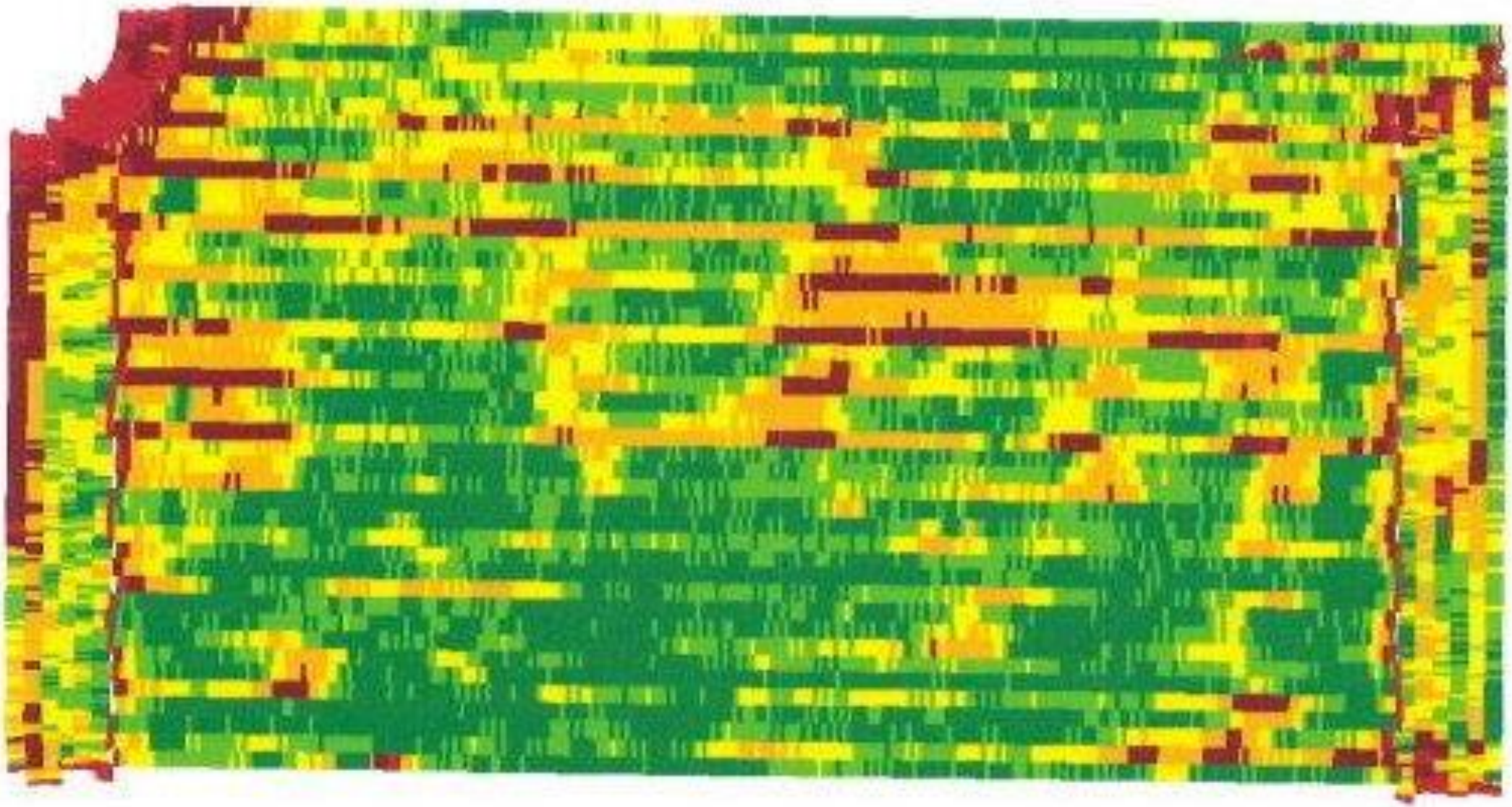
1. Yield
2. Soil Health / Compaction
3. Input costs


This is a level field.
What happened here?>>


Ear from wheel track row

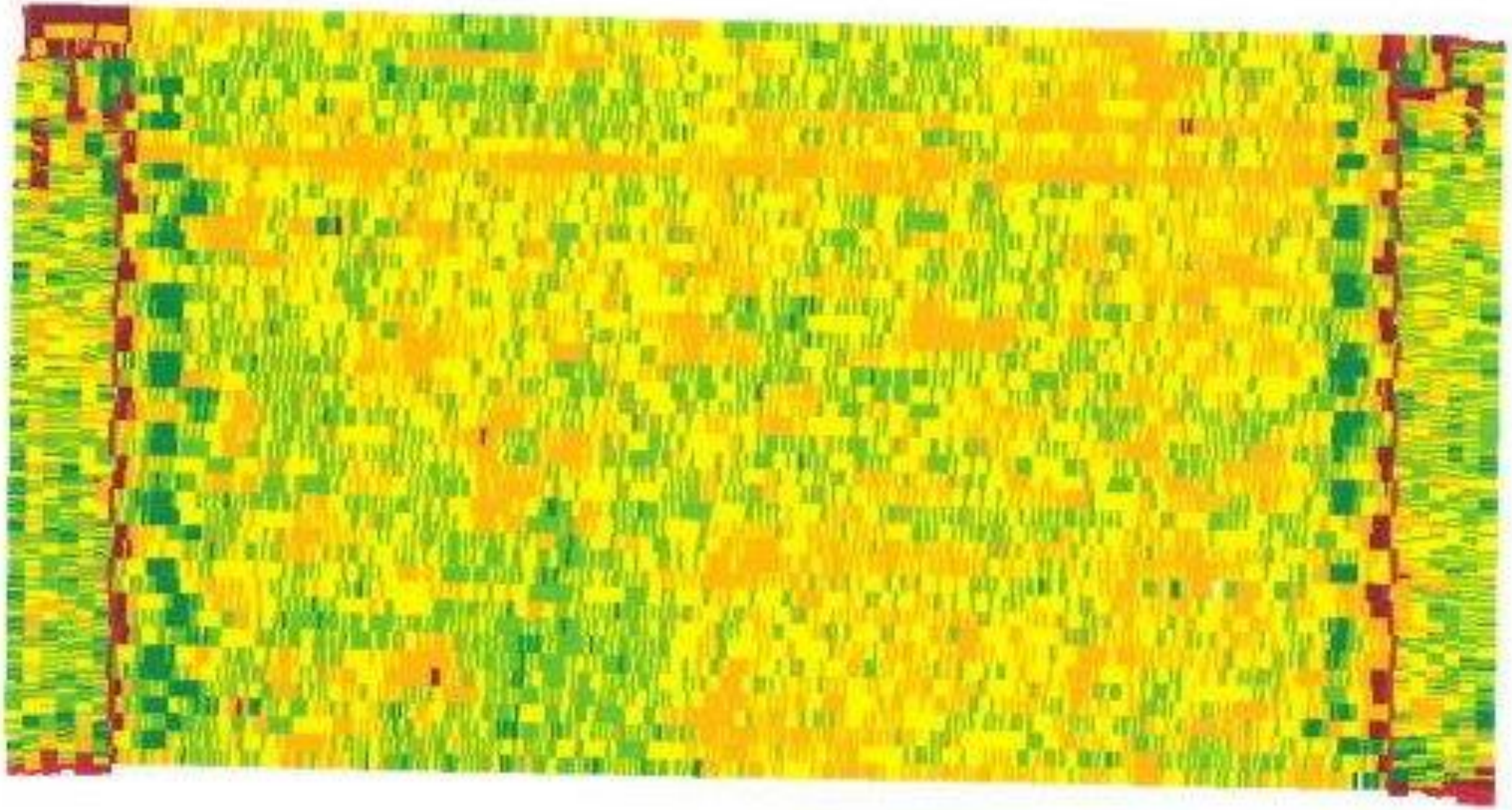

Ear outside of
wheel tracks

Yield Map with Planter Compaction




Inflation system
11:11
RDS Central Tire Inflation System
PTG
Axle Suspension
AUTO
MAX
Manual
Location
--- Client
--- Farm
--- Field
14
11
31
psi
15
12
42
psi
SETUP
WORK
OFF
AUTOTRAC
OFF
GUIDANCE
QUICK LINE
SWAP TRACK
iTEC
OFF
ISO
ISOBUS VT
HELP
MENU
iTEC
PRECISION INFLATION LLC
PTG systems are ISOBUS Ready

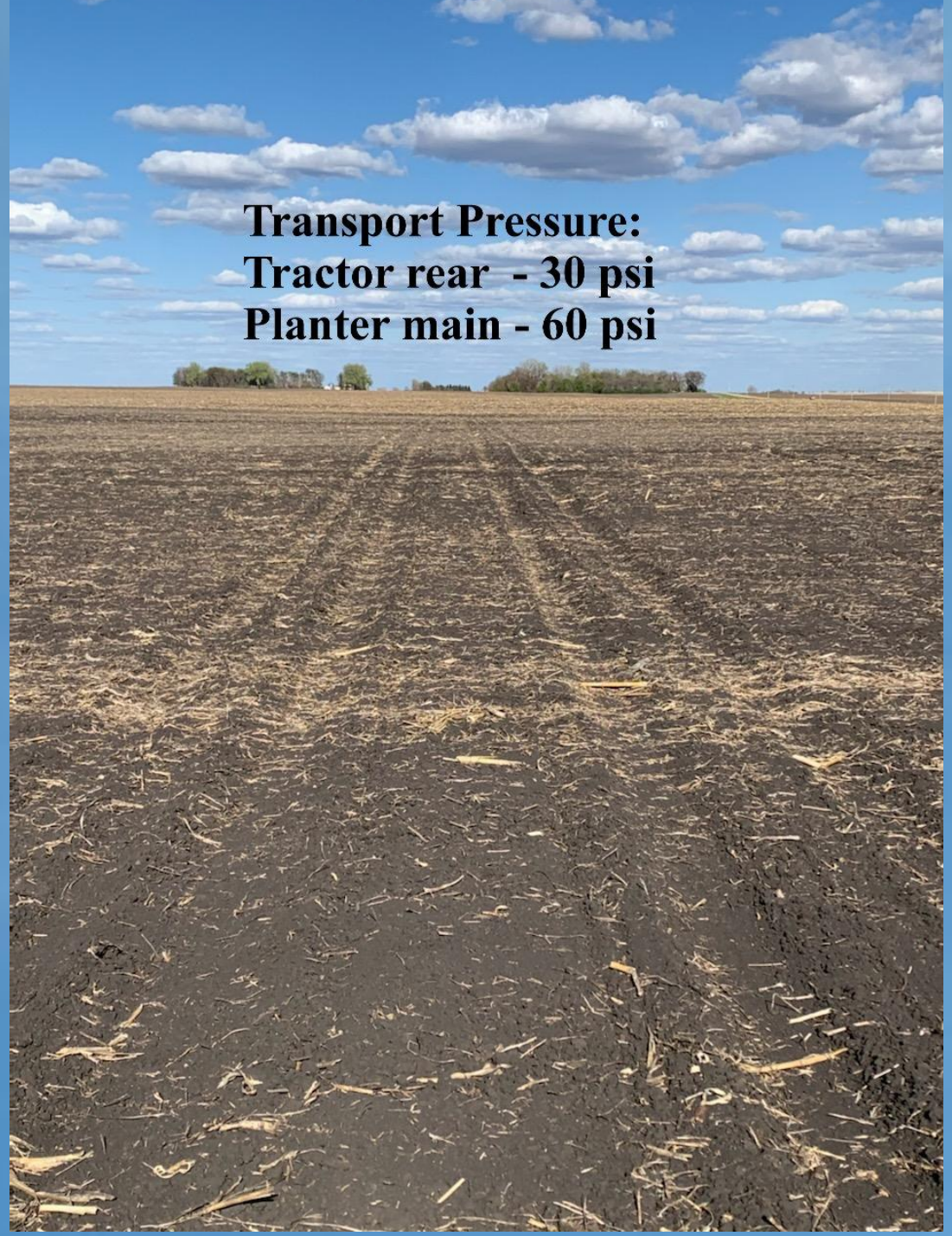
Yield map with CTIS = No Compaction




96,000 lbs. Tractor & Planter
25 psi Tractor
90 psi planter


60 PSI TRANSPORT
34 PSI

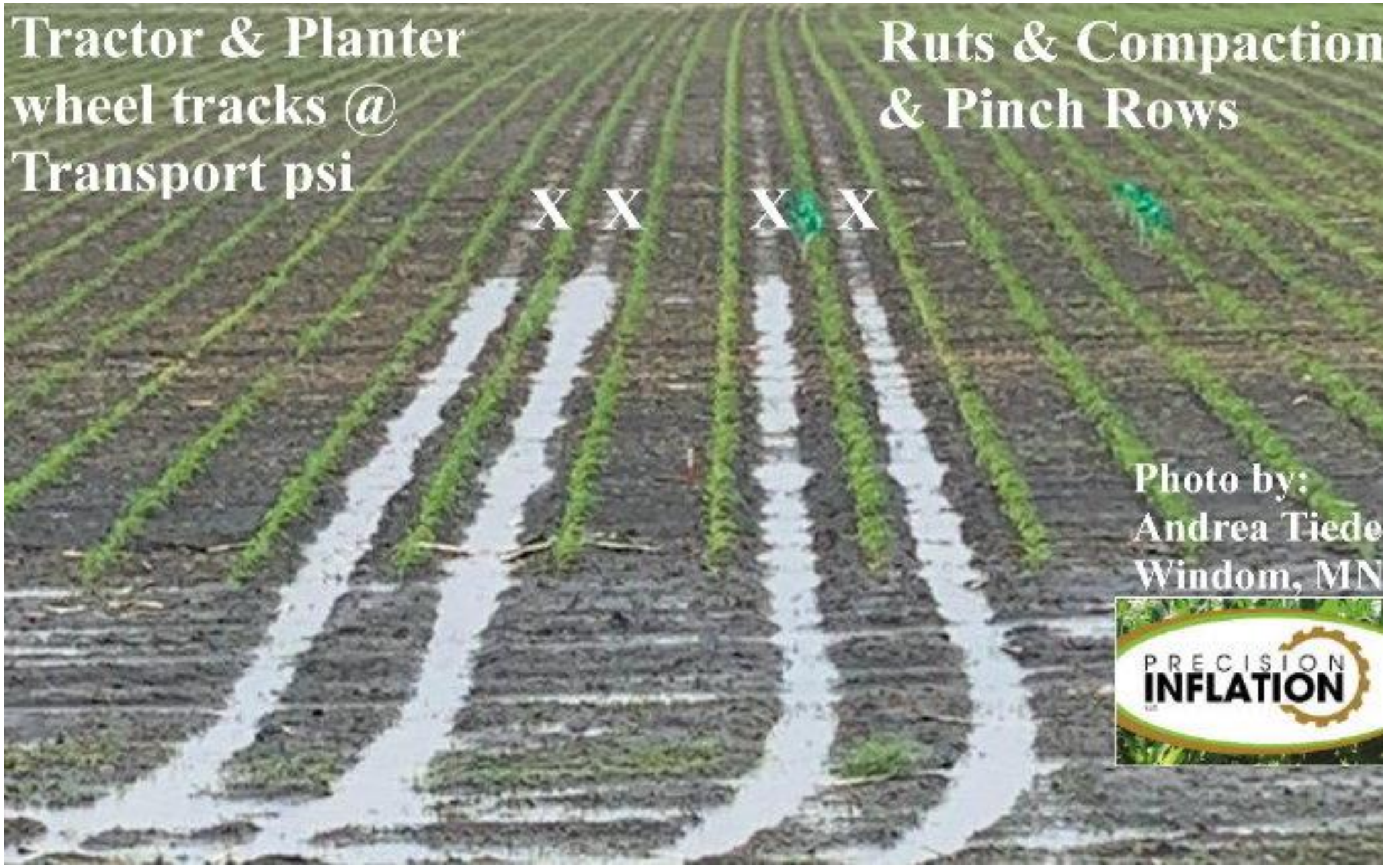

24 PSI
Field
14 PSI


Transport Pressure:
Tractor rear - 30 psi
Planter main - 60 psi


Field Pressure:
Tractor rear - 14 psi
Planter main - 24 psi


Road Pressure Pinch
Uneven Emergence

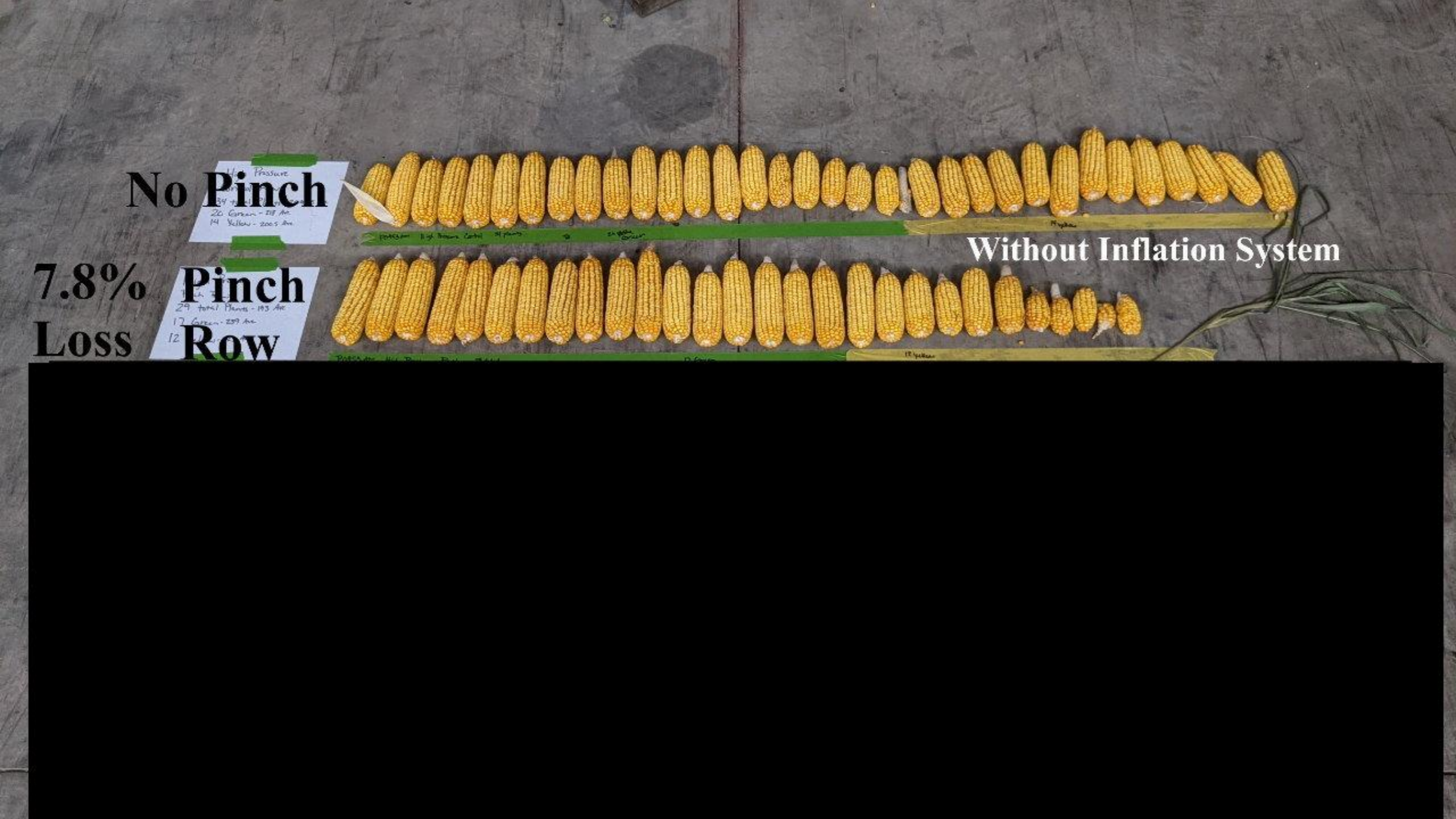

Field Pressure Pinch,
All but 2 plants
Emerged same day!


Tractor & Planter
wheel tracks @
Transport psi
X X X X
Ruts & Compaction
& Pinch Rows
Photo by:
Andrea Tiede
Windom, MN
PRECISION
INFLATION


Tractor & Planter
wheel tracks @
Lowered field psi
X X X X
Float over
the Field!!
PRECISION
INFLATION
Phote by:
Andrea Tiede
Windom, MN


High Pressure
Control
Pinch Row


Low Pressure
Pinch Row
Control


No Pinch
Without Inflation System
7.8%
Loss
Pinch
Row


No Pinch
7.8% Loss
Pinch Row
Without Inflation System
No Pinch
With Inflation System
Pinch Row
1.4% Loss

Do You Have Compaction?

If you say you have no compaction,
you deceive yourself and the truth is not in you…


Compaction from
Track tractor

Planting rows 1 & 4 into wheel tracks

Planting rows 1 & 4 into wheel tracks
Tire pressure = 10 psi!!!


Row 1
Tire
Row 2
No tire
Row 3
No tire
Row 4
Tire

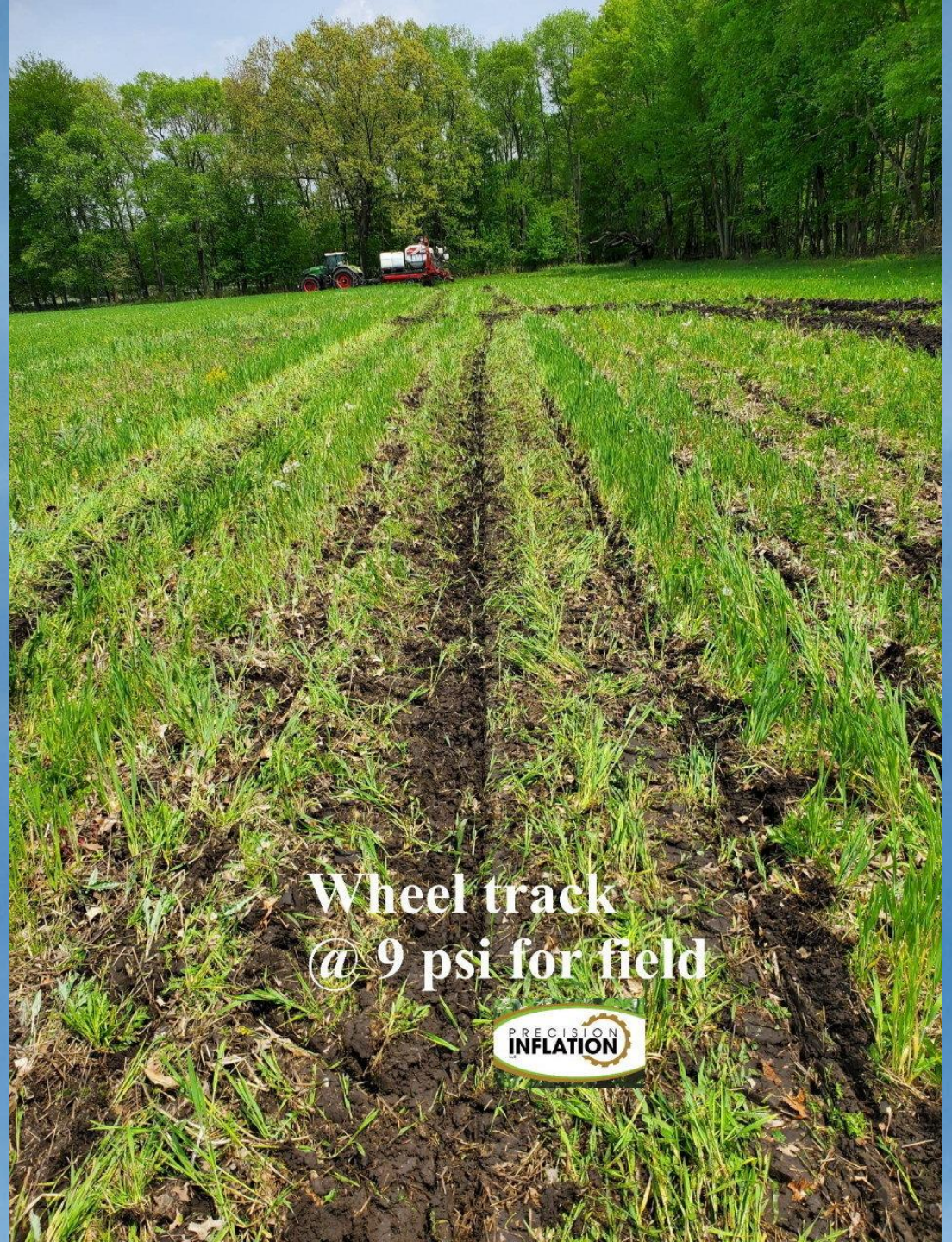

Reifendruck regeln bringt’s tatsächlich:


Low Pressure: the ground deforms the tire.
Tire Pressure
9 = PSI
High Pressure: the tire Deforms the Soil
Tire Pressure
23 = PSI


HARVEST
HARVEST


HARVEST
HARVEST
PB60
Spindle on 4
rear planter mains
AirBox Rear of Fendt
PRECISION
INFLATION
LLC


22 psi
for Road
Transport
PRECISION
INFLATION
LLC


Wheel track
@ 9 psi for field
PRECISION
INFLATION

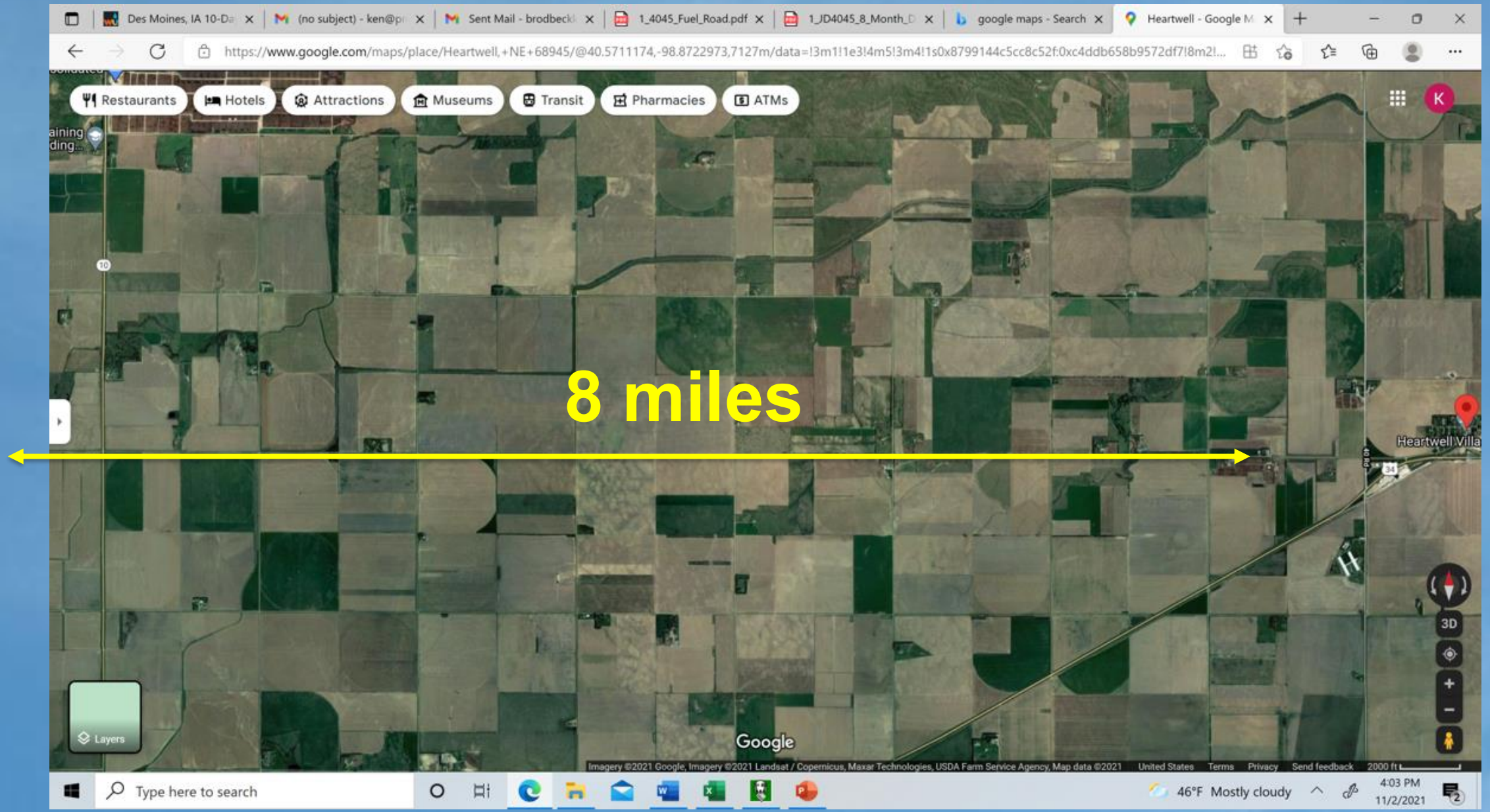
Testing Protocol – Ken Brodbeck

Road Fuel Test

Field Fuel Test

Road Handling Test

Testing Protocol – Road Test



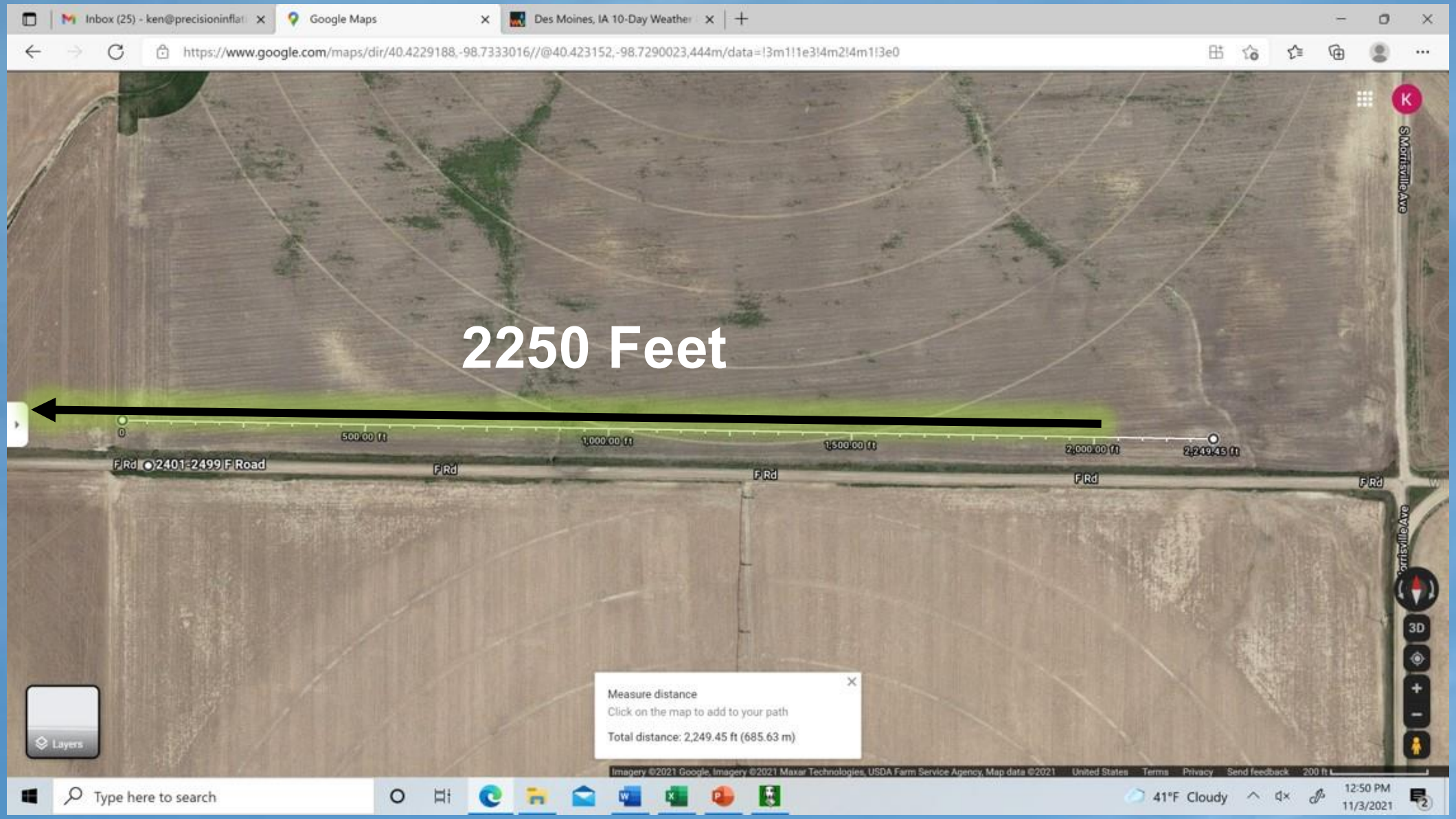
Testing Protocol – Road Fuel Test

- Tested 3 different pressure settings over 4 series of runs
- Used an 8 mile stretch of road
- Accounted for slope, wind, air temperature and machine and tire operating temp
- All data was recorded using JD onboard information in smallest measurable segments
- 128 miles of total measurements taken for accuracy

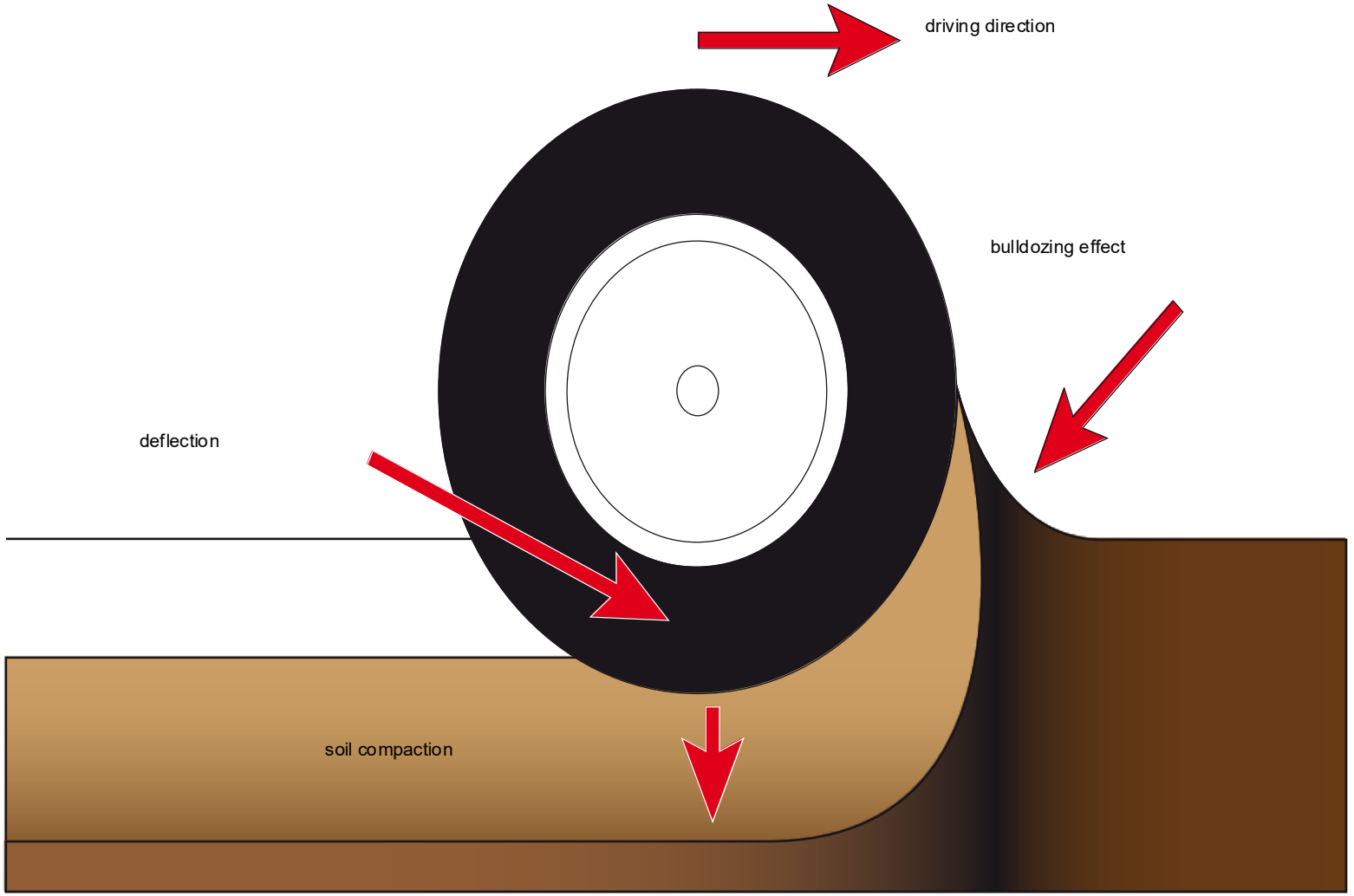
- **Best fuel savings was at max pressure front and back of 52 PSI for a total savings of 6% over standard non-CTIS pressures**

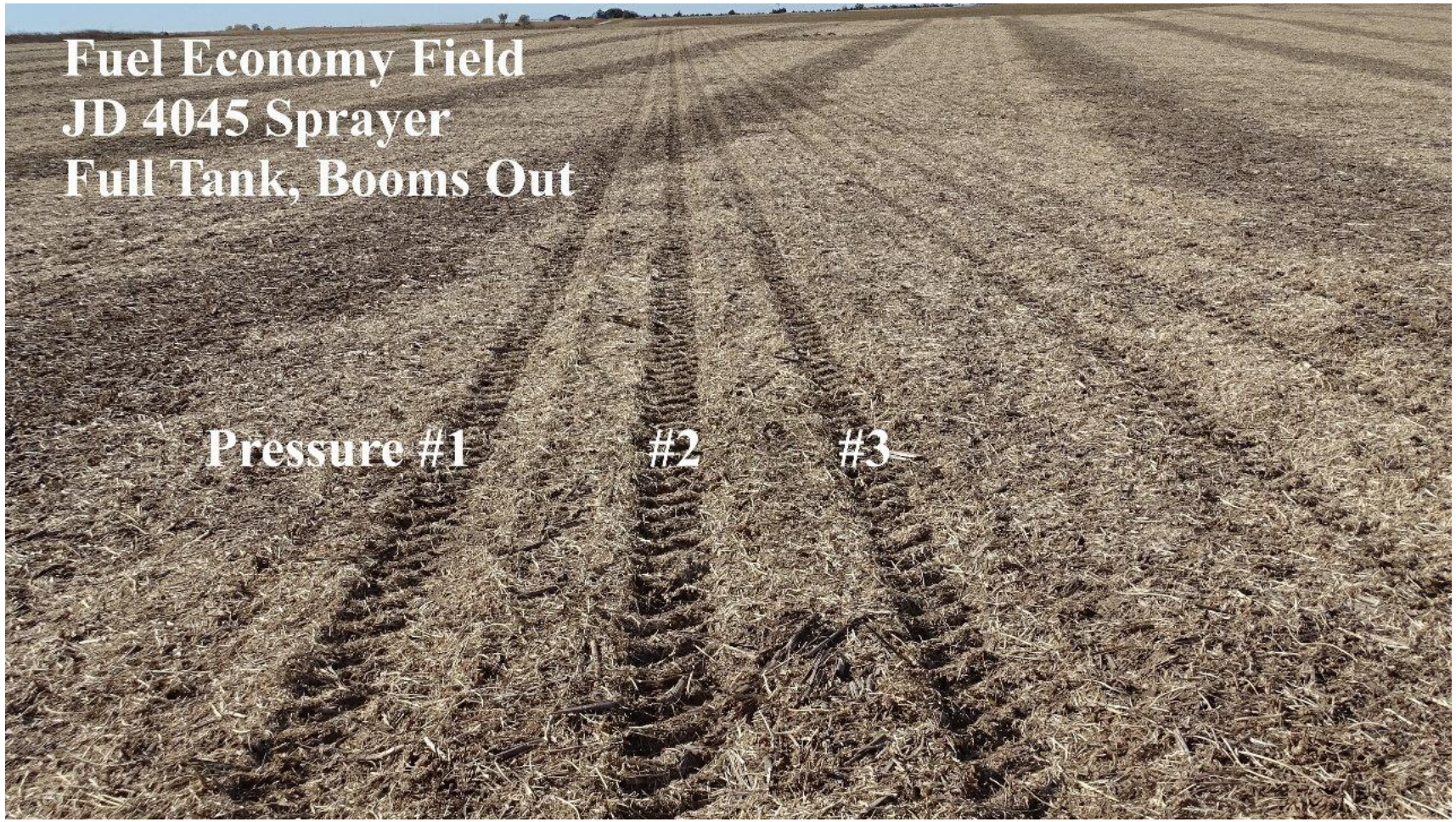
MICHELIN

Testing Protocol – Field Test



Depth of Rut:
+ 0.4 inches depth of rut = + 10 % fuel consumption





3 Pressure settings (psi) Front/Rear:

No CTIS #1	CTIS #2	CTIS #3
32/45	26/45	26/35

Fuel used avg. of 3 rounds in Liters:

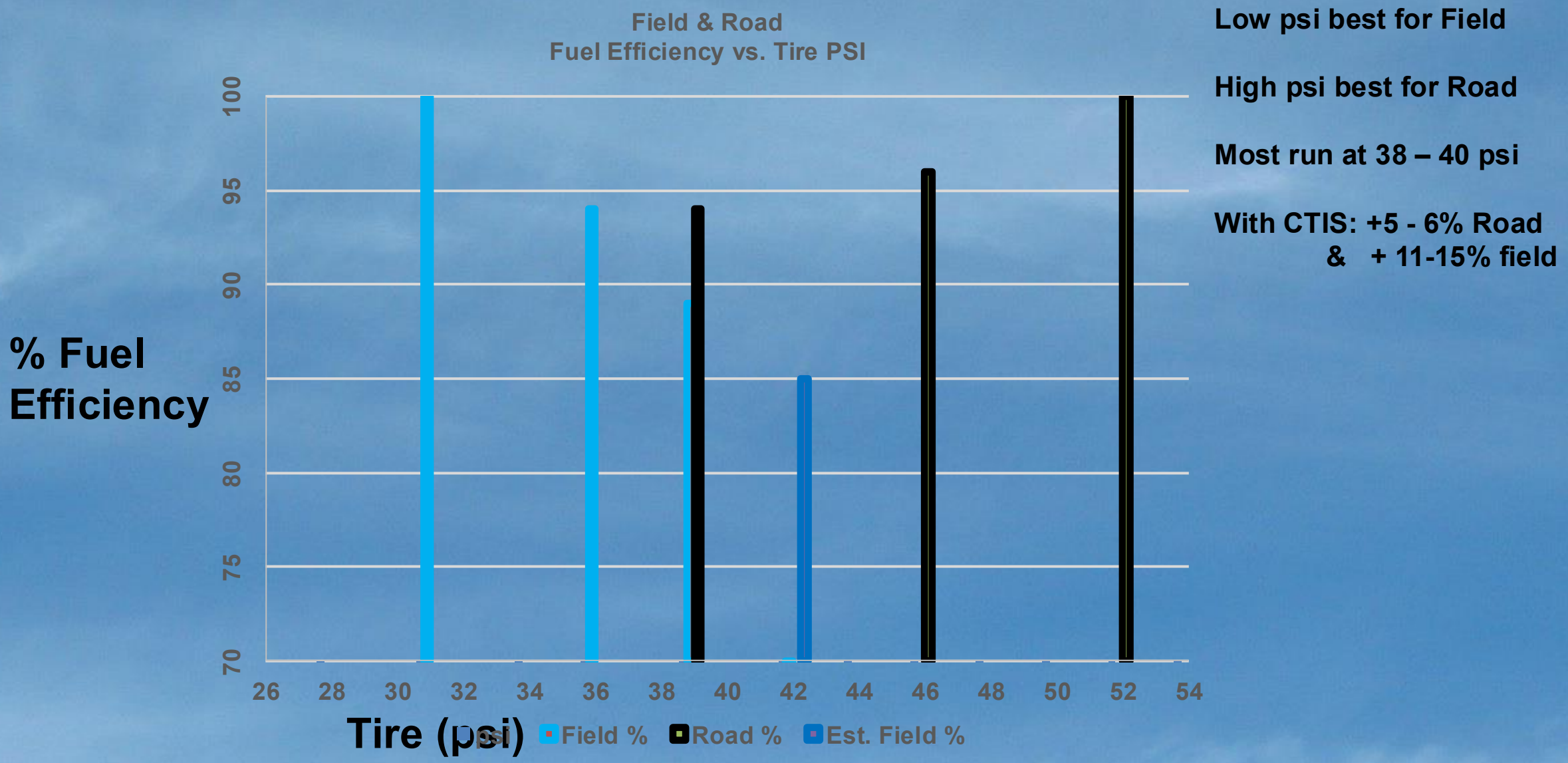
No CTIS #1	CTIS #2	CTIS #3
1.9 L	1.8 L	1.7 L
No CTIS	-5%	-11%

32/45 psi NOT acceptable for transport

52/52 psi NOT acceptable for field

Projected field advantage 52 psi to 26/35, estimated 22% fuel savings!

Road & Field Fuel Efficiency vs. Tire (psi)



Low psi best for Field

High psi best for Road

Most run at 38 – 40 psi

With CTIS: +5 - 6% Road
& + 11-15% field

The Effect of Tire Inflation Pressure on Fuel Consumption of an Agricultural Tractor on a Paved Road

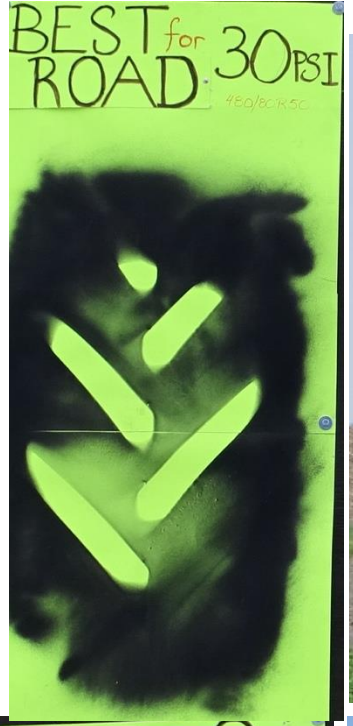
V. Udompetaikul, S. Upadhyaya, B. Vannuccis At UC Davis in California
Published 2009

Results:

Tire psi	Fuel Econ. %
9	100
16	107
23	111

How Does Tire psi Effect Traction?

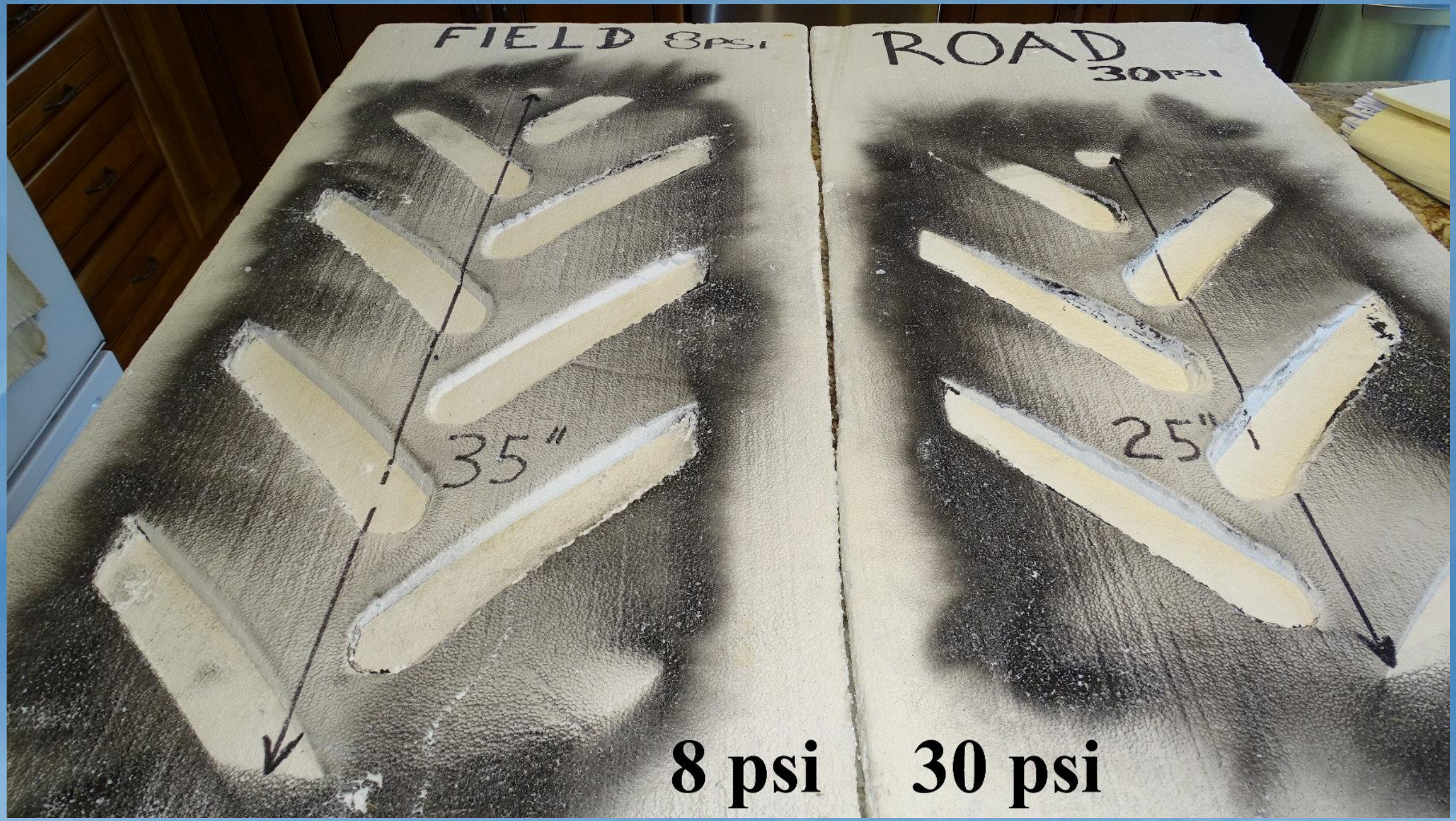
High/Overinflated psi = small, short footprint
VF minimum psi = Large, Long footprint


BEST for ROAD 30PSI

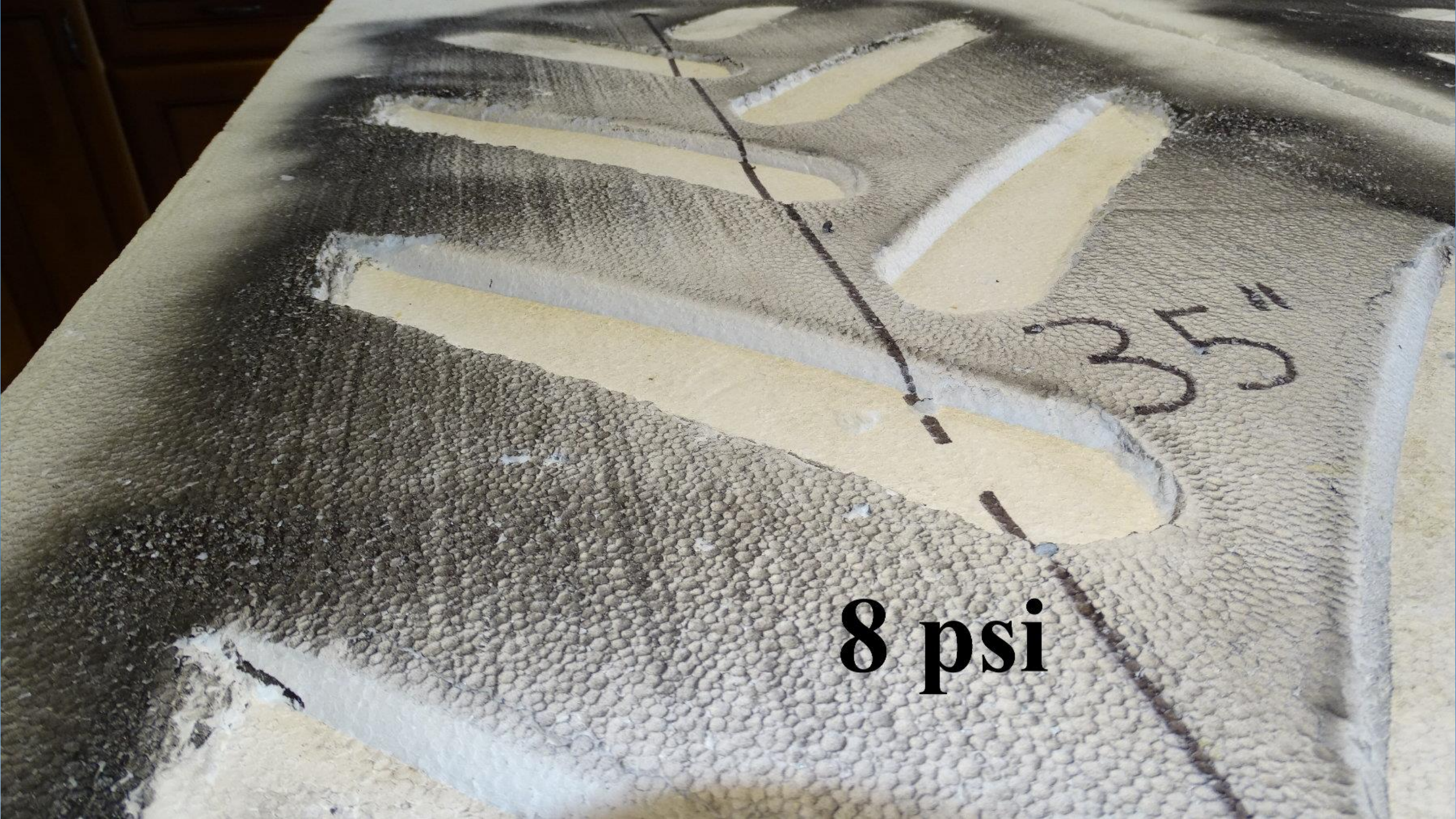

Transport Configuration


BEST for FIELD 8PSI


Planting Configuration


FIELD 8PSI
35"
ROAD
30PSI
25"
8 psi
30 psi


30 psi


35"
8 psi

What is Best for Traction?

Minimum tire psi in the field
Provides long, large footprint
Minimum compaction
Will cut wheel slip in half from high road psi
20 to 10%, 10 to 5% in the field

What is Best PSI for Transport?

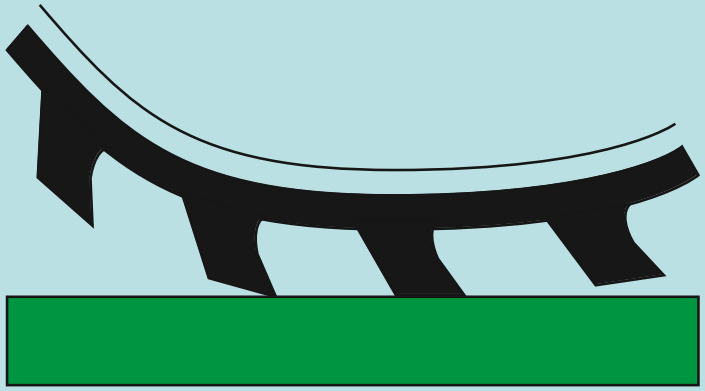
6 to 10 psi above the minimum provides:

1. Up to 20% longer tire life
2. Better stability and steering
3. Between 7 to 11% better fuel economy

Tread Wear on the Road

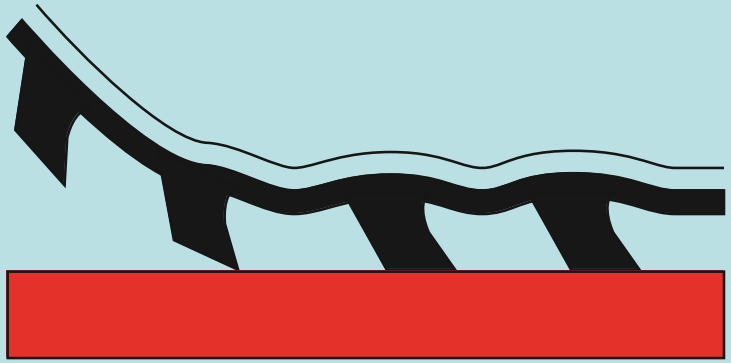
road tire 23 psi (1.6 bar)

normal wear!



field tire 12 psi (0,8bar)

excessive wear!

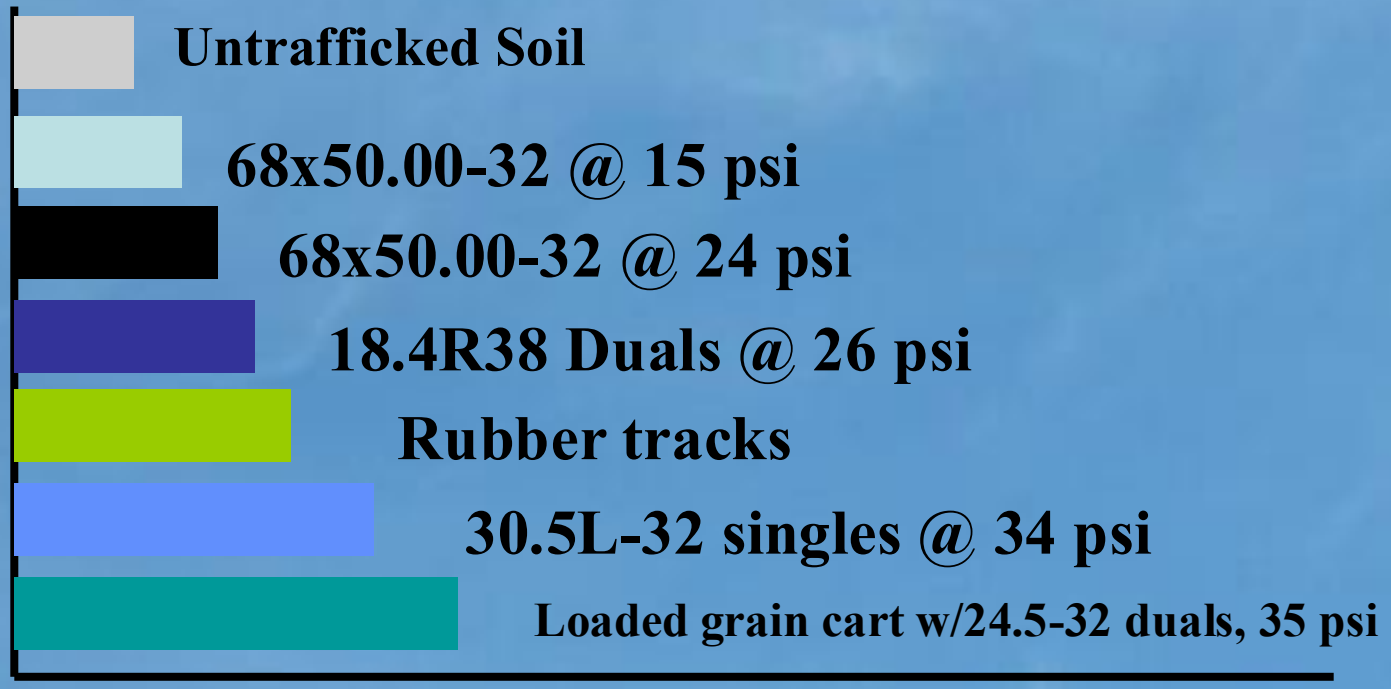


How Best to Minimize Soil Compaction?

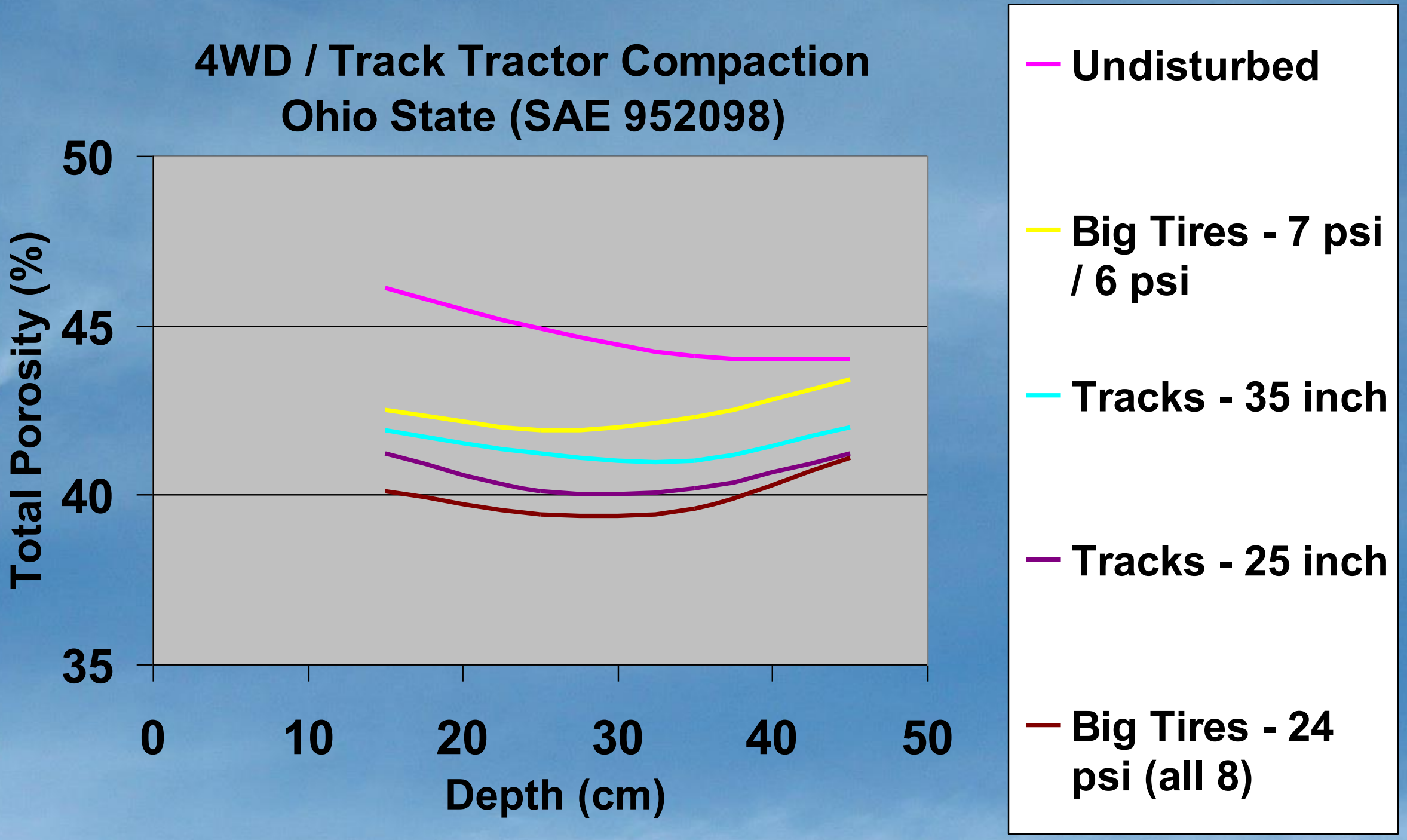
Which Is better, tires or tracks?

Let's look at the data over time.

OSU Soil Compaction Study



JD 9600 Combine with 12 Row Head, Full Grain Tank


4WD / Track Tractor Compaction
Ohio State (SAE 952098)
Total Porosity (%)
50
45
40
35
0
10
20
30
40
50
Depth (cm)
Undisturbed
Big Tires - 7 psi / 6 psi
Tracks - 35 inch
Tracks - 25 inch
Big Tires - 24 psi (all 8)

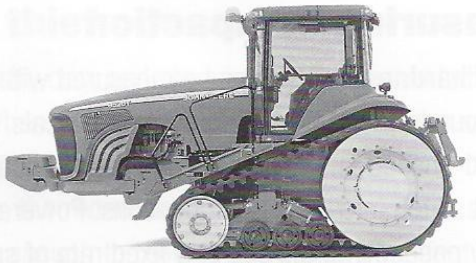
Wheels versus tracks

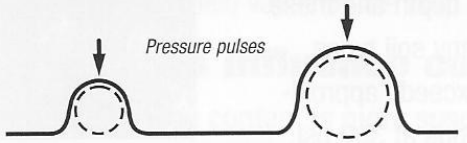
Flotation is the ability of a vehicle to stay on top of wet soil and still keep moving without getting mired. Track tractors generally have better flotation than tractors with tires. However, tractors with properly sized radial tires inflated to the correct pressures, produce less compaction than tractors with tracks.

Tractors with over-inflated tires create more compaction than tractors with tracks. ***Both tires and tracks can create compaction when operated on wet soils!***

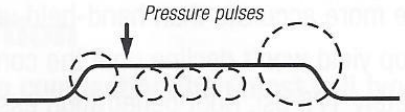
Single front tires versus front duals

Wheels versus tracks:



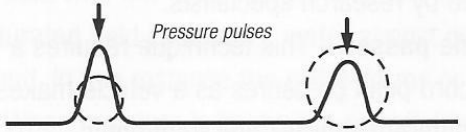


PERCEIVED PRESSURE FROM A WHEEL TRACTOR

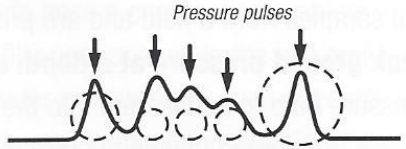


PERCEIVED PRESSURE FROM A TRACK TRACTOR

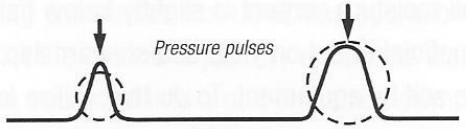
(Static average ground pressure: tractor weight divided by the total track-contact area)



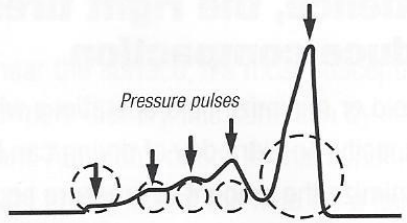
ACTUAL PRESSURE WITHOUT IMPLEMENT



ACTUAL PRESSURE WITHOUT IMPLEMENT



ACTUAL PRESSURE WITH IMPLEMENT



ACTUAL PRESSURE WITH IMPLEMENT

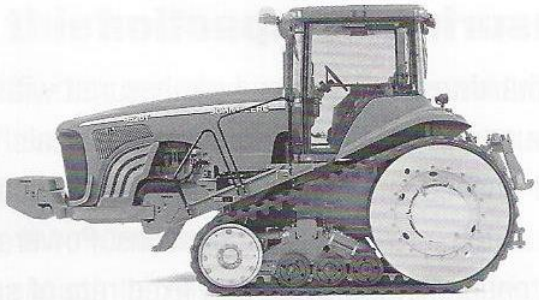
Measured ground pressure from tires increases only slightly with proper setup

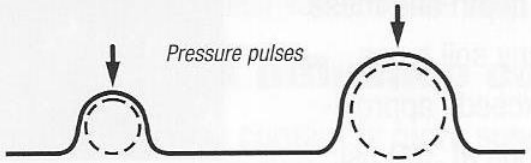
John Deere researchers planted pressure sensors in the soil to measure what happens

Pressure pulses on track tractors vary greatly versus wheeled tractors

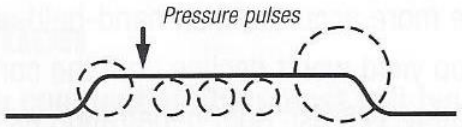
The perception that pressure remains constant under a track tractor is false. In fact,

Wheels versus tracks:



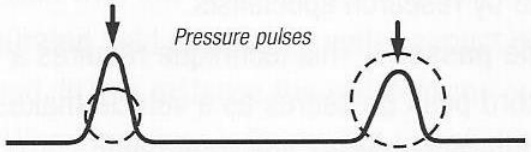


PERCEIVED PRESSURE FROM A WHEEL TRACTOR

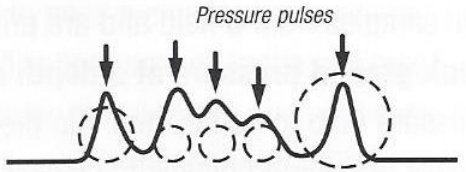


PERCEIVED PRESSURE FROM A TRACK TRACTOR

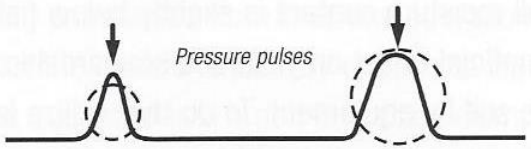
(Static average ground pressure: tractor weight divided by the total track-contact area)



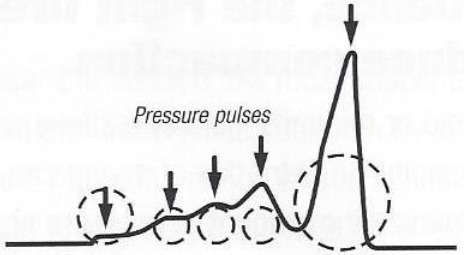
ACTUAL PRESSURE WITHOUT IMPLEMENT



ACTUAL PRESSURE WITHOUT IMPLEMENT



ACTUAL PRESSURE WITH IMPLEMENT

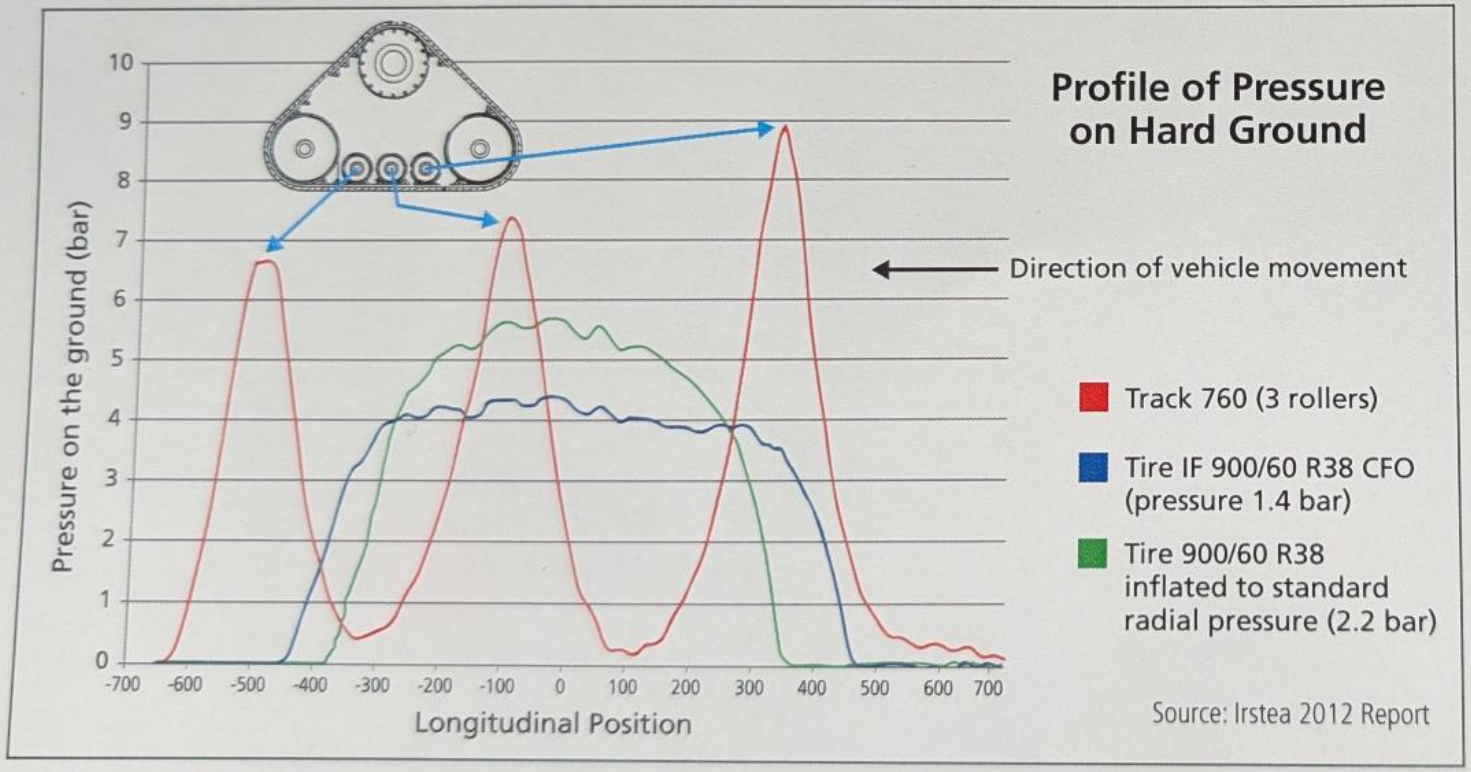


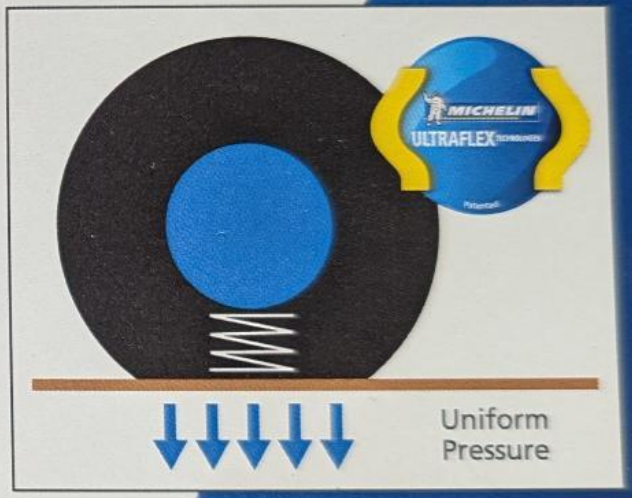
ACTUAL PRESSURE WITH IMPLEMENT

SOIL PROTECTION

THERE IS A BIG DIFFERENCE

- Testing has shown there is a significant difference in how ground pressure is applied when comparing 4-track machines to multi-tire tractors.
- Tracks do NOT provide uniform pressure to the soil. There are spikes of very high ground pressure applied to the fields with the pass of each roller (see chart below).
- The flexible MICHELIN® Ultraflex tire runs at very low pressure in the field and applies a steady uniform pressure to the ground – about half the ground pressure of a track roller.





MICHELIN
A better way forward

IOWA STATE UNIVERSITY
College of Agricultural and Life Sciences
College of Engineering

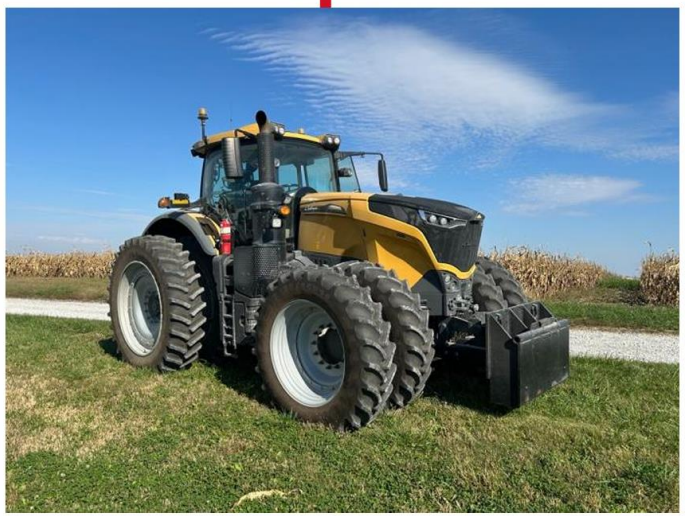
Tire vs. Track Tractors Free-Rolling Effects on Shallow and Deep Soil Compaction
Iowa State University to Firestone and Precision Inflation - Progress Report *

Mehari Tekeste[a], Joshua Tai[a], Kenneth Brodbeck[b], Sally Brodbeck[b], Bill Durivage[c], Gregory Jones[c]

[a] Soil Machine Dynamics Laboratory (SMDL), Agricultural and Biosystems Engineering, Iowa State University (Ames, Iowa)
[b] Precision Inflation, LLC (West Des Moines, Iowa)
[c] Firestone Agricultural Tires, Bridgestone Americas Tire Operations (Des Moines, Iowa)

Dec 30, 2025

Track Tractor Versus Wheeled Tractors Replicated Four Times



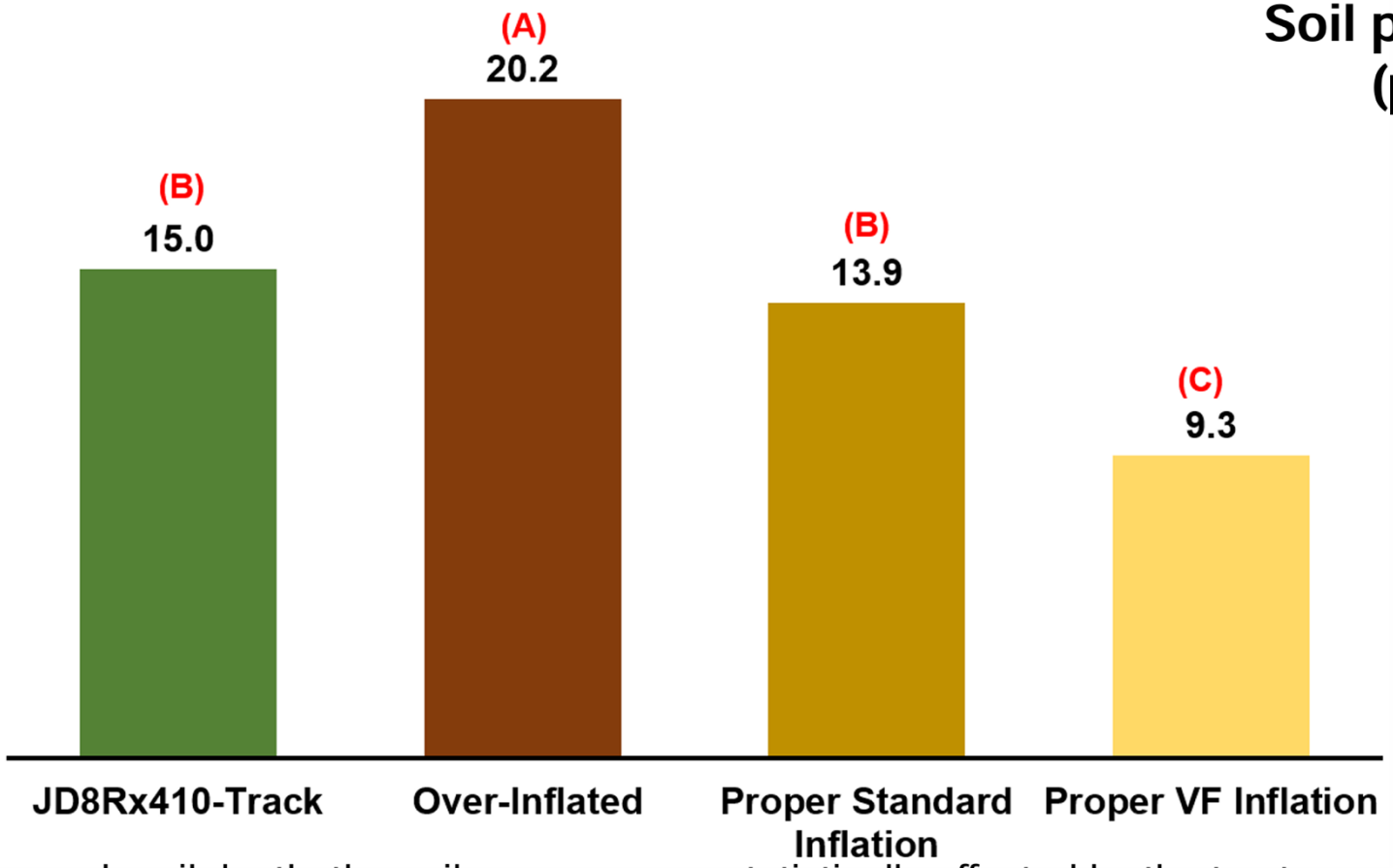
- **Front: JD8Rx410 Two 24" Track Width x 58.8" Track Length**
- **Front: JD8Rx410 Two 24" Track Width x 71.5" Track Length**

- **Over-Inflated:** (F: 30 psi | R: 30 psi) [High]
- **Proper Standard Inflation** (F: 16 psi | R: 15 psi) [Middle]
- **Proper VF Inflation** (F: 9 psi | R: 8 psi) [Low]

Axle	Tractor	Tire/Track	Axle Load (lbs)	Tire or Track Load (lbs)	Treatment
FRONT	JD8Rx410	Two 24" Track Width x 58.8" Track Length	22,920	11,460	JD8Rx410 Two 24" Track Width x 58.8" Track Length
	AGCO Challenger 1038	Duals VF420/85R38	16,420	4,105	Over-Inflated* (F:30 psi| R:30 psi)
	AGCO Challenger 1038	Duals VF420/85R38	16,420	4,105	Proper-Standard Inflation (F:16 psi| R:15 psi)
	AGCO Challenger 1038	Duals VF420/85R38	16,420	4,105	Proper-VF Inflation (F:9 psi| R:8 psi)
REAR	JD8Rx410	Two 24" Track Width x 58.8" Track Length	24,500	12,250	JD8Rx410 Two 24" Track Width x 71.5" Track Length
	AGCO Challenger 1038	Duals VF480/80R50	20,400	5,100	Over-Inflated* (F:30 psi| R:30 psi)
	AGCO Challenger 1038	Duals VF480/80R50	20,400	5,100	Proper-Standard Inflation (F:16 psi| R:15 psi)
	AGCO Challenger 1038	Duals VF480/80R50	20,400	5,100	Proper-VF Inflation (F:9 psi| R:8 psi)

* The tires were Inflated according the proper tire inflation pressure according to Firestone tire load tables https://s7d1.scene7.com/is/content/bridgestone/2025_Fs_AG_Databook_%20Load_Inflation_Tablespdf

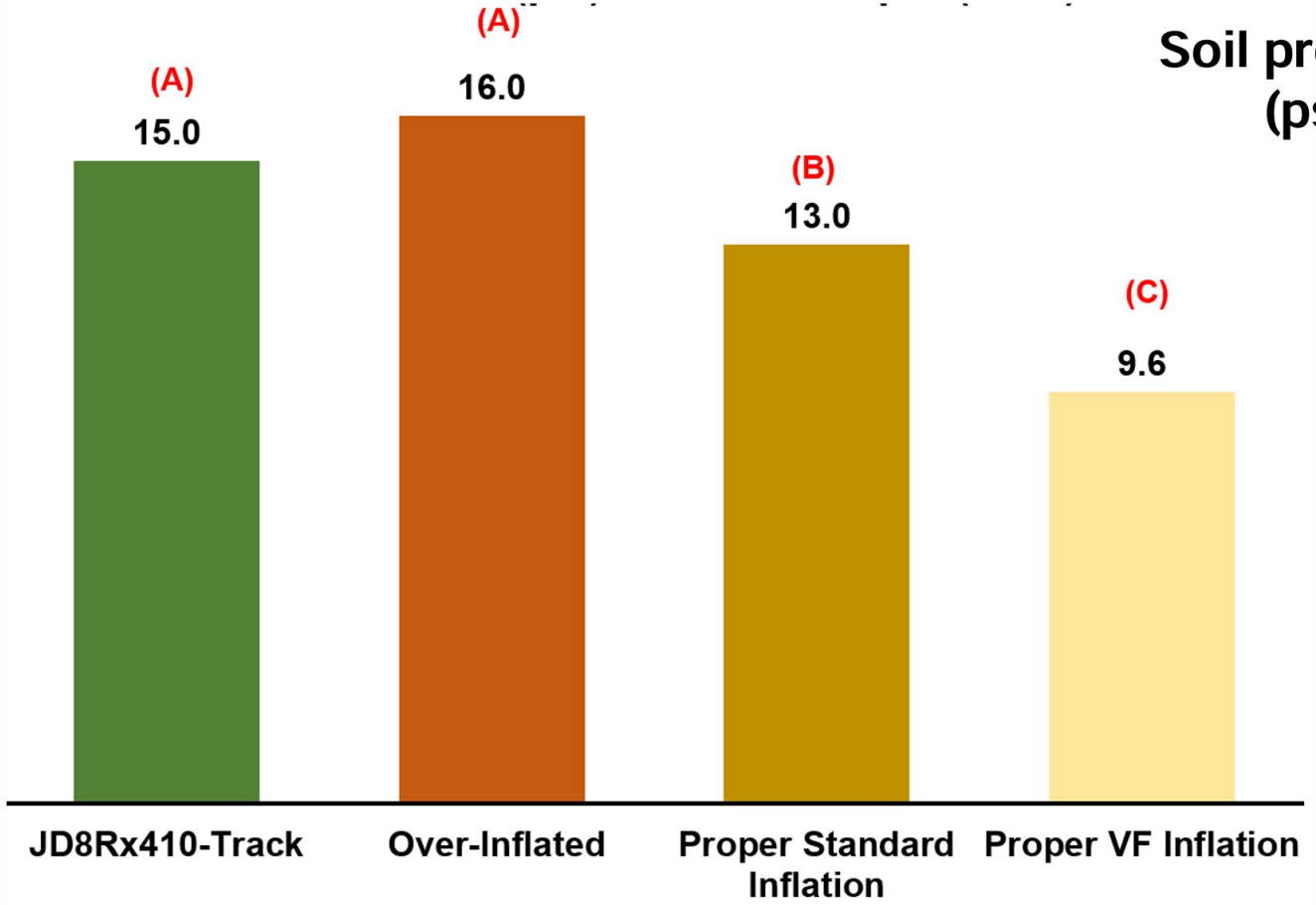
Rear: Track Tractor Versus Wheeled Tractors 8”



- Track
- Over-Inflated: (F: 30 psi | R: 30 psi)
- Proper Standard Inflation (F: 16 psi | R: 15 psi)
- Proper VF Inflation (F: 9 psi | R: 8 psi)

- Within each soil depth, the soil pressure was statistically affected by the tractor configurations. The same letter within each soil sensor depth class indicate no statistical difference at p-value of 0.05

Rear: Track Tractor Versus Wheeled Tractors 12”

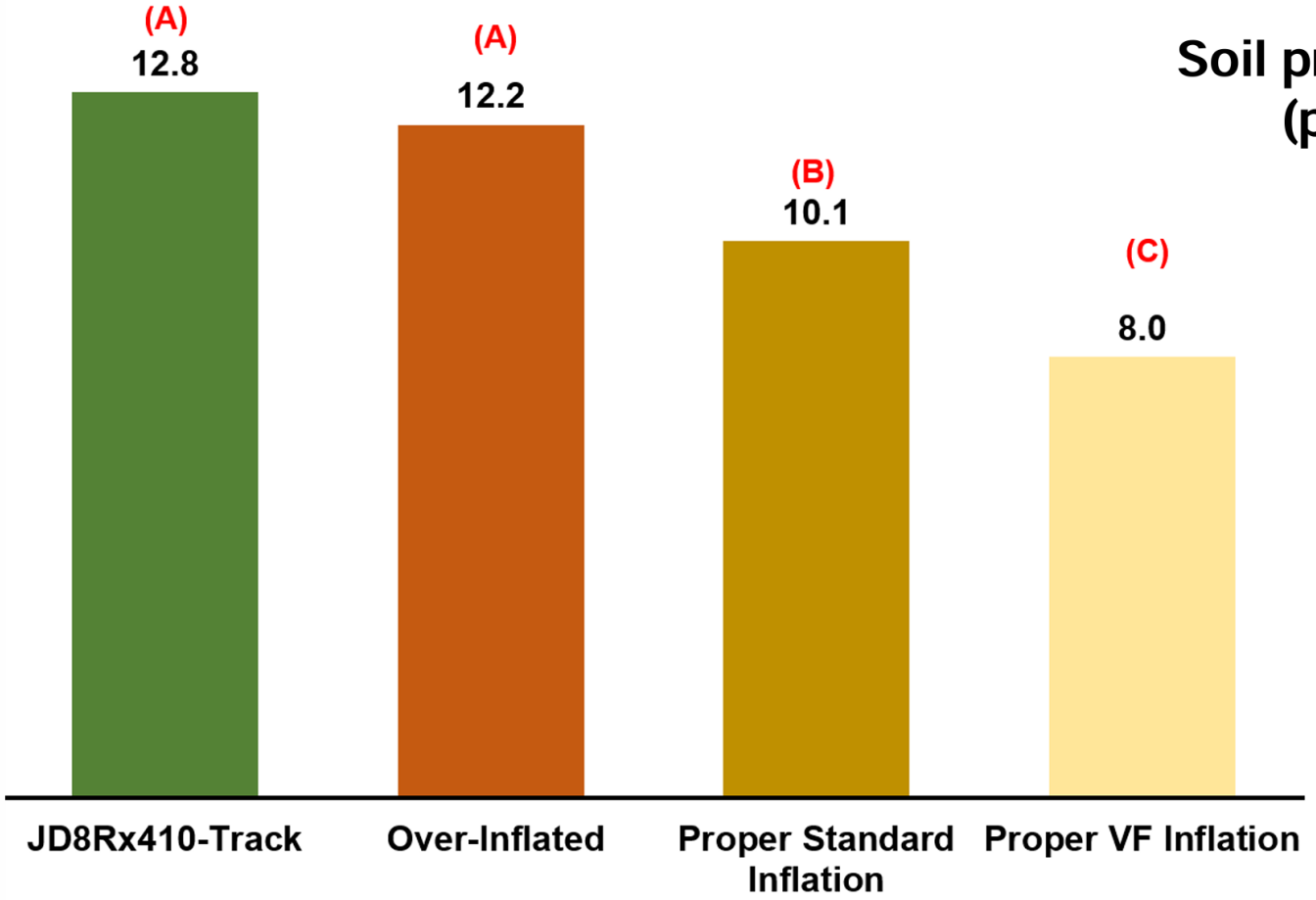


- **Track**
- **Over-Inflated:** (F: 30 psi | R: 30 psi)
- **Proper Standard Inflation** (F: 16 psi | R: 15 psi)
- **Proper VF Inflation** (F: 9 psi | R: 8 psi)

- Within each soil depth, the soil pressure was statistically affected by the tractor configurations. The same letter within each soil sensor depth class indicate no statistical difference at p-value of 0.05

* ASABE article in-review to be published by Trans. Of ASABE and presentation at Annual International Meeting, Indianapolis, Indiana, 2026 to MS-45 Session

Rear: Track Tractor Versus Wheeled Tractors 16”



- **Track**
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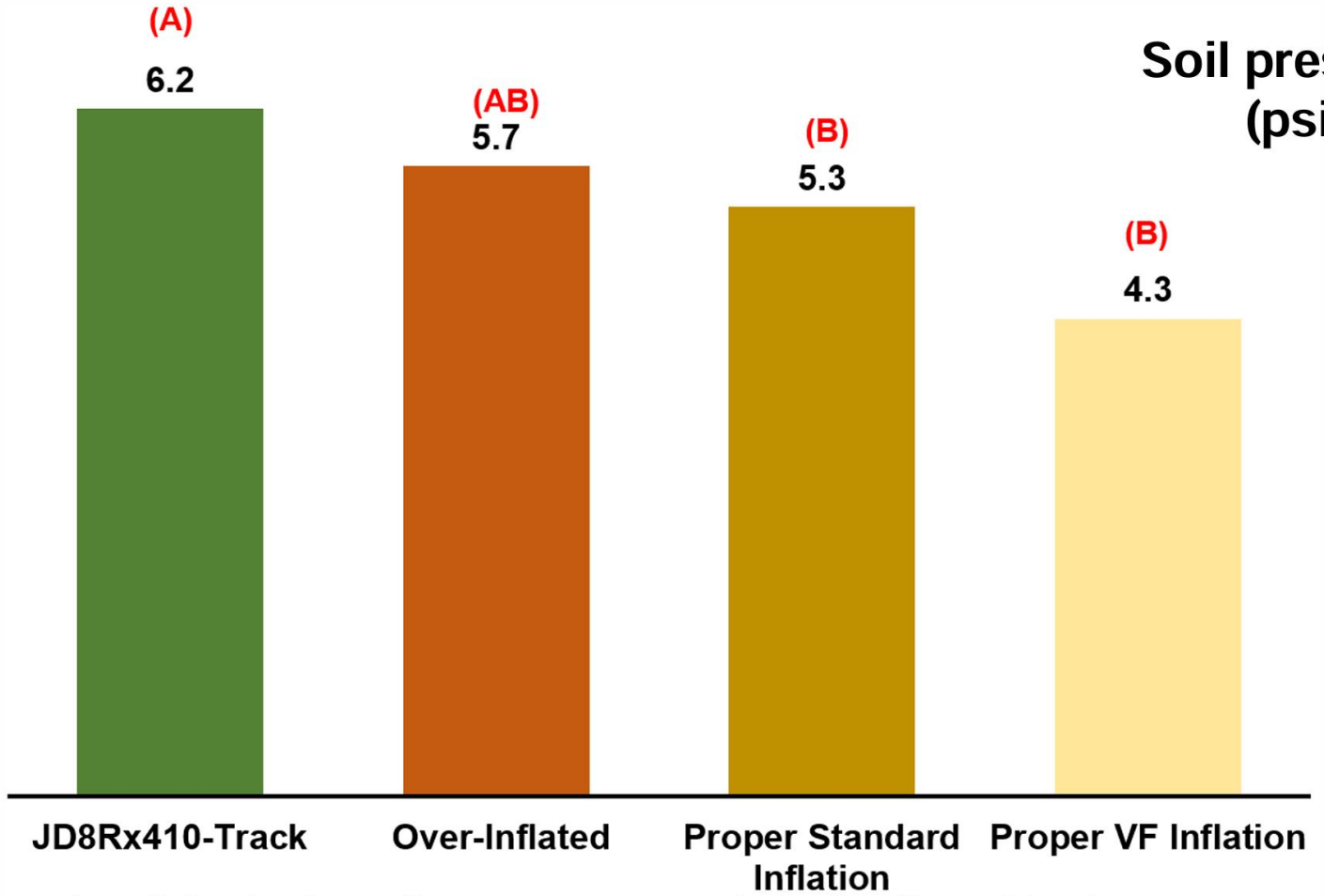
Rear: Track Tractor Versus Wheeled Tractors 20”



- **Track**
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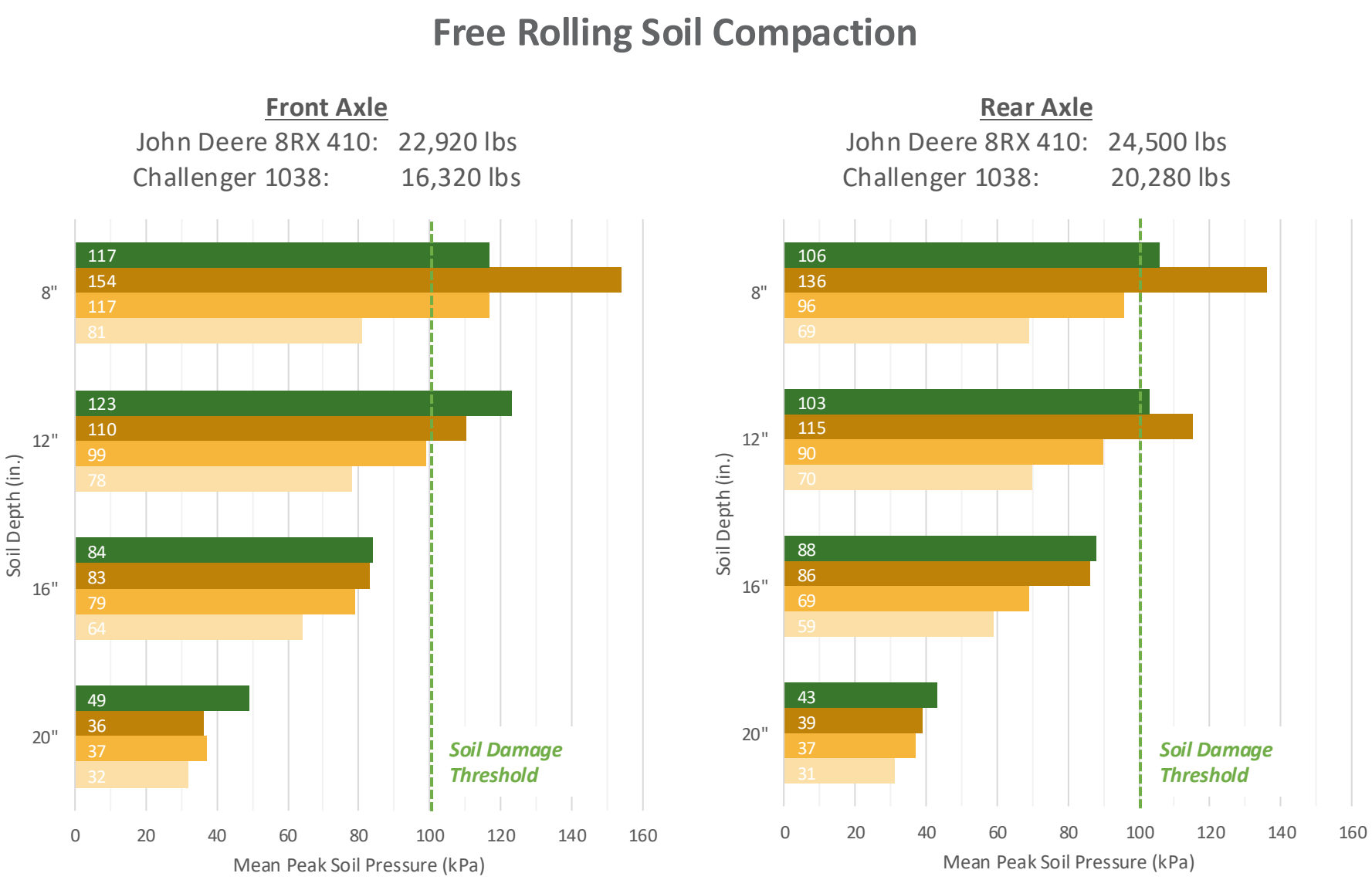
Free Rolling Soil Compaction



Track

Over-Inflated
(F: 30 psi | R: 30 psi)

Proper Standard Inflation
(F: 16 psi | R: 15 psi)

Proper VF Inflation
(F: 9 psi | R: 8 psi)

Conclusion

- ***Proper VF inflation*** tire pressures had significantly lower compaction than the ***JD 8RX track*** *(P-value < 0.05)* within each of the soil depth classes
- ***Proper VF inflation*** resulted in statistically the lowest soil compaction (*P-value < 0.05*) compared ***proper standard*** and ***over-inflated*** tire pressures, except at 20 inches and rear-wheel tractor settings
- ***Over-inflated*** *rear tires at 30 psi showed significantly higher compaction at 8 inches (P-value < 0.05) compared to the* ***JD 8RX track****. No significant differences were found at other soil depths*
- Our findings indicated that deep soil compaction was more influenced by heavier axle loads, while shallow soil compaction is primarily affected by tire inflation pressures

Track
Over-Inflated:
(F: 30 psi | R: 30 psi)

Proper Standard Inflati
(F: 16 psi | R: 15 psi)

Proper VF Inflation
(F: 9 psi | R: 8 psi)

New tire technology comparison

Size: 480/80R50 Duals

Pulling front fold planter in field	Transporting front fold planter
Axle Load: 20,000 lbs.	Axle Load: 30,000 lbs.
Tire Type (Min. psi)	Tire Type (Min.psi)
St. 14 Better	St. 26
VF 8 BEST	VF 16 Good

Standard tire with CTIS, BEATS VF only
CTIS + VF = Best!!

Excessive Soil Compaction

1. Steals YIELD
2. Compaction Damages Soil Health
3. Degrades Water Quality
4. Causes Soil Erosion
5. Reduces Fuel Economy
6. Decreases Equipment Efficiency

CTIS = High psi road & minimum field!

SEE WHY PRESSURE MATTERS

PRECISION INFLATION

Right pressure, right now - On The Go!

Best Road Footprint

+ Fuel Economy
+ Tire Life
+ Speed
+ Stability
+ Ride

Best Field Footprint

+ Yield
+ Soil Health
+ Traction
+ Flotation
+ Efficiency
+ Lower Slip

Speeds Keep Increasing, up to 47 mph

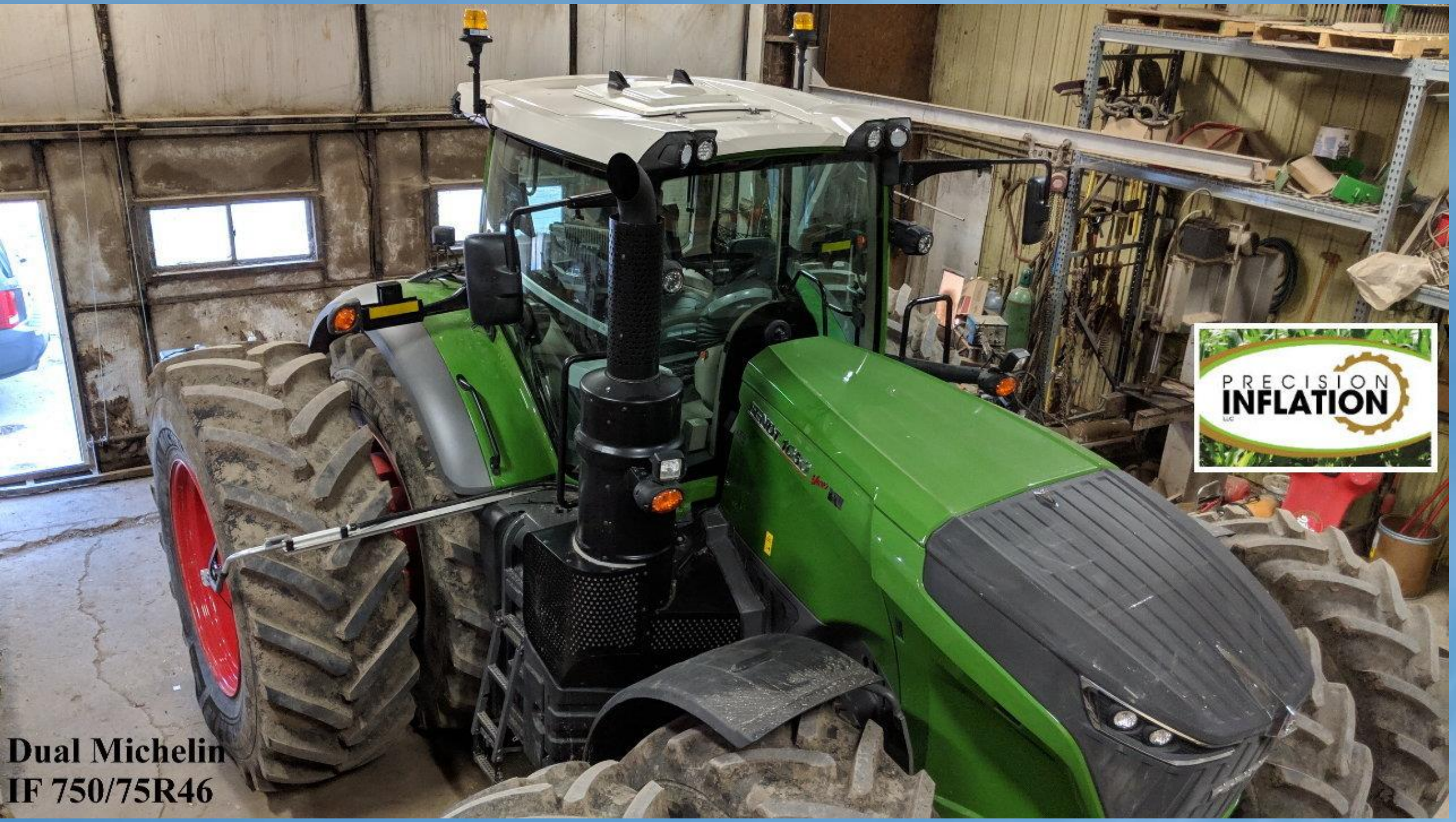
And We Need to Turn

Questions

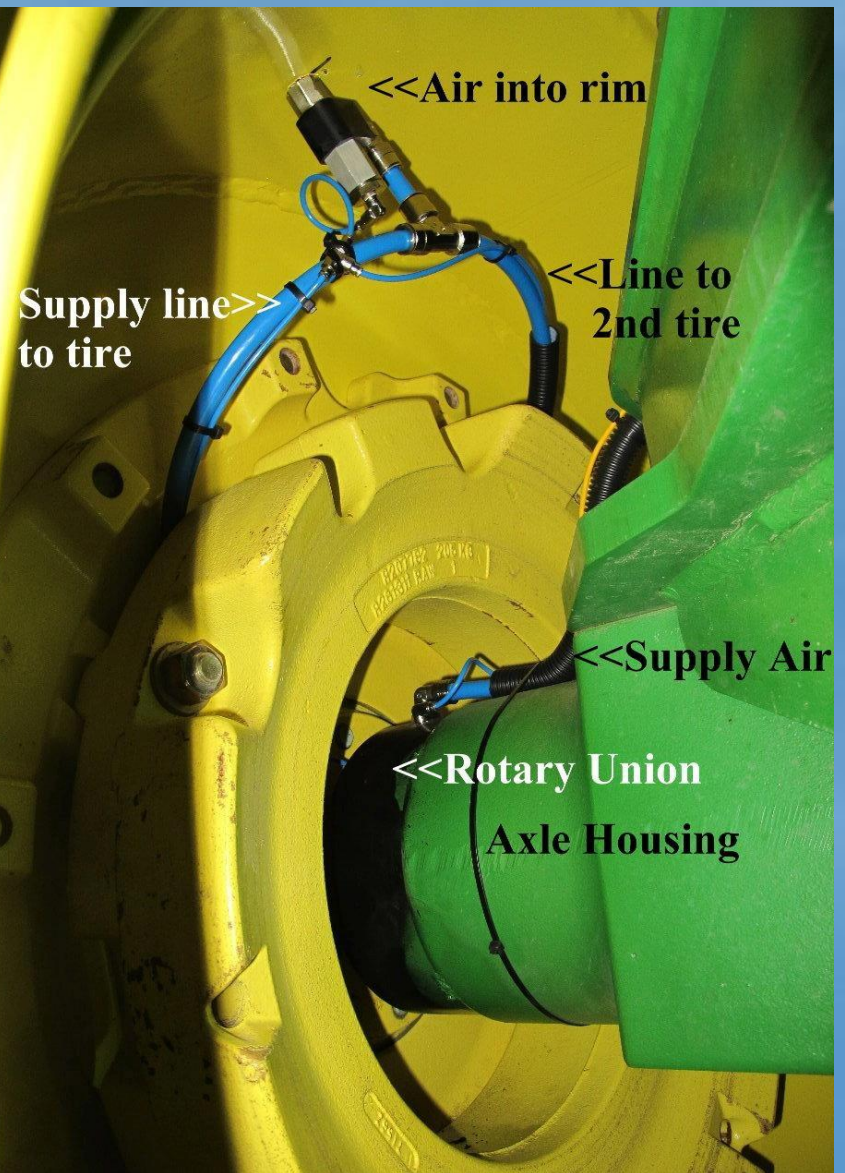

Precision Inflation, LLC
Sales, Training, Installation

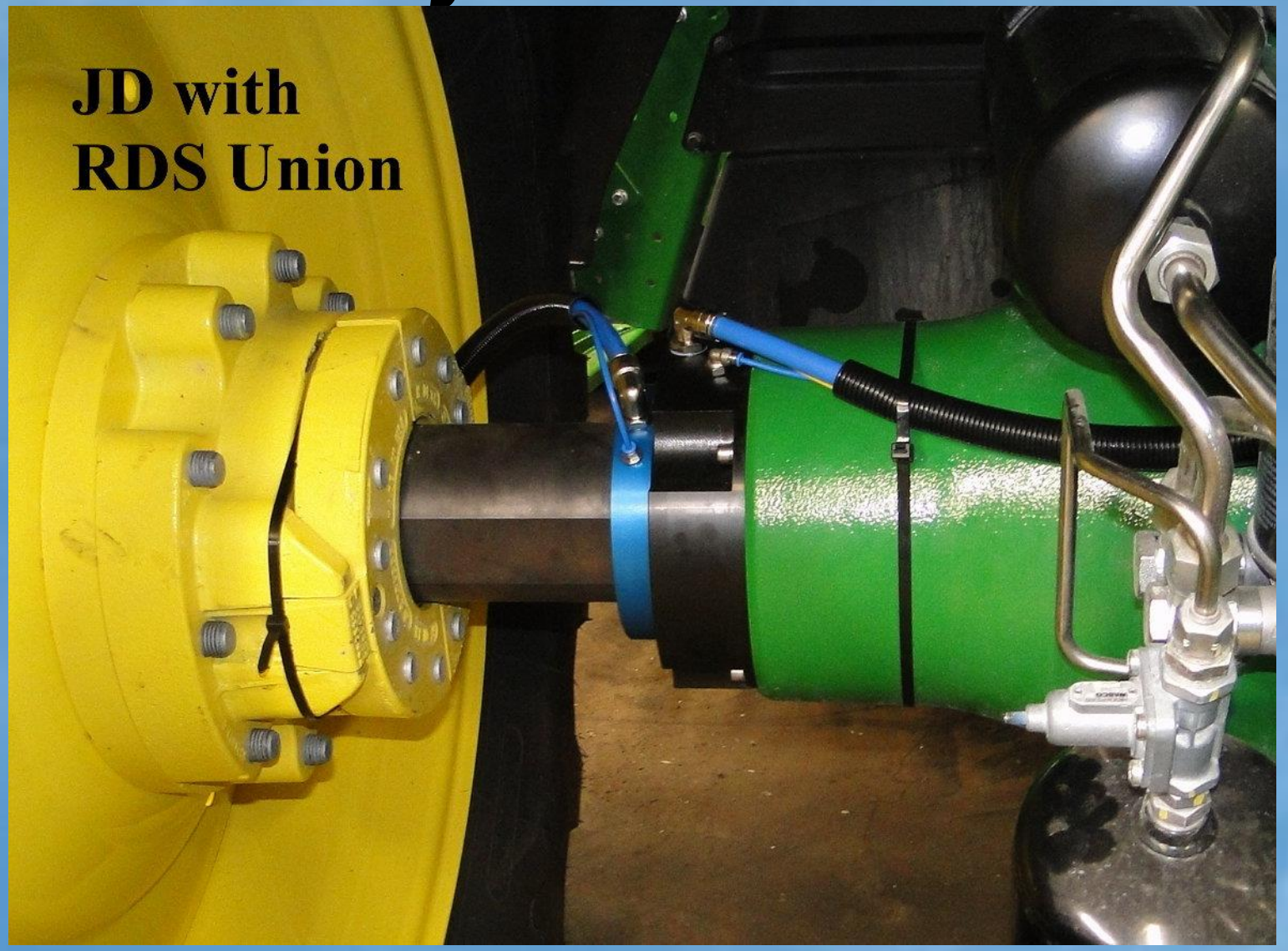

AirBox Truck

AirBox Style Rotary Union

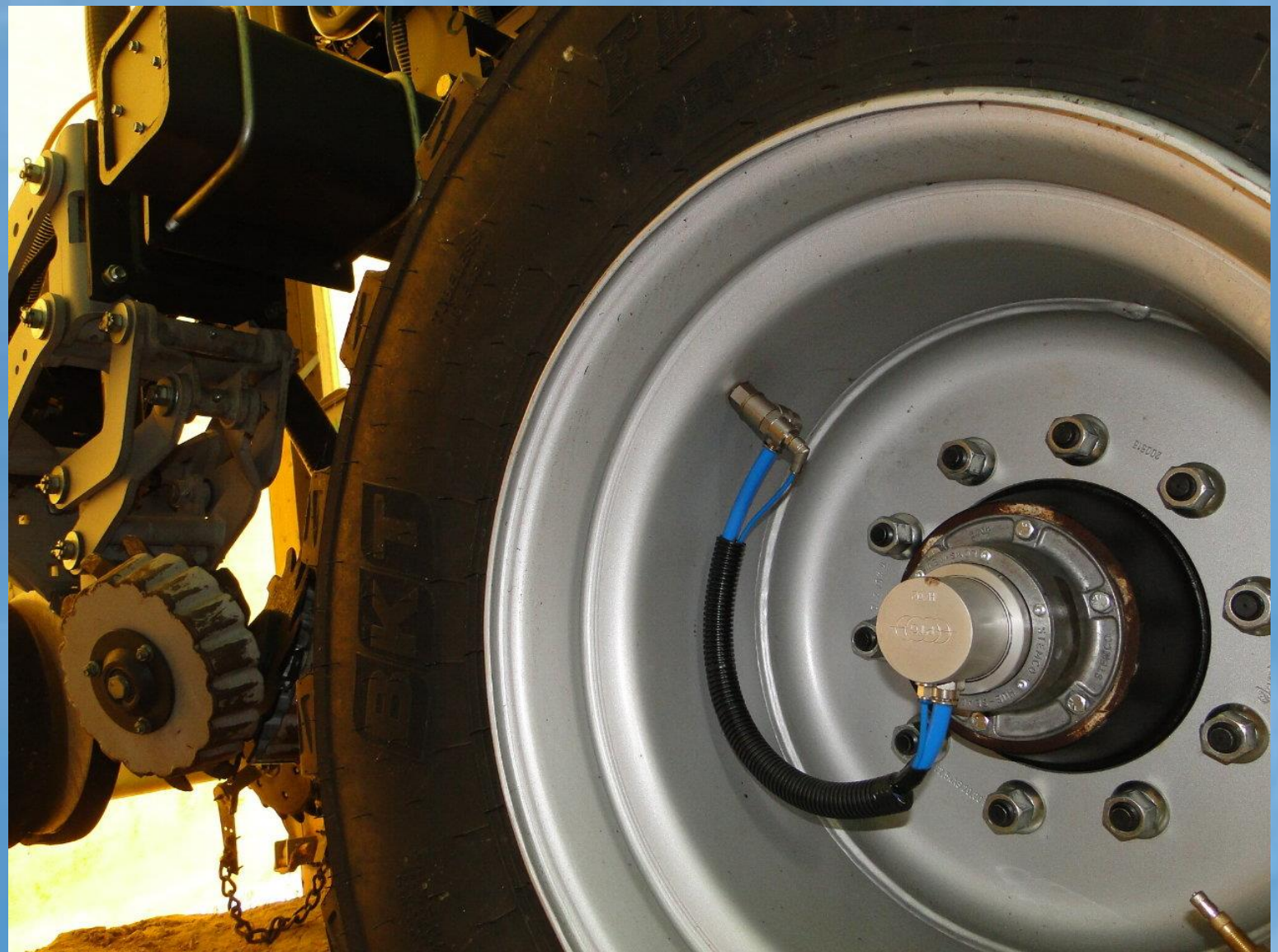

PRECISION
INFLATION
LLC
Dual Michelin
IF 750/75R46

RDS Rotary Union





RDS & Rifle Spindle Rotary Unions



Air Compressors

John Deere Power Hop Control

Does Tire Pressure Effect Your Profit?

Soil Health
Yield Increase
Minimize Compaction
Minimize Rutting and Run Off
Improved Plant Emergence
Stronger Roots and Plant Standability
Timely Planting, Spraying and Harvest
Increased Fuel Economy