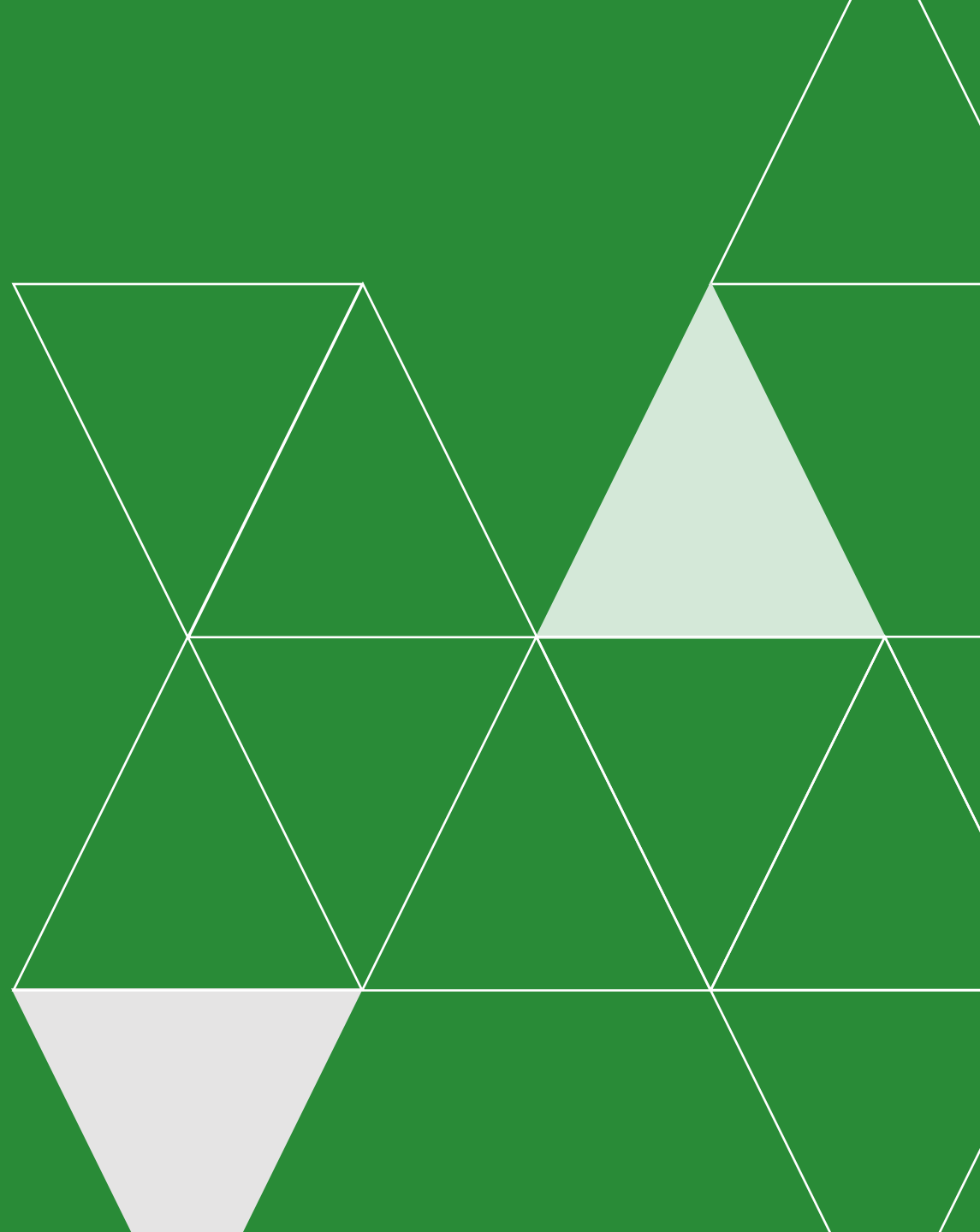


# My Farm, Development of the DSX No till drill & liquid systems

2 November 2022





# About us

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- The Horizon Brand was launched in 2020
- We have a core focus on machines designed for regenerative/sustainable/precision agriculture
- We launched the DSX no till drill in 2020, the SPX strip till cultivator and PPX Precision planter in 2021
- We employ 48 personnel
- We procure 60% of our components within a 50 mile radius of the facility in Holbeach
- We have a direct impact on the local economy and are proud to do so
- We are growing at 25-30% annually
- 72% of our production is for export markets, bringing foreign money into the local economy
- We start with agronomic challenges and then hit the drawing board!



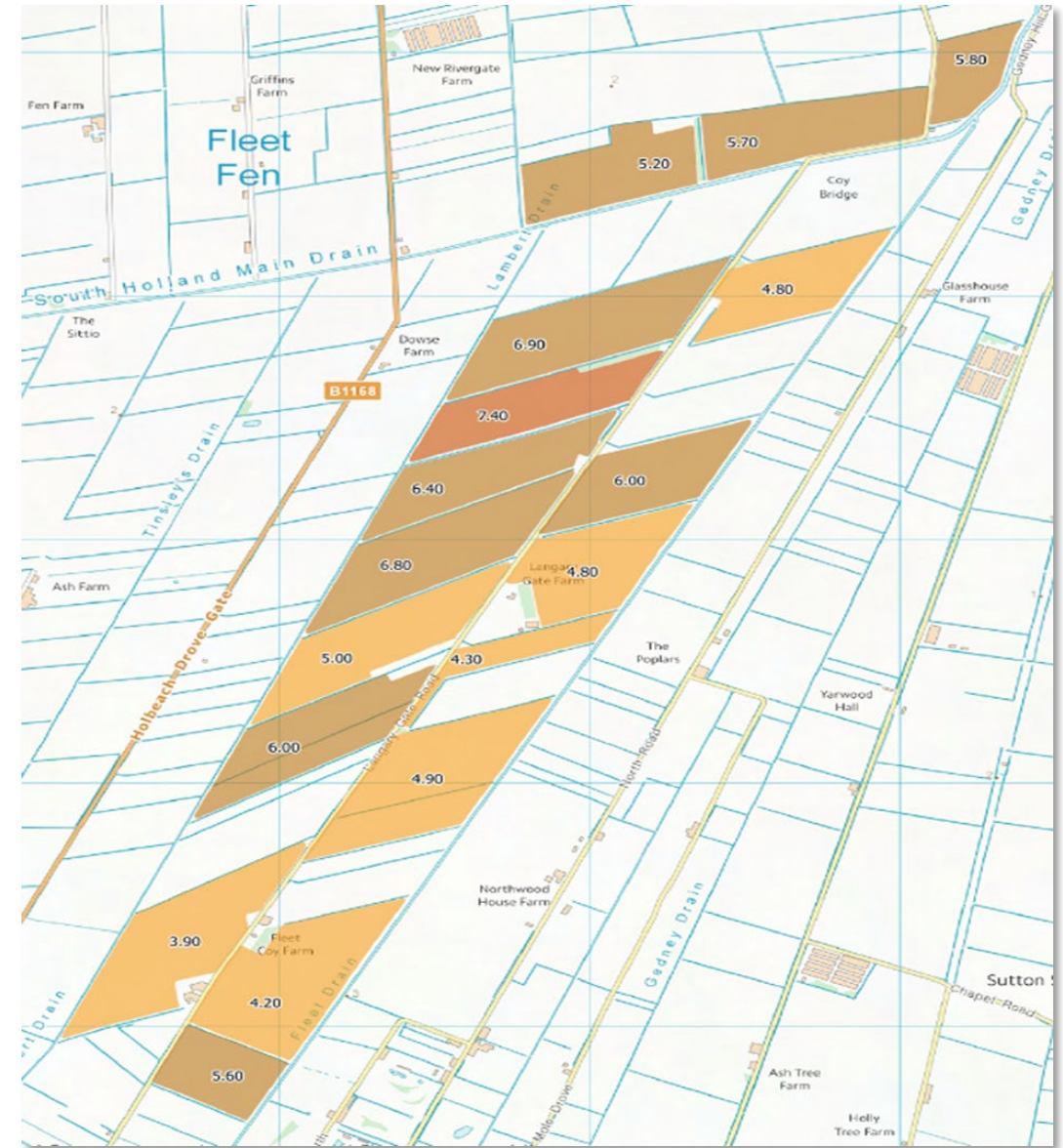
# OUR FARM

- 300 Hectares of mostly grade 2 soils, ringfenced
- Previously contract farmed for 17 years, taken back in late 2017
- All drained mostly in the 1970's with some more recent localized / zone drainage
- +/- 0.5m from sea level



# ORGANIC MATTER = £££

- Our farm was originally all winter grazing pasture up until the 2nd World War
- During the 2nd world war certain fields were ploughed up
- The highest O.M fields are the ones that were in permanent pasture up to the late 70's.
- The fields that have been annually cropped and cultivated since WW2 now hold on average 48-63 less litres of water per cubic metre. Or for our bulk density we have farmed out around 16 tonnes of carbon per hectare. This equated in carbon credit terms around £900/ha in Carbon
- It means my soil will on average infiltrate 50cm less water per hour, which makes sense... we have huge infiltration issues as we have no "O" layer of soil
- I plan to apply about 200 tons of Organic manure to each acre over the next 10 years to try and keep an average of 5%



# MY SOIL TODAY

- We start to see real change in 3 years in the top 20mm only
- We have natural “tilth” starting without tillage.



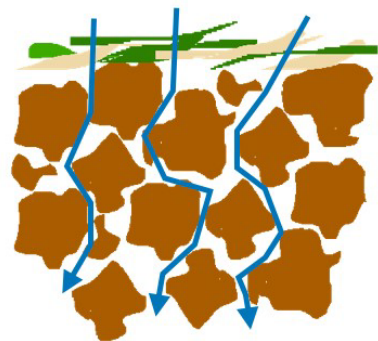
2018



2022

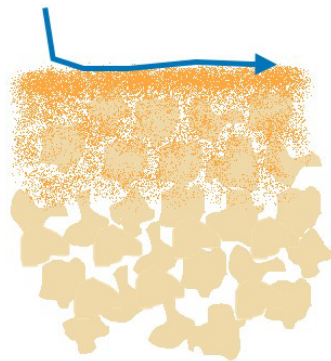
# Is Ploughing safer than no-till in climate extremes?.....

2019 – 141mm rainfall in 15 hours, subsoiled to 35cm, then ploughed



### Healthy Soil

- Good structure
- Water infiltration into soil pores
- Slows water velocity
- Dark color
- High organic matter
- Soil surface is covered with dead vegetation



### Degraded Soil

- Weak structure
- No water infiltration soil pores clogged
- Water runs off quickly
- Light color
- Low organic matter
- Soil surface is covered with a soil crust

2019 – 141mm rainfall in 15 hours, no-till corn/maize into cover crop/residue with row cleaners

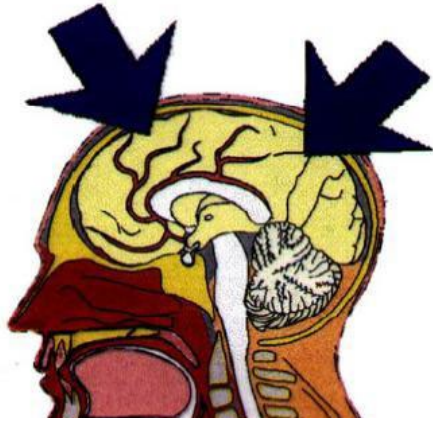
We learned that in this situation it was no better if you ploughed/Sub Soiled.



# When do we need to do tillage?



## *Plantio Direto* *Zona de Descompactação*



- A south American study measured farmers decisions about soil compaction versus reality
- The result was 72% of Compaction is inside our heads☺ not in the soil
- When you plough/deep cultivate you also compact back to the depth of ploughing, it's a cycle of tillage that needs tillage



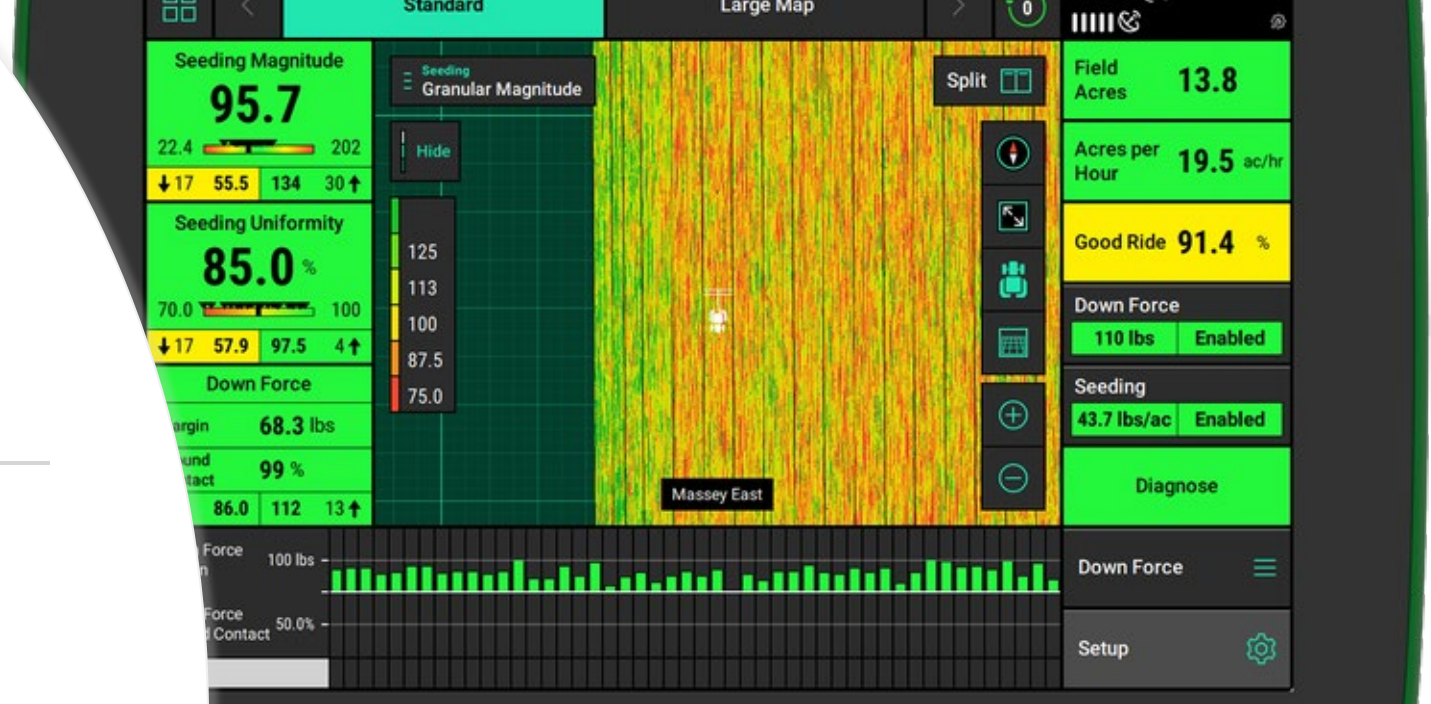
## No Till presents challenges not seen in conventional systems

- Conventional tillage gives a more uniform seedbed
- There are less pests (slugs etc) generally
- Soil density is more consistent
- Closing the furrow is easier
- There is no residue to deal with
- High levels of residue, less level seed beds, varying soil density and moisture level
- Can we get to “planter performance” in a no till high residue situation?
- We believe so 😊



# Where is the seed drill/planter market headed?

- More autonomy and precision technology
- New sensors coming into the marketplace will revolutionise how we grow/establish crops
- So many steps we take in planting/drilling a seed have inaccuracies that can be improved
- Uniformity of emergence across all seeders/planters has room to improve
- The average width of seed drills sold in Europe are increasing by >2m/decade
- Investment in Precision seeding/planting technology is accelerating at over 20%/annum



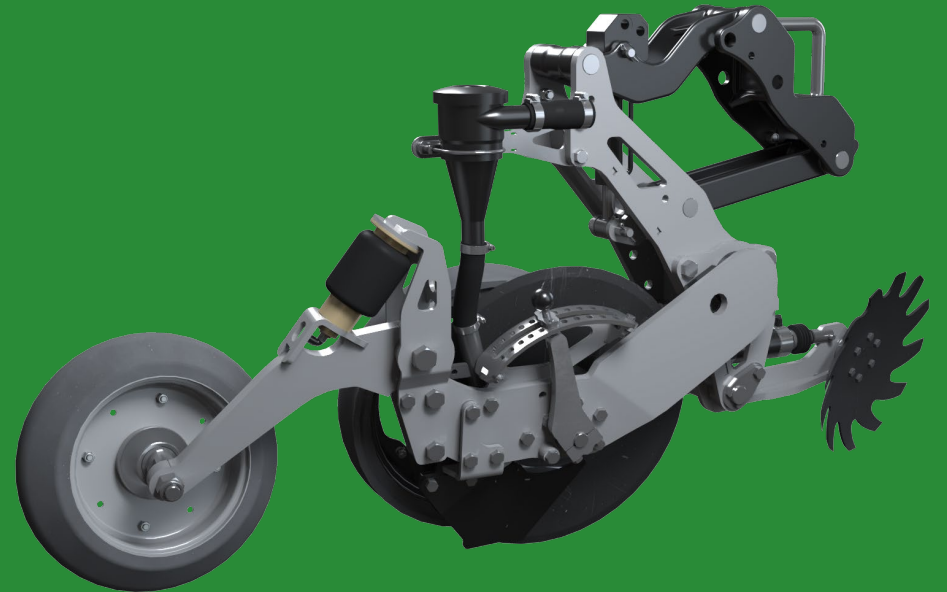
# Seed drills and Planters are they merging?



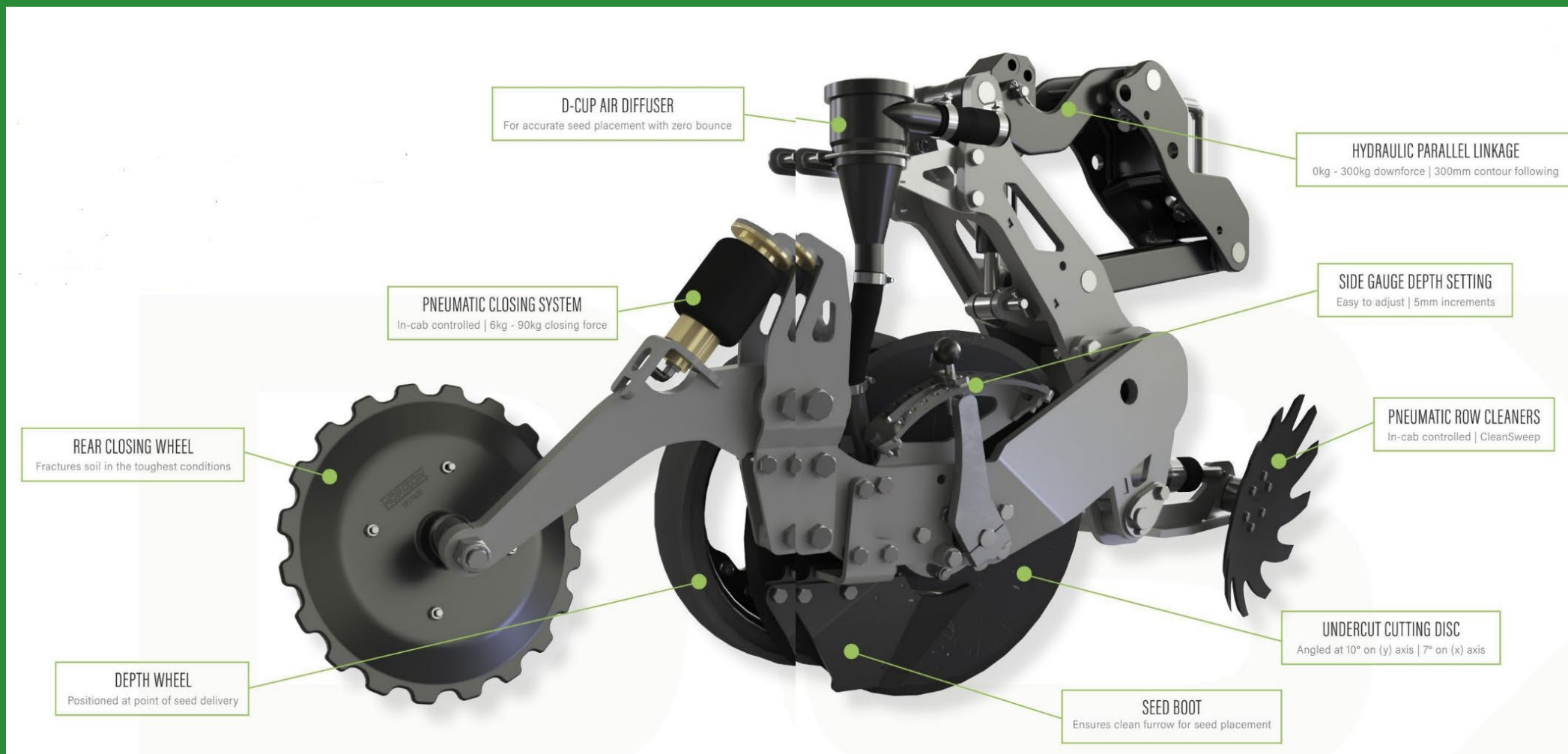
- ✓ Seed Singulation
- ✓ Automatic Downforce
- ✓ Reactive closing system
- ✓ Central Fill Seed
- ✓ Depth set at seed outlet
- ✓ Row Cleaner

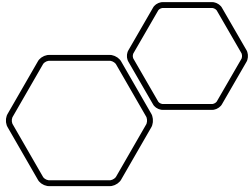


- X Seed Singulation
- X Automatic Downforce
- ✓ Reactive closing system
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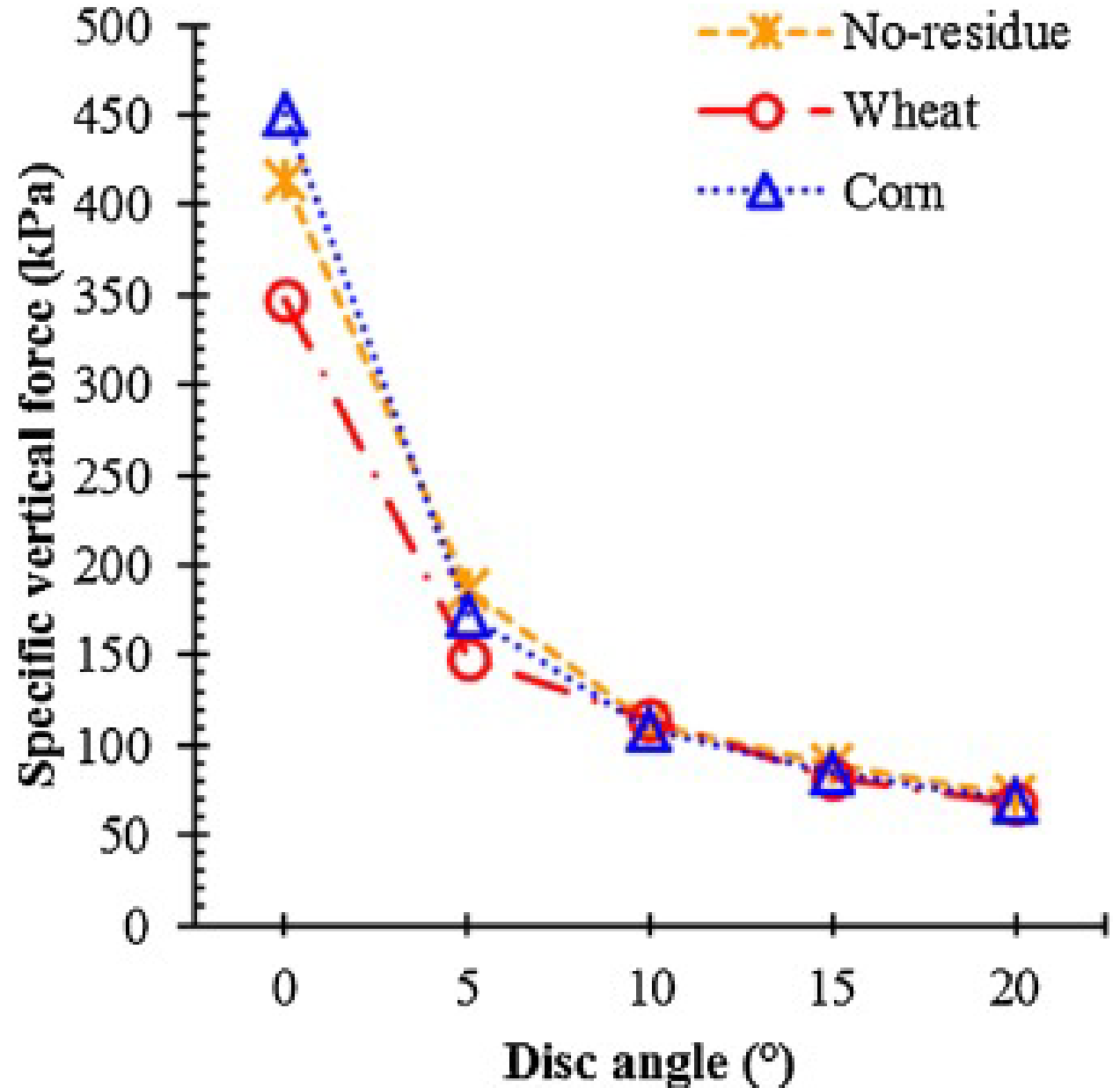
# DSX Gen 2 Disc Opener



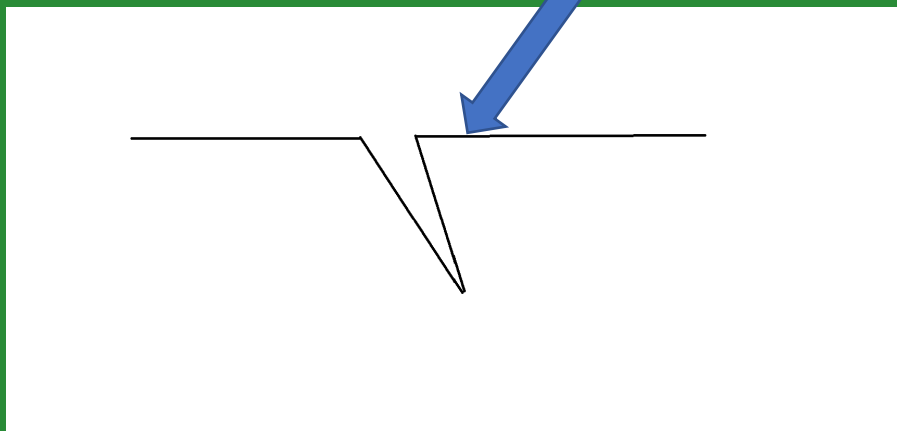


## Why an Angled disc? At 10 degrees?

- Vertical discs require significantly more weight and downforce to penetrate to a given depth
- This means the seed drill has to be heavier and hydraulic pressure/system larger meaning in wet conditions you have a heavier machine to deal with
- Vertical discs open a vertical furrow, with a single closing wheel this is a challenge to close in adverse conditions



10 degrees makes it easier to use gravity and the “flap” to crush and consolidate around the seed



Vertical Disc drills have challenges closing the slot

# No-Till

- No-till Planting Peas in April 2021
- Previously the field was a cover crop and sheep were grazing the cover crop, adding manure in return
- Glyphosate at 2L/Ha applied 27<sup>th</sup> March
- The sheep made the top 30mm hard/poached



# Product development =Breaking down the process?

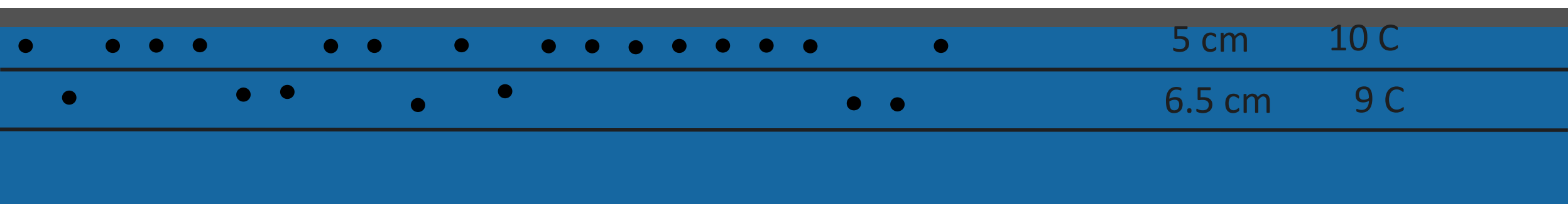
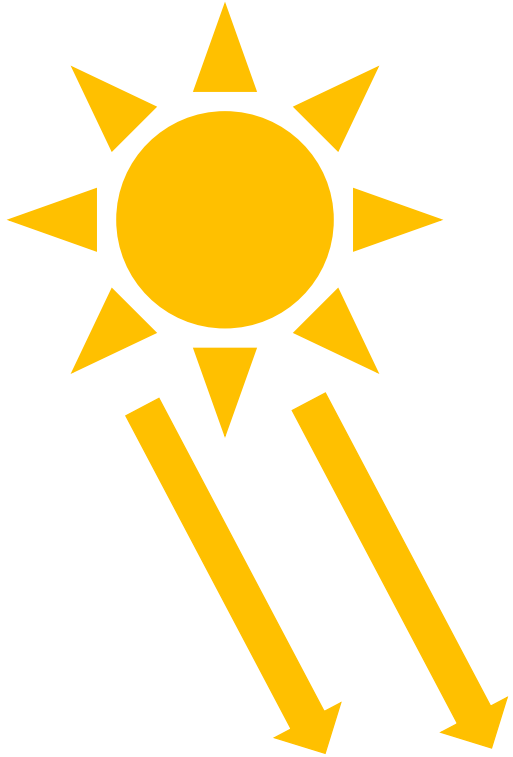
- If you start to design a seed drill or planter, where do you start?
- We looked at what a seed needs to go from the seed bag to a fully emerged plant and then start working backwards
- So what does a seed need to do this?
- Sufficient Moisture (approx. 35% Soil moisture)
- Sufficient Temperature (certain seeds)
- Accurate depth to give even emergence
- Sufficient seed to soil contact to transmit moisture
- Closed furrow to give a consistent density around the seed for even emergence



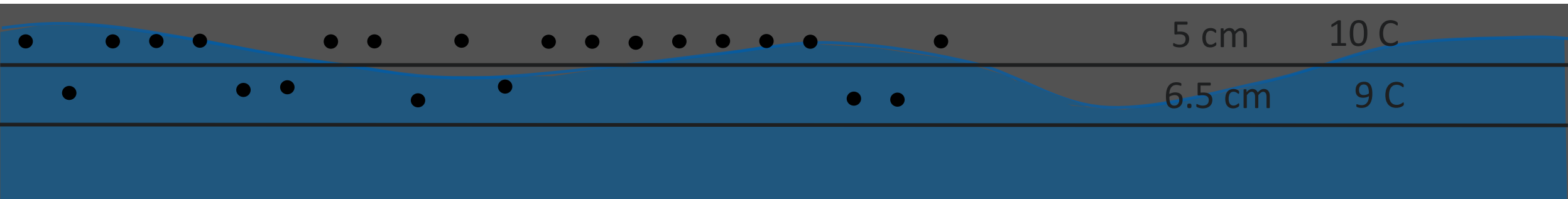
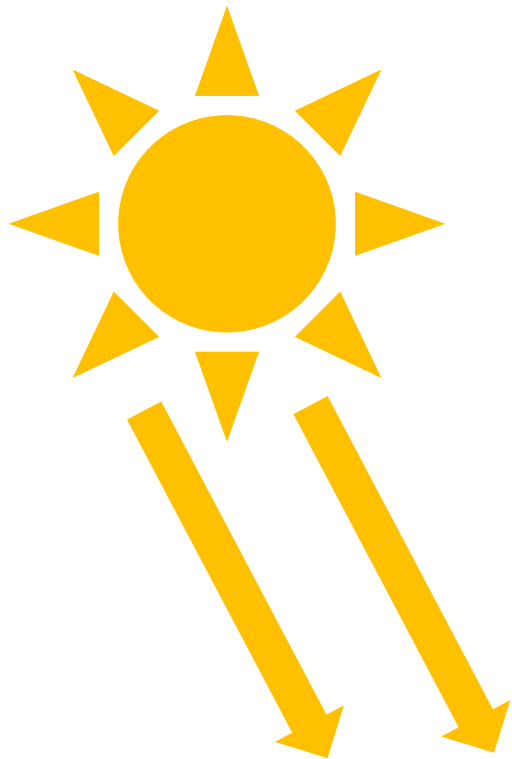
Depth



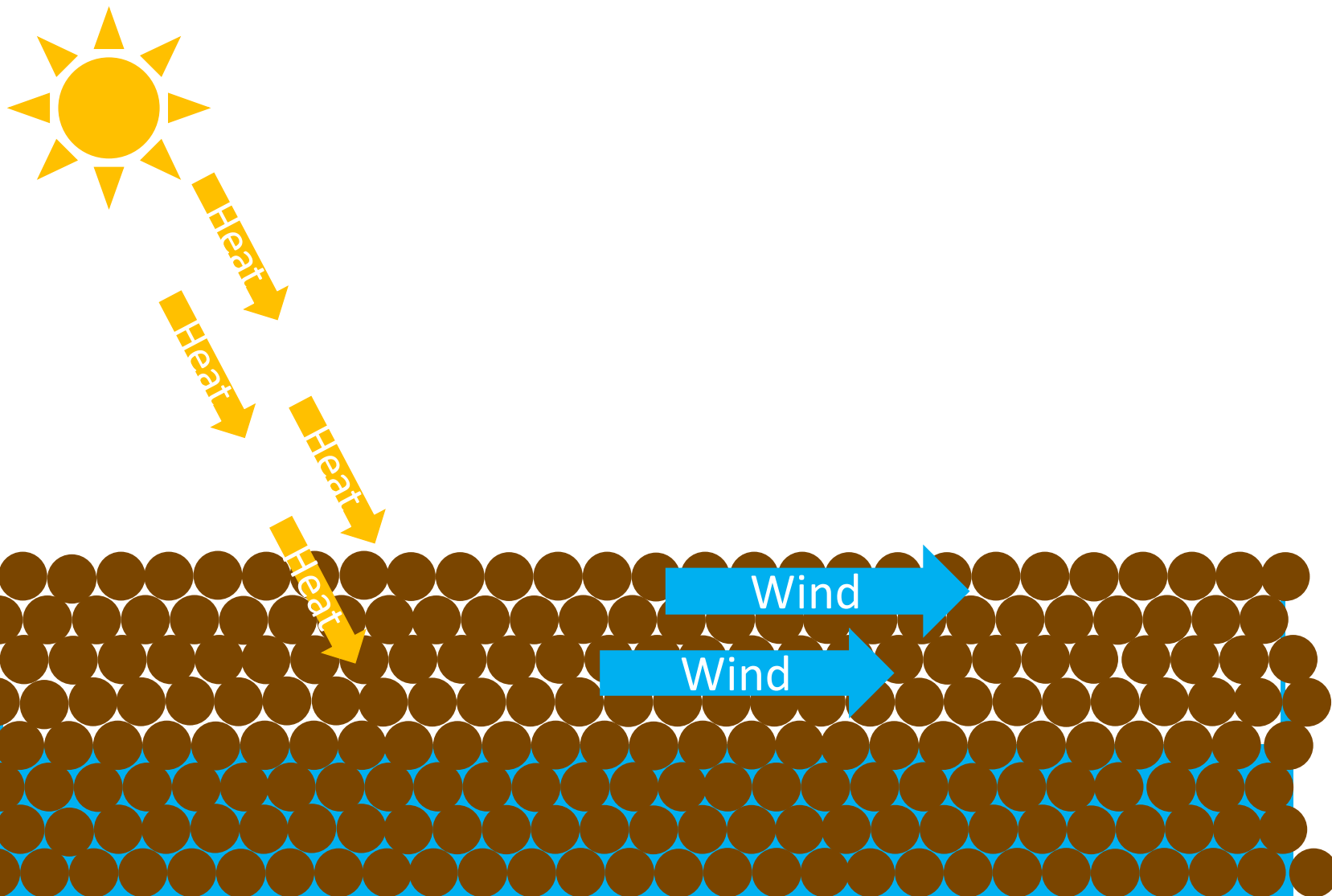
# Why is Depth so Critical?



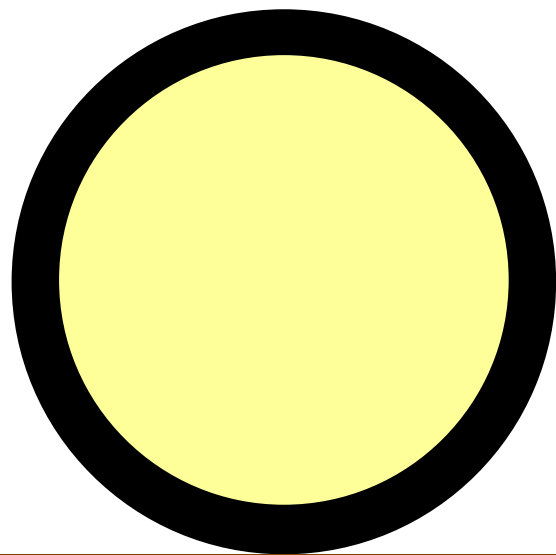
# Why is Depth so Critical?



# Shallow Planting

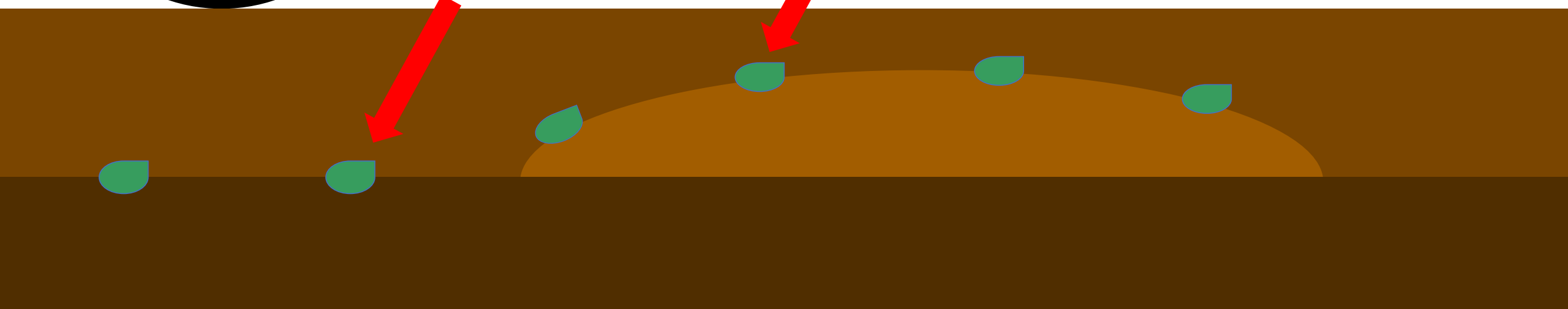


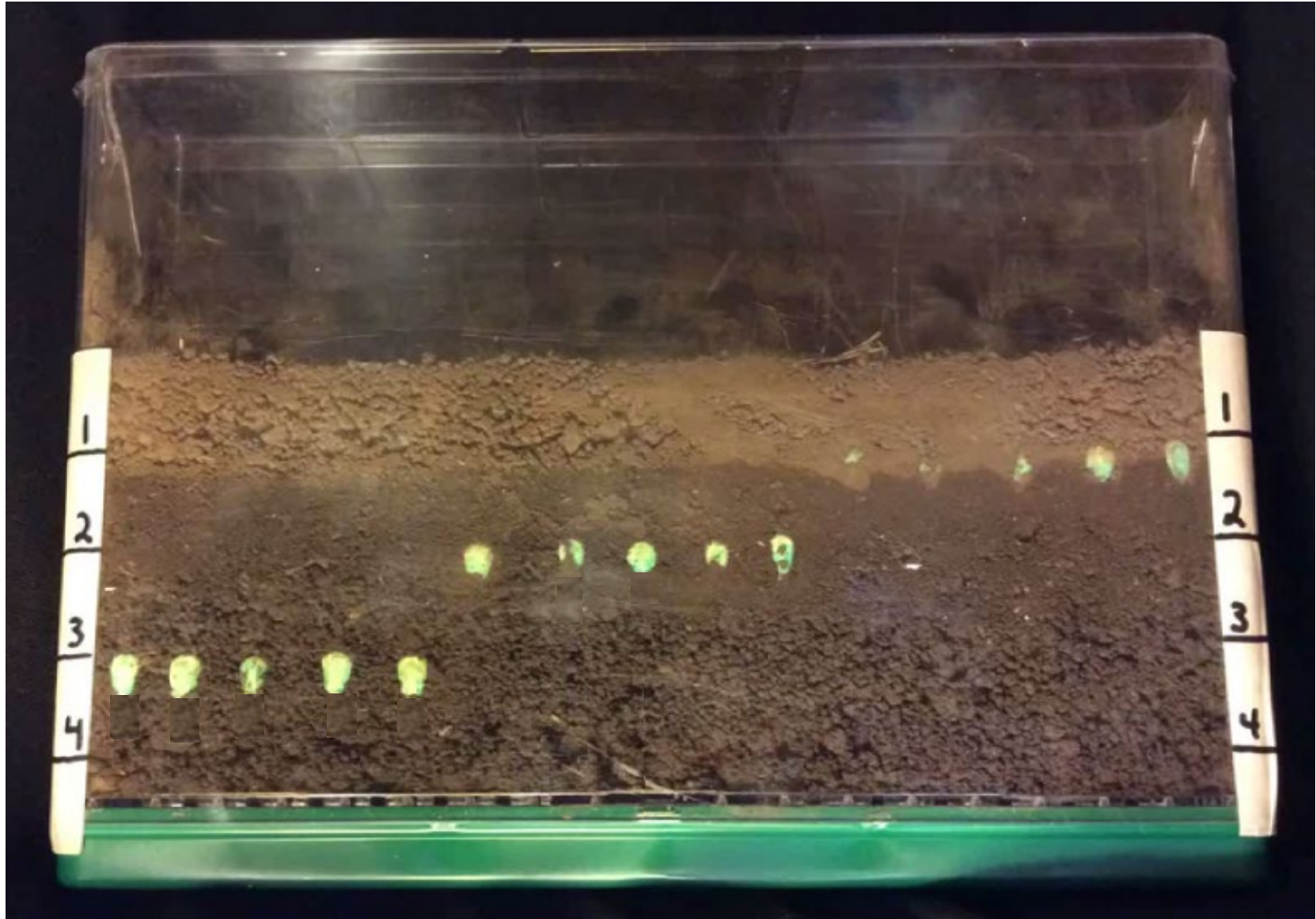
# Loose soil in furrow



6.5 cm

2.5 cm







2.5 Days Germ  
6.5 Days  
Emerge

2.5 Days Germ  
5.5 Days Emerge

6.5 Days Germ  
11 Days  
Emerge

1

2

3

Uniform &  
Sufficient  
Moisture

Uniform? &  
Sufficient  
Moisture

Neither

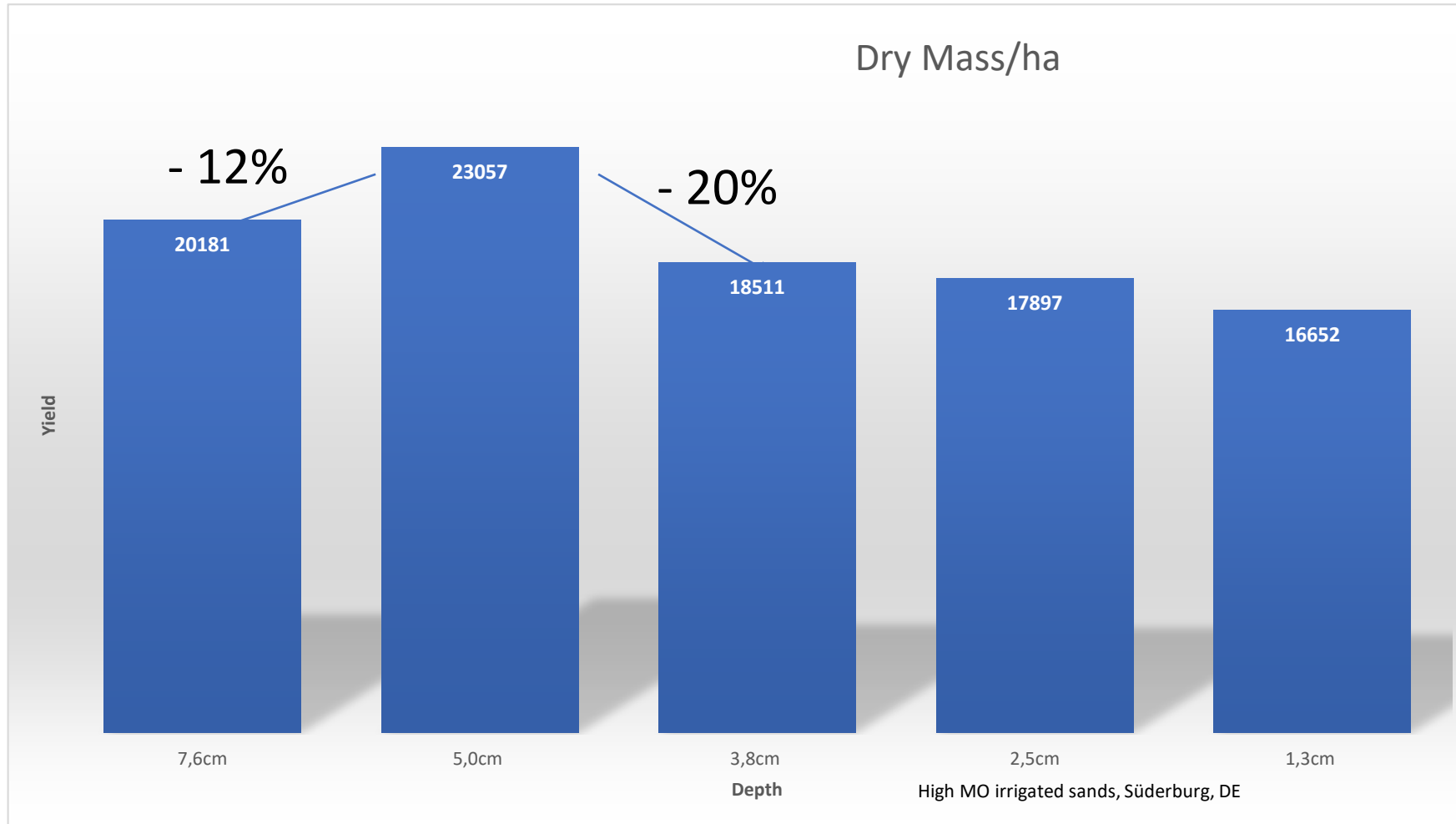
1

2

3

4

# Depth study (Germany)

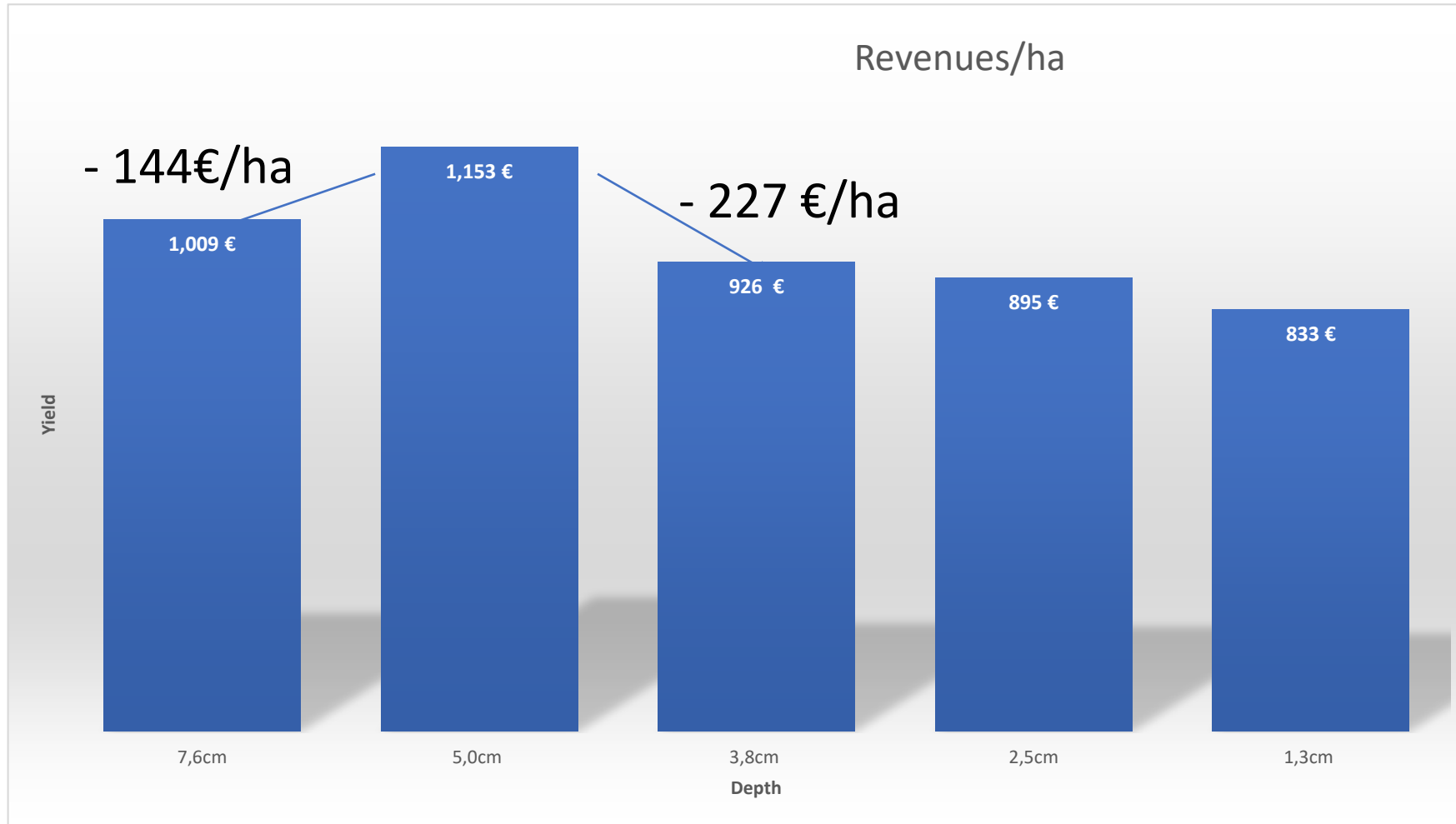




# Depth study (Germany)



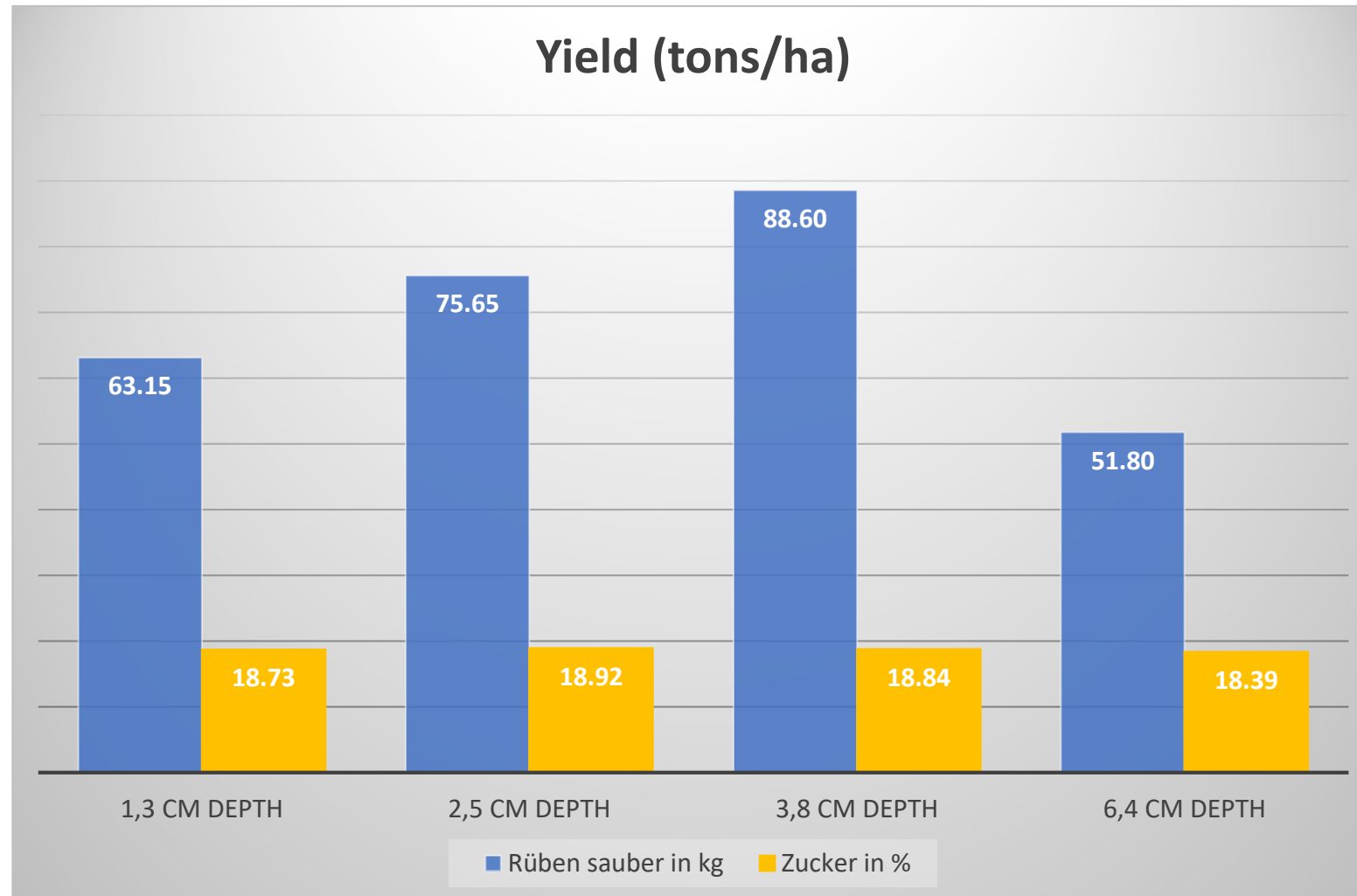
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# Depth study



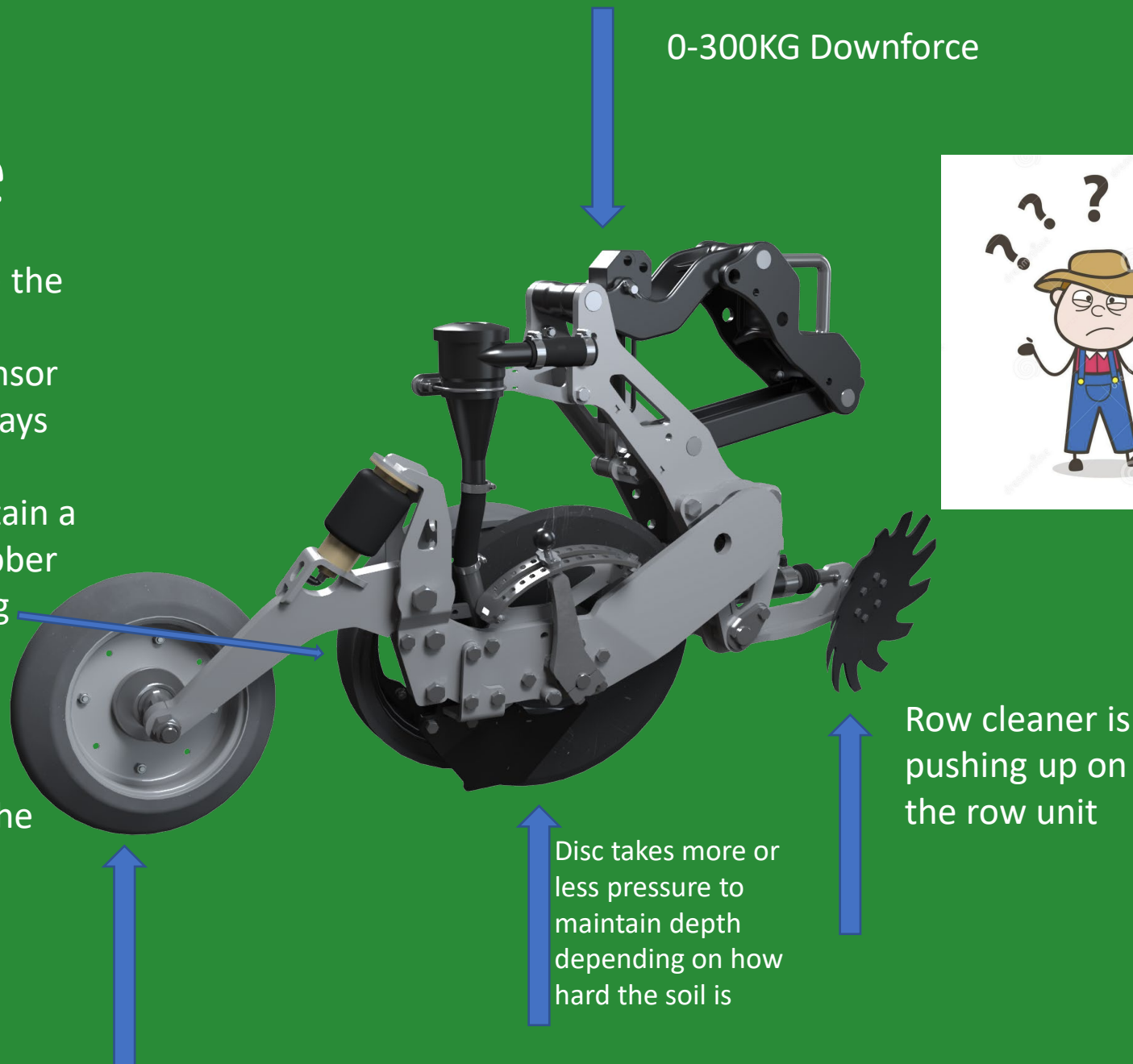
# Depth study



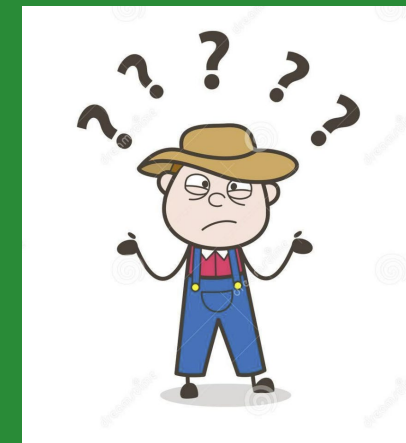
# Downforce

# Downforce

- How do operators choose the downforce?
- Generally without any sensor feedback farmers will always choose a high setting
- We want to try and maintain a desired weight on the rubber gauge wheel, usually 30kg



0-300KG Downforce



What downforce pressure do I set?

If you increase the packing wheel pressure you increase the upward force on the row unit

Disc takes more or less pressure to maintain depth depending on how hard the soil is

Row cleaner is pushing up on the row unit

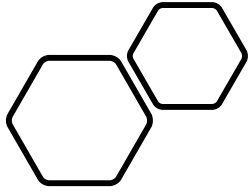
## Too much downforce?

- Running to higher downforce will compact the edge of the furrow, making early root development more difficult and closing harder
- Porosity in the soil is reduced

## Too little downforce?

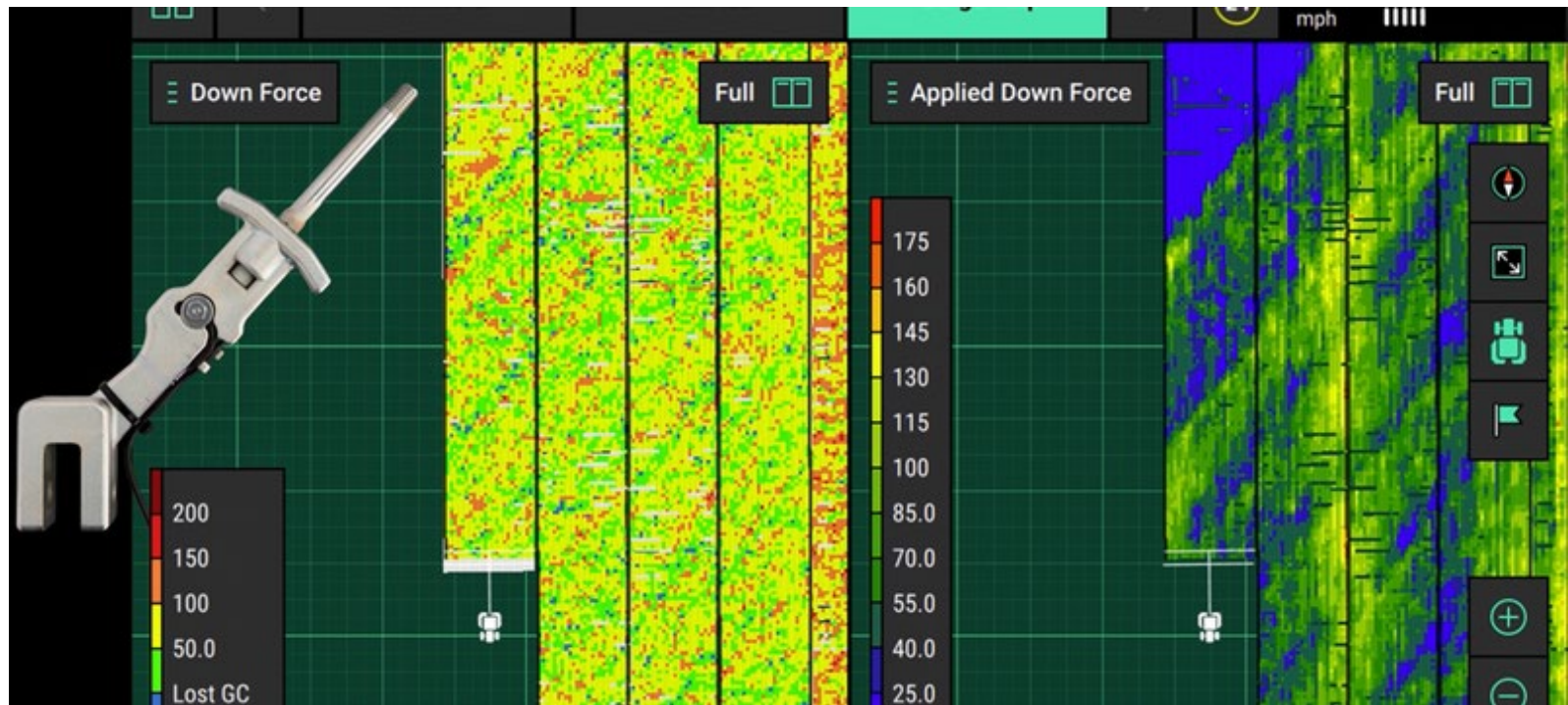
- Too little downforce means the gauge wheel won't sit on the soil surface
- This means the depth setting will be random giving uneven seed depth and uneven emergence





# Automating Downforce

- We are shortly about to release automatic downforce on the DSX
- This will look after the downforce on the openers at a sample rate of 3X per second and automatically maintain 20-40KG (depending on operator setting) on the gauge wheel
- Too much downforce causes furrow compaction
- These sensors combined with a gyroscope will advise the operator on forward speed by telling them if depth uniformity is being maintained





# Nutrients/Fertility

## Application of Liquids – treating the cause not the symptom?

- We are one of the only manufacturers to fit Liquid systems on the drills/planters from new, liquid fitment is growing and now 32% of drills are shipping with liquid
- We have 2 different control systems available (basic and advanced)
- The Advanced system uses only an electromagnetic sensor to detect flow, and can control liquid flow either row by row or sectionally
- The basic systems uses flow tubes and orifices with only machine wide section control
- The EM sensor enables the use of biologicals/compost teas without the need for filters (as there is no flow turbine)



Basic

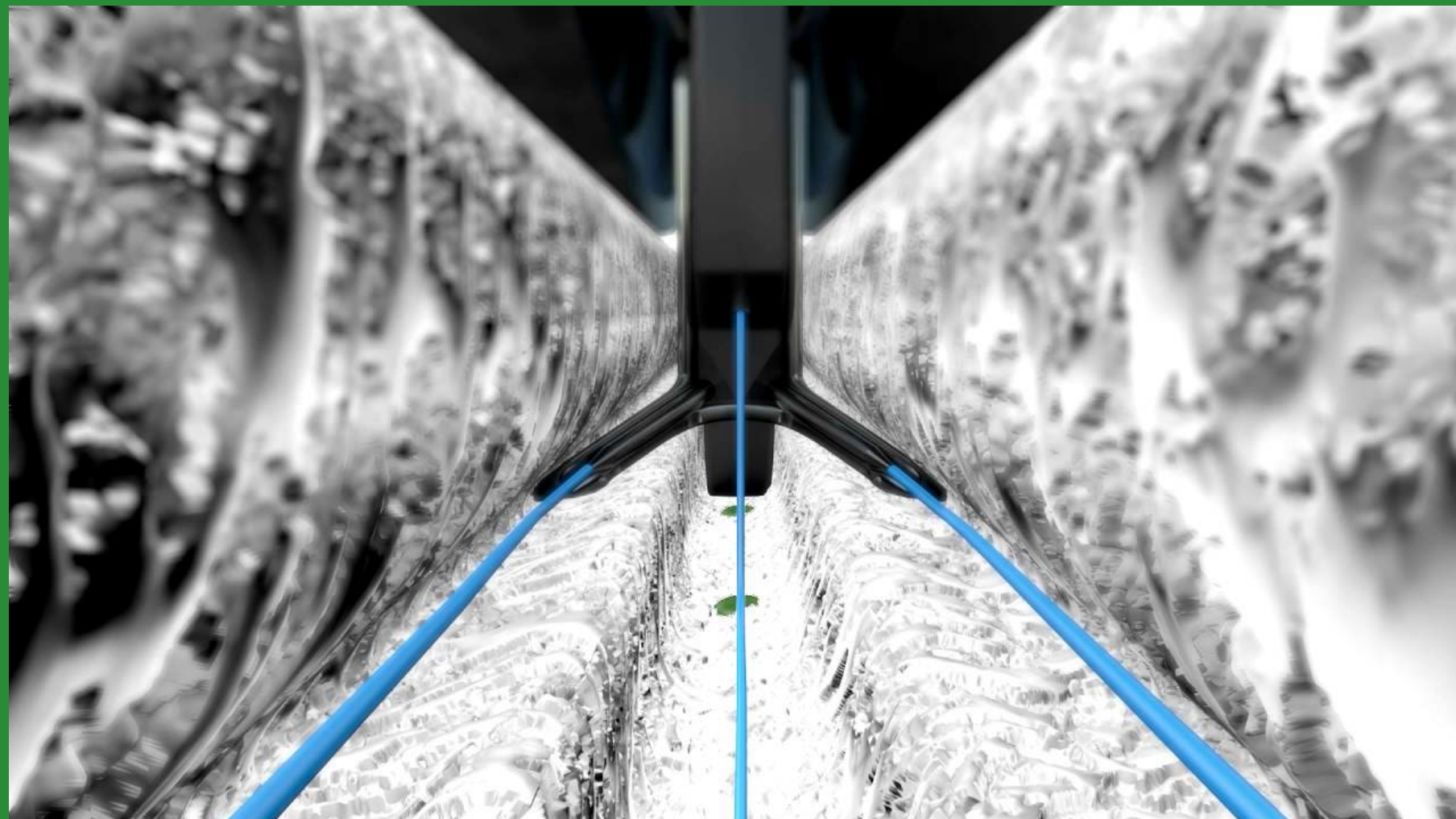


Advanced



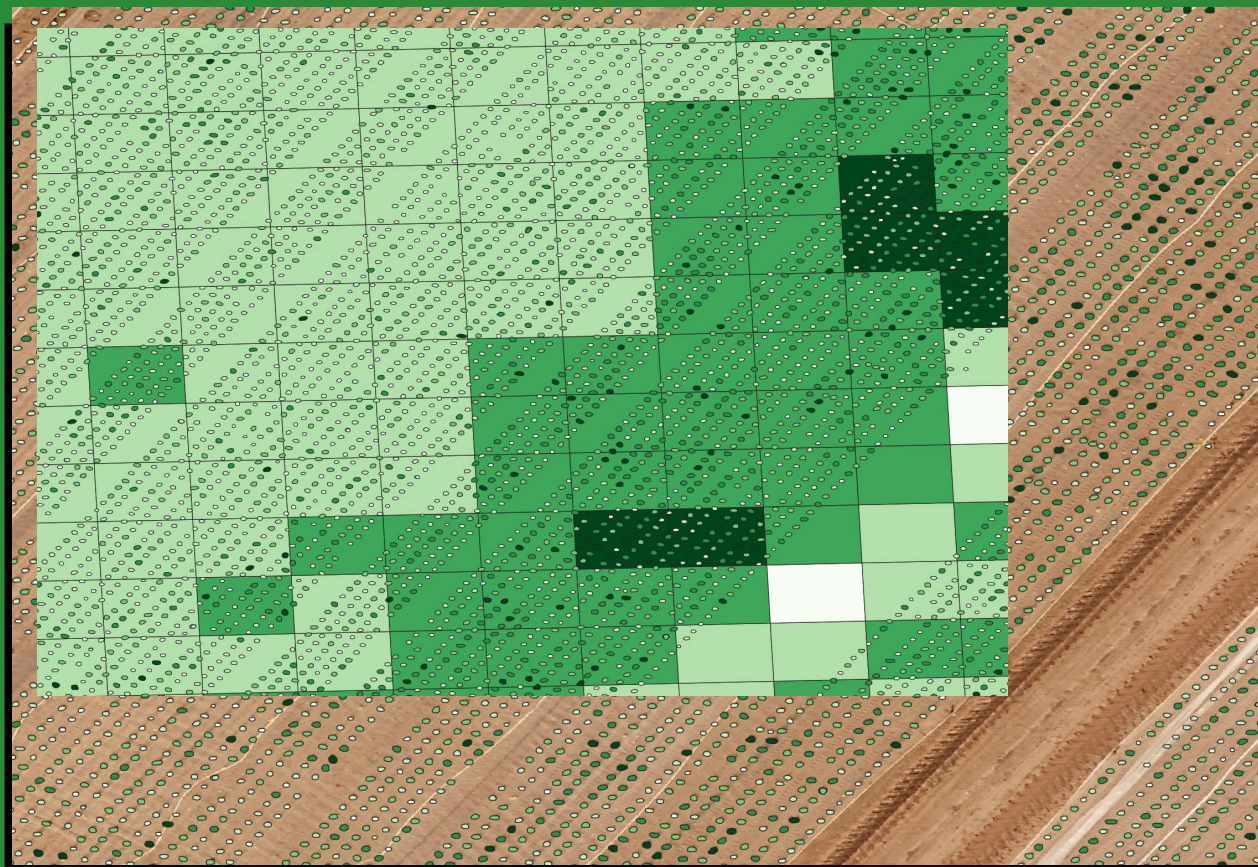
# Placement

- Up to two liquids can now be placed either on the seed or 20mm left/right
- This opens up a number of options for liquids
- We are currently integrating this option into the DSX seed boot
- It is already available on our PPX Precision Planter.



# Can advanced liquid systems actually reduce fertiliser use?

- We were approached by a UK Vegetable grower, asking to fit liquid systems to their planter and hoe
- The challenge was to offer row by row rate control, fed from both soil maps, live in furrow soil sensing and from drone maps working on a 2mX2m grid



- ✓ Targeted N application
- ✓ 56% saving in Nitrogen in year 1
- ✓ 13% CFG GHG saving
- ✓ 24% more product entered the supermarket due to more even head size (lettuce)



Thank you for listening

