

# Effects of row-injected cattle slurry on yields of silage maize



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Foto: Samson Agro



Promilleafgiftsfonden for landbrug

ManuResource conference, Hertogenbosch, Holland, 12 May, 2022.

**SEGES**  
INNOVATION

# What are we looking at?

Cattle slurry row-injected to maize  
But why our interest?

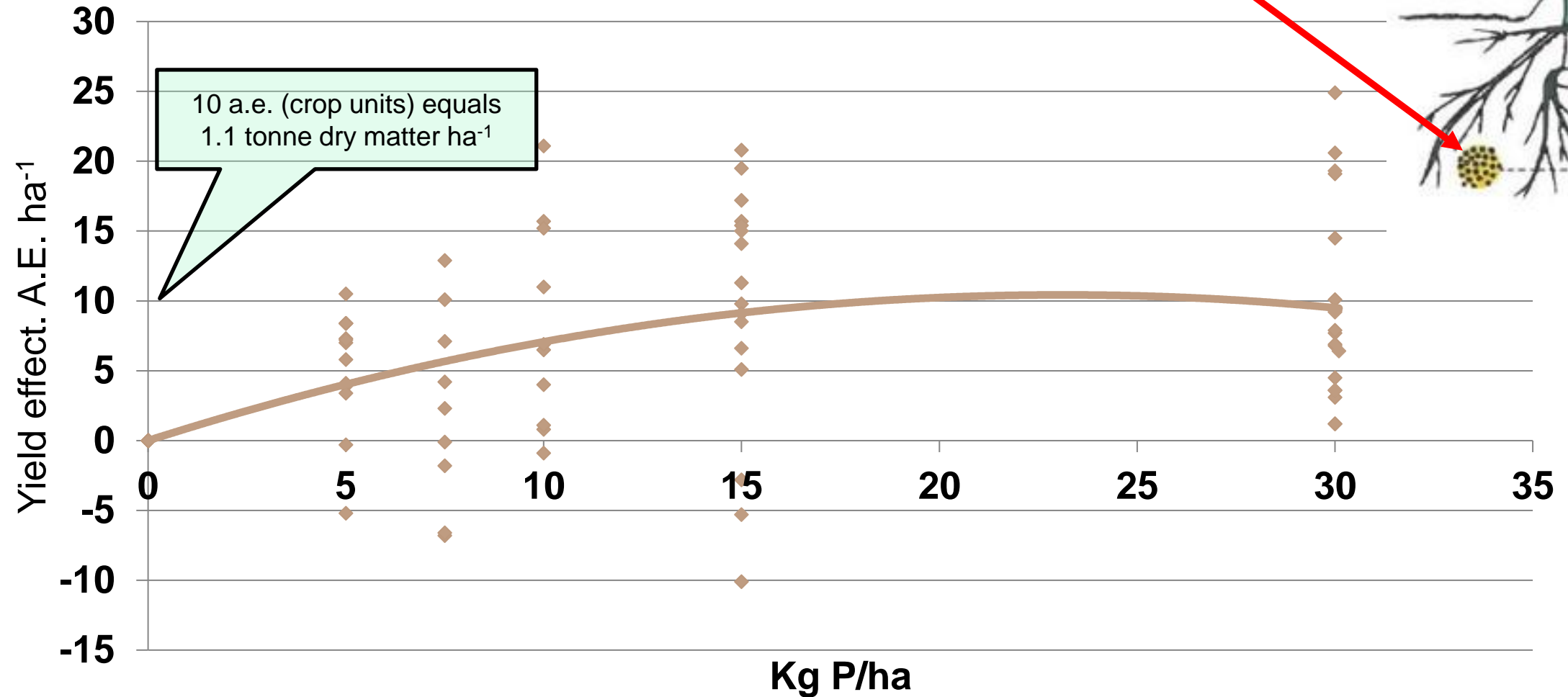
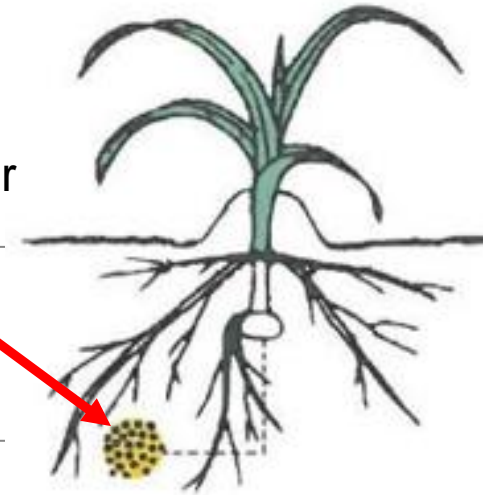


Foto: Samson Agro

# Yield effect of mineral start P to maize

26 Field trial studies 2003 - 2017

Mineral start P fertiliser



Mikkelsen M., 2017

## New Danish phosphorus regulation in 2018

Production type	N-Ceiling, kg N ha <sup>-1</sup>	P-ceiling, kg P ha <sup>-1</sup>
Dairy production	170	30
Dairy production, derogation	230	35

- The P-ceilings has restricted the farmers ability to apply starter P to their maize
- Due that, we have been involved into a project to increase the utilisation of the nutrient content of the slurry applied to maize
- The aim of the project has been to study the nutrient and yield effects of row-injection of slurry

# Difference between the standard and the row-injection method

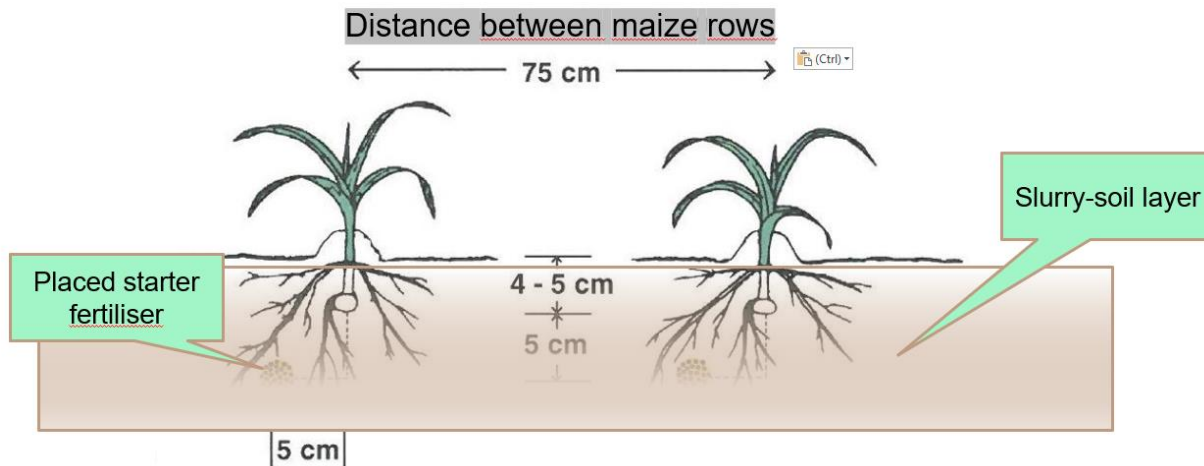
## Standard application of slurry

1. Slurry application by black soil injection
2. Tillage
3. Sowing of maize



### Standard method (reference system):

1. Soil injection of slurry
2. Ploughing or harrowing
3. Seeding of maize and placement of starter fertiliser



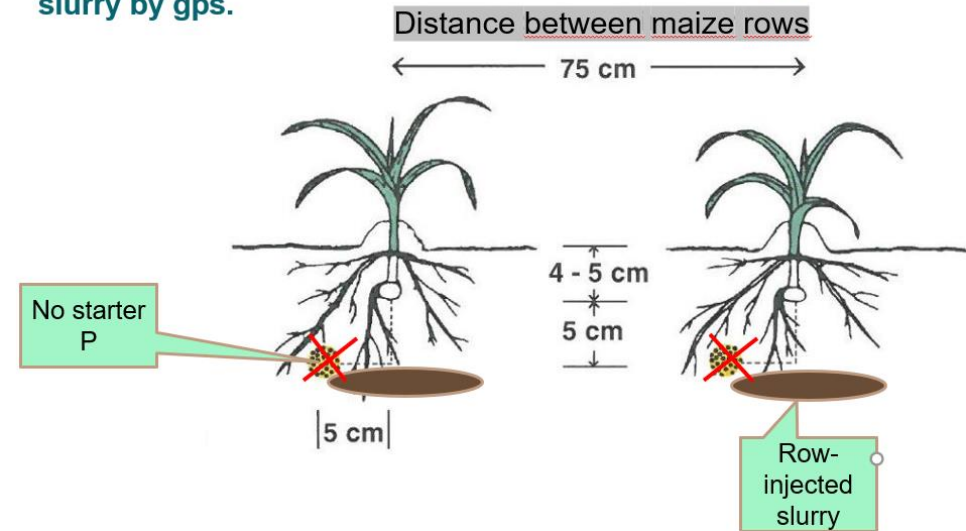
## Row-injection of slurry

1. Tillage
2. Slurry application by row-injection (GPS)
3. Sowing of maize (GPS)



### Row-injection of slurry:

1. Ploughing or harrowing
2. Row-injection of slurry 10 cm below soil surface
3. Seeding of maize 5 cm above the surface of the applied slurry by gps.

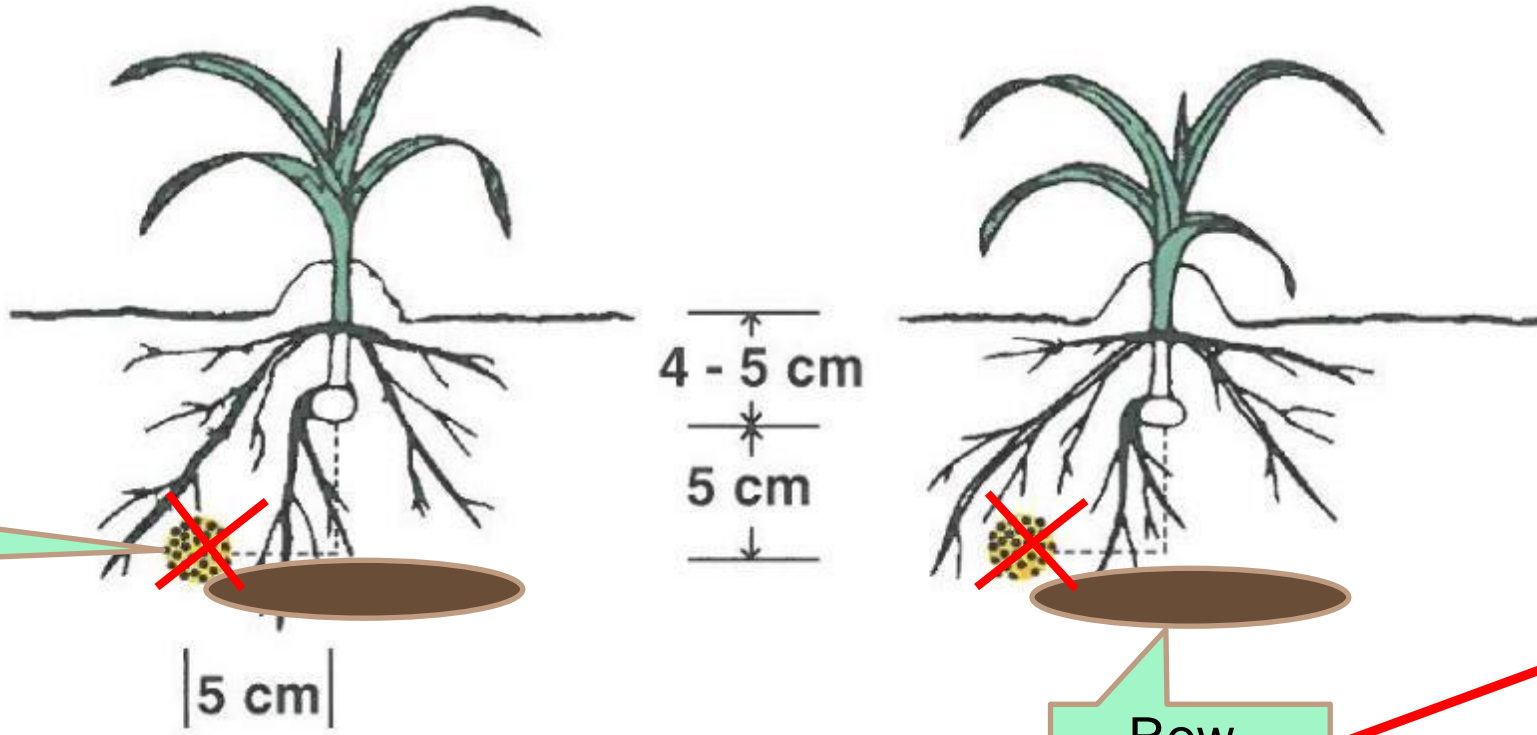


# Row-injection of slurry:

- 1. Ploughing or harrowing
- 2. Row-injection of slurry 10 cm below soil surface
- 3. Seeding of maize 5 cm above the surface of the applied slurry by gps.

Distance between maize rows

← 75 cm →



With or without starter P

Row-injected slurry



# The yield effects of row-injection of slurry were studied by field trial studies

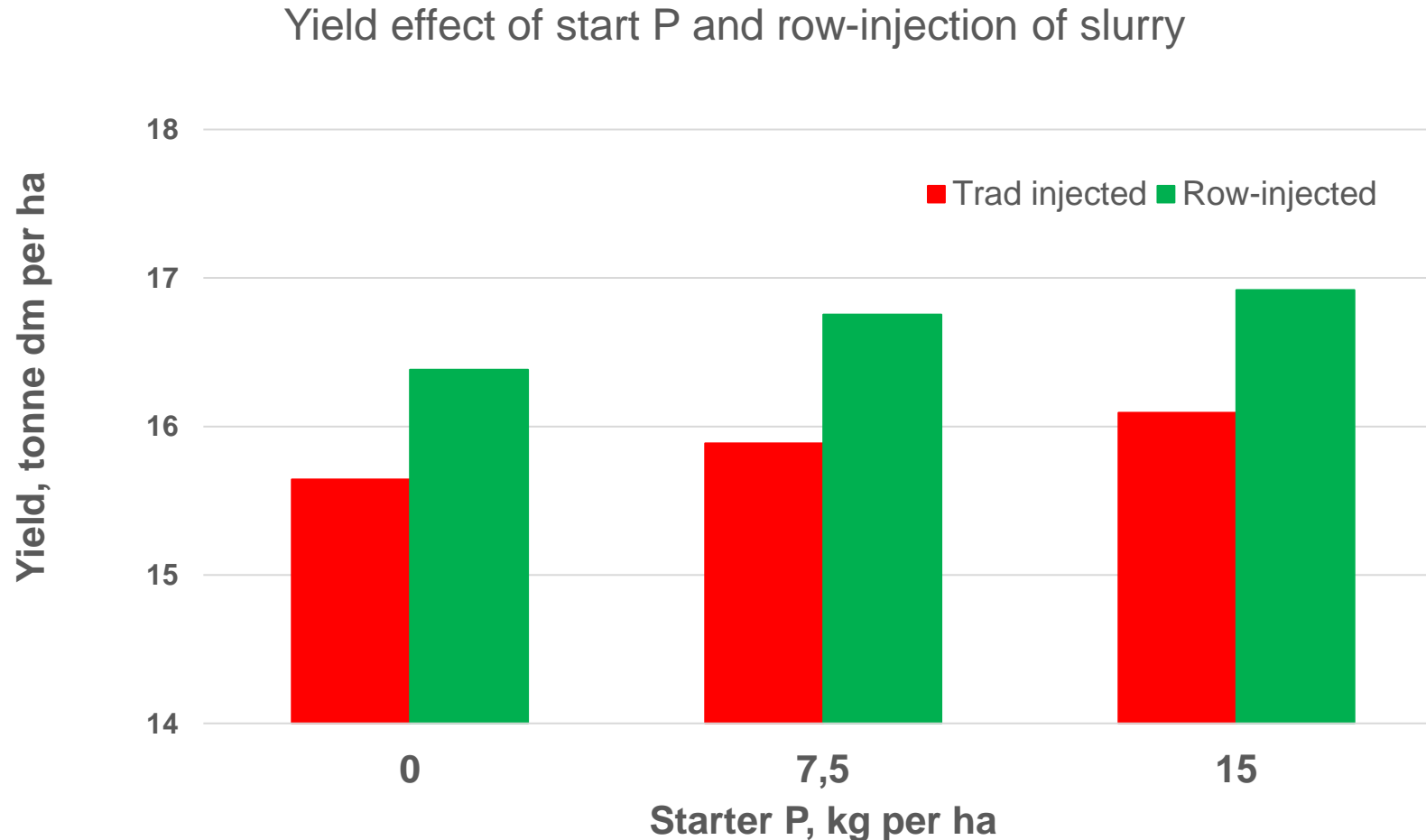


- More than 20 field trial studies involving row-injection of slurry have been conducted between 2018 and 2021
- The studies were conducted by use of 3 m wide experimental plots.



# Yield effects of mineral start P and row-injection of slurry

10 field trials, 2020 and 2021



## Yield effects of row-injection

- Row-injection replaces the yield effect of 15 kg start P per ha
- Given the same amount of starter P, row-injection of slurry gives higher yield than traditional slurry injection



A lot of digging has been done to see, how slurry is distributed by different tine systems – and to what depth.

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# The design of tines effects crop yield

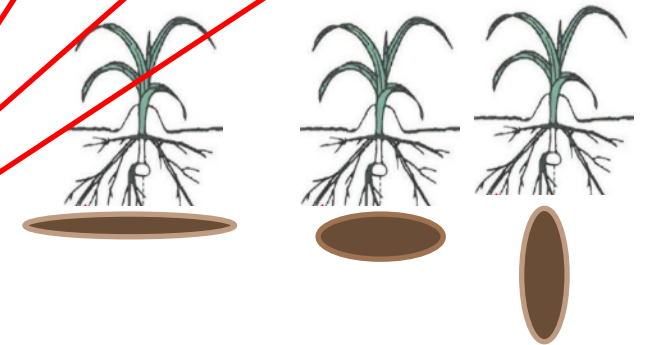
## 3 field trials 2019 and 2020

### Row-injection of cattle slurry to maize at ploughed soil

Maize	Start-fertilizer, kg pr. ha		NH <sub>4</sub> -N in slurry, kg pr. ha	Tillage, before or after slurry application	Slurry application system	Tine design	Yield and additional yield. pr. ha	
	N	P					DM	NEL <sub>20</sub> a.e.

2019 og 2020. 3 field trials.

1.	27	0	127	Ploug, after	Trad. Injected	Black soil injector	<b>15.7</b>	<b>134,9</b>
4.	27	0	127	Ploug, before	Row-injected	Goose foot, 260 mm	1.6	6,9
7.	27	0	127	Ploug, before	Row-injected	Goose foot, 170 mm	1.4	3,0
8.	27	0	127	Ploug, before	Row-injected	Goose foot, 80 mm	1.3	2,9
							ns	ns

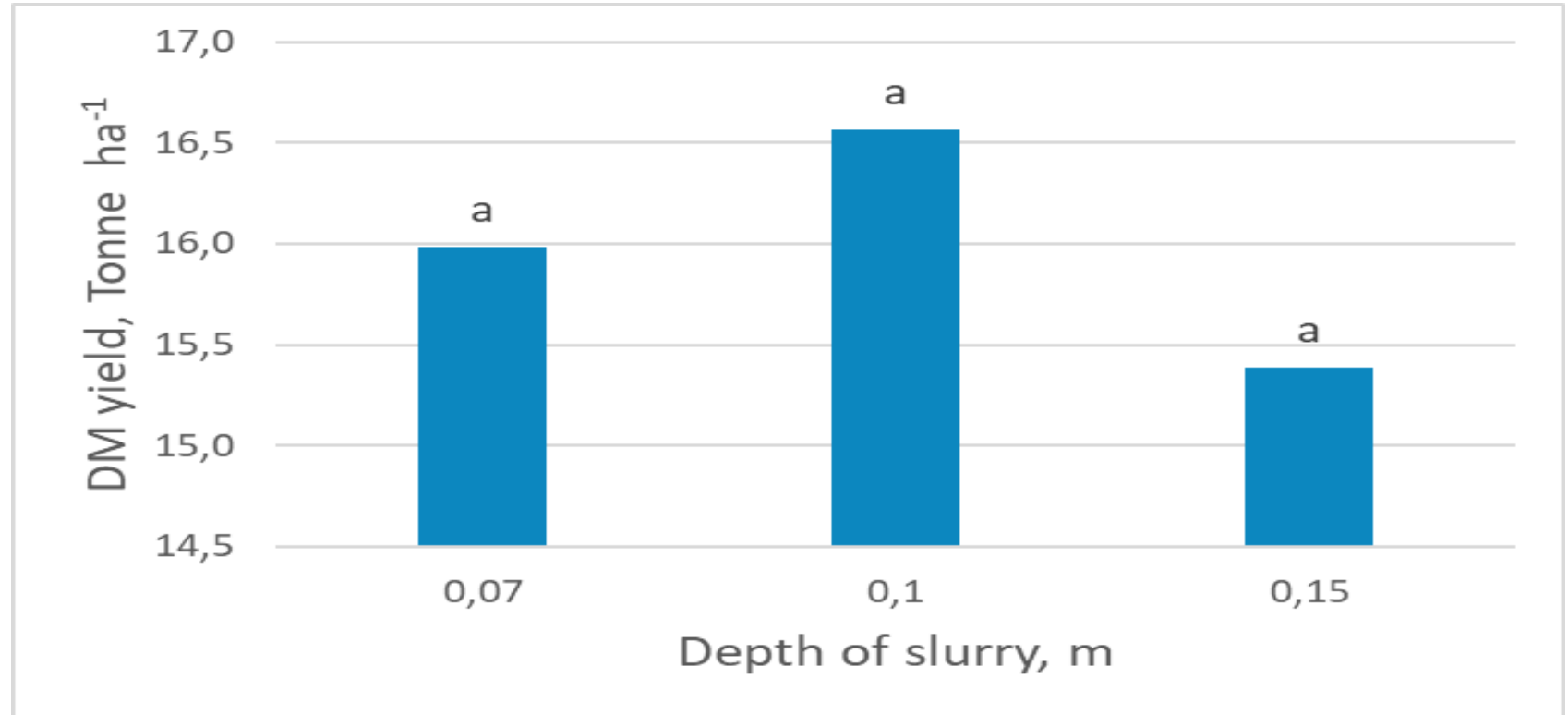


Additional yield

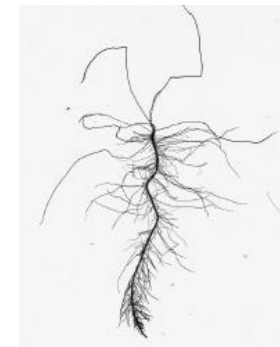
# The slurry has to be placed in 10 cm depth.

- Higher and lower placement cause loss of yield.

3 field trials, 2019 og 2020



Effects of distance between slurry and maize seed on root development.  
Pedersen IF. AU, 2018.



## Summing up

- A new phosphorous regulation has restricted the use of starter P to maize in Denmark
- That requests a better utilization of the nutrients of the applied slurry
- Row-injection of slurry can replace the yield effects of 15 kg starter P per ha
- Given the same amount of starter P, row-injection of slurry gives higher yield than traditional slurry injection
- Optimal effects of row-injection requires the right tine system and injection depth

Thank you

Questions and comments

