Intelligent crop production

Active Farming

3C – the crop establishment concept

Westerkappeln I trials site

Fertiliser strategy of using N fertilisers in conservation tillage arable farming procedures

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Overview of the results

System techniques

Details

AMAZONE

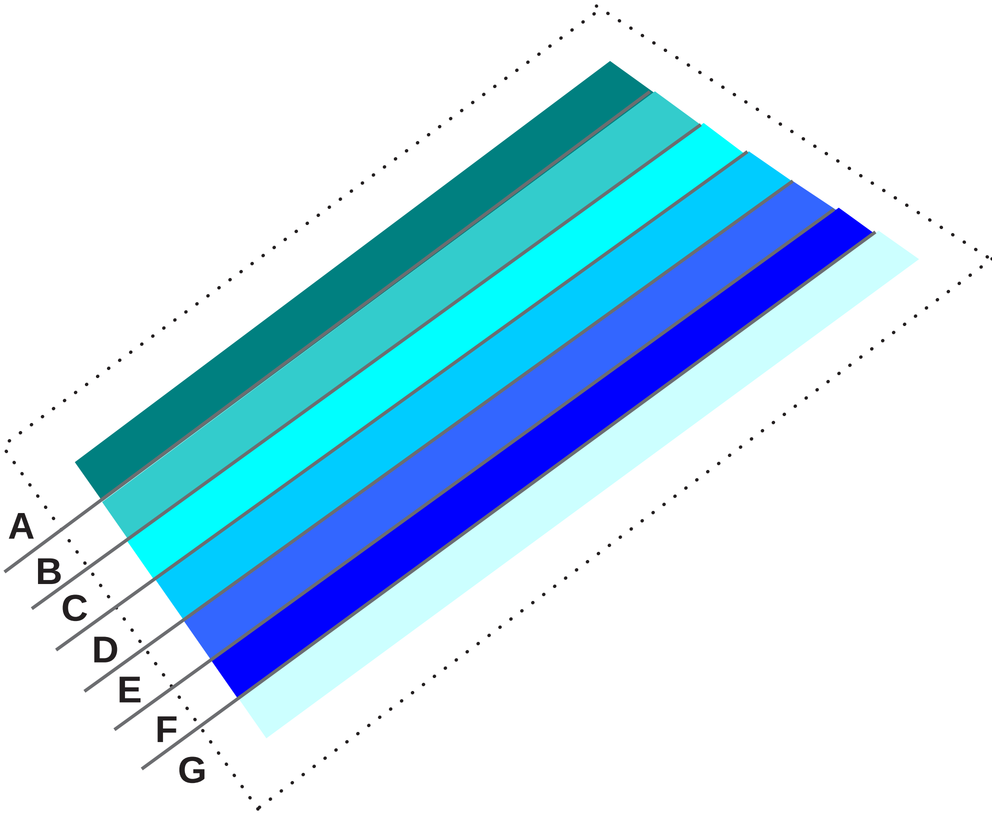
* Here, in this trial, only one crop (winter wheat) is monitored and so the site for the trial changes from year to year.

Overview of the results: Westkappeln I trials site

Aim of the trials:

Are there advantages of using a stabilised Nitrogen fertilisers in sandy, loam locations where the crop has been established using conservation tillage techniques?

Trials structure:



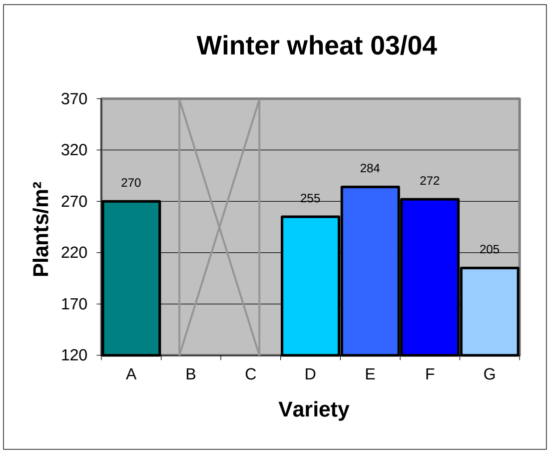
	Plot A	Plot B	Plot C	Plot D	Plot E	Plot F	Plot G
Number of fertiliser applications	1	1	2	2	3	3	-
1. application: beginning of vegetation	190 kg N/ha as Nstab+S	190 kg N/ha as Nstab	120 kg N/ha as Nstab+S	52 kg N/ha as ASS	52 kg N/ha as ASS	70 kg N/ha as CAN	-
2. application: ES 30–32 stalk extension	-	-	70 kg N/ha as Nstab	138 kg N/ha as Nstab	68 kg N/ha as CAN	60 kg N/ha as CAN	-
3. application: ear emergence	-	-	-	-	60 kg N/ha as CAN	60 kg N/ha as CAN	-

The same soil tillage applies to the complete trial. A stubble cultivation with a compact disc harrow followed by a soil tillage pass with a multi-row mulch cultivator (Cenius) at a depth of 15 cm.

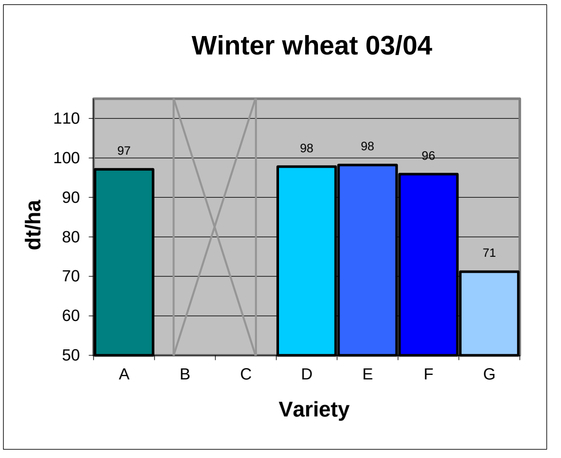
For seeding there is also just one level of intensity; all the plots are sown with an active seed drill combination.

Trials results 03/04 – 05/06:

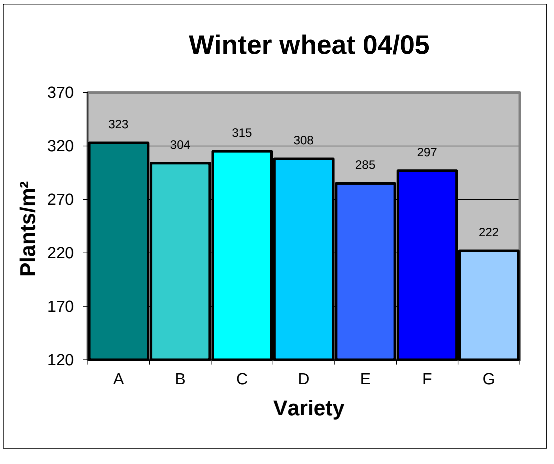
Plant emergence



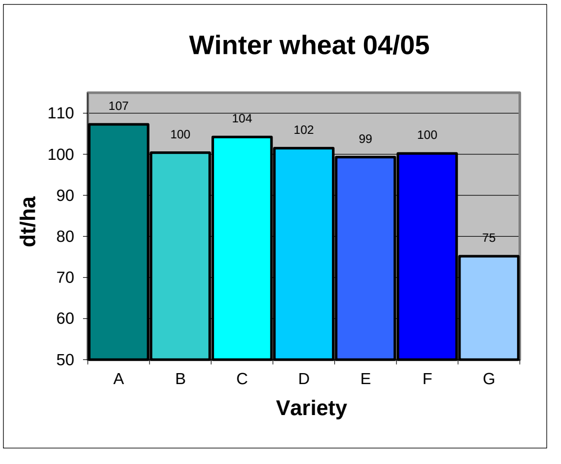
Yield



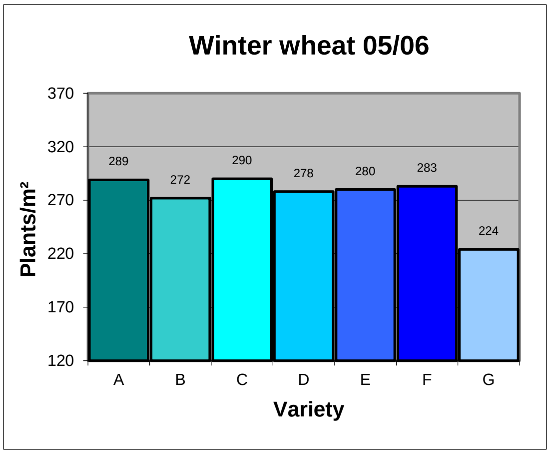
Plant emergence



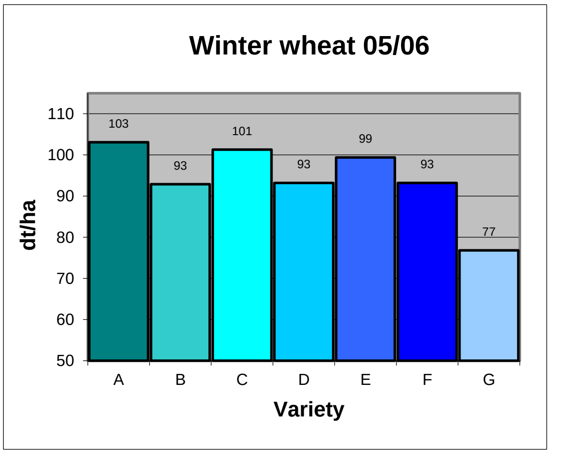
Yield



Plant emergence

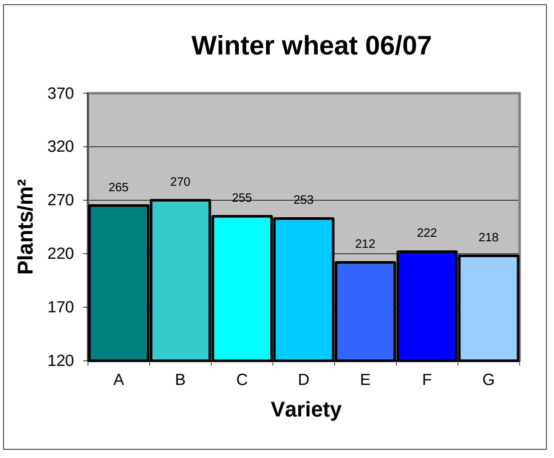


Yield

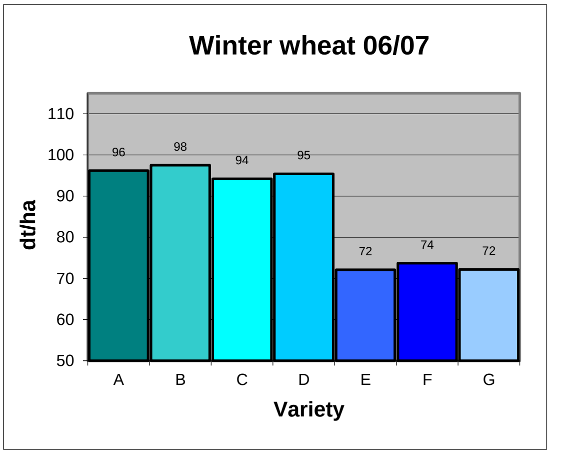


Trials results 06/07 – 08/09:

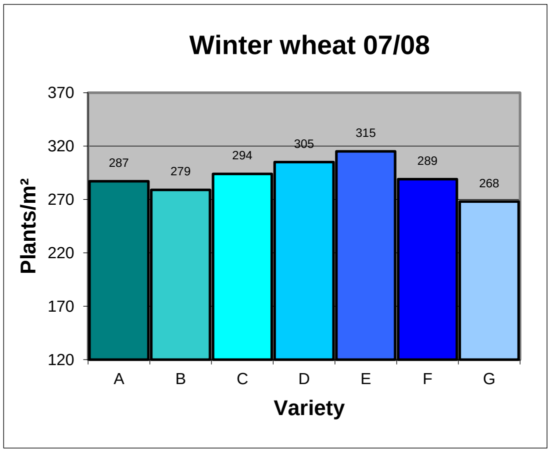
Plant emergence



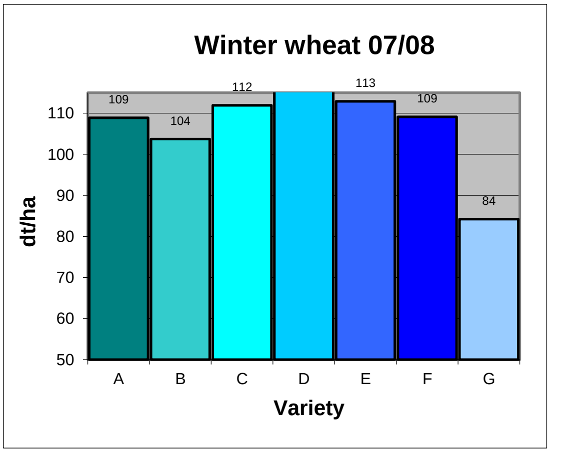
Yield



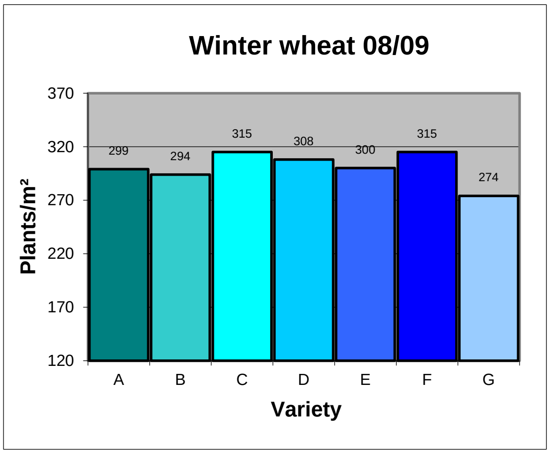
Plant emergence



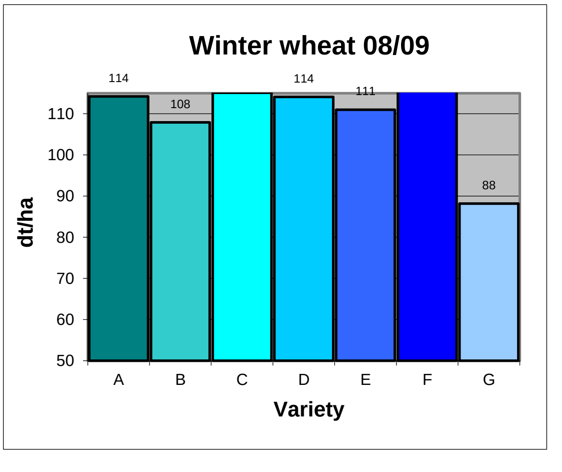
Yield



Plant emergence

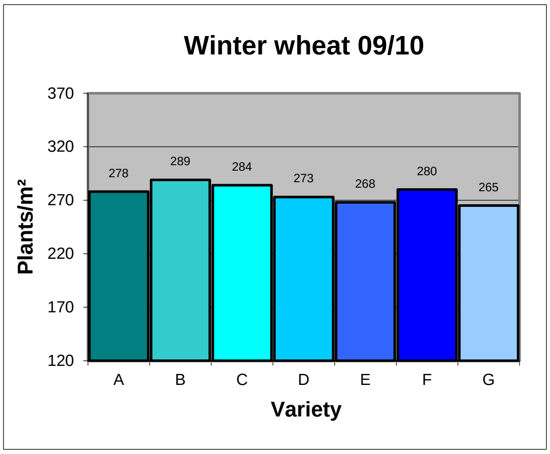


Yield

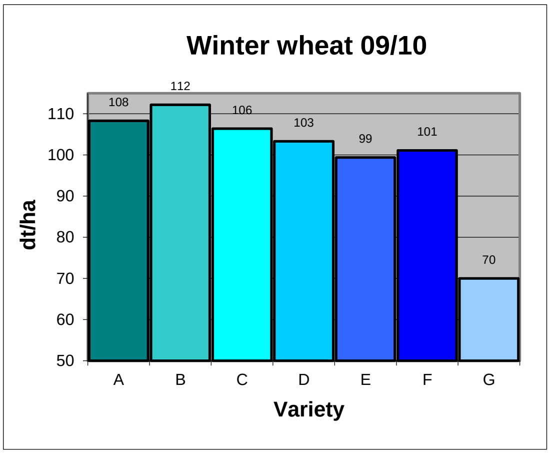


Trials results 09/10 – 10/11:

Plant emergence



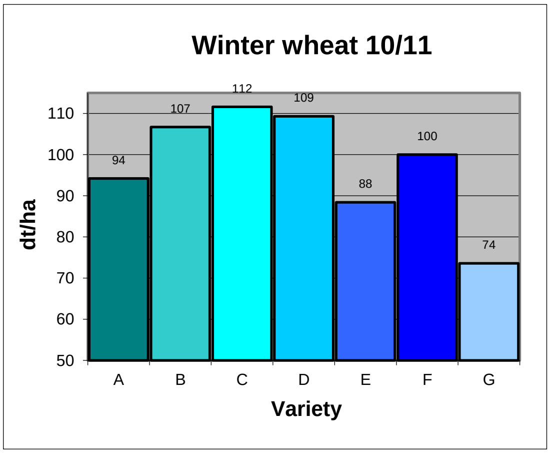
Yield



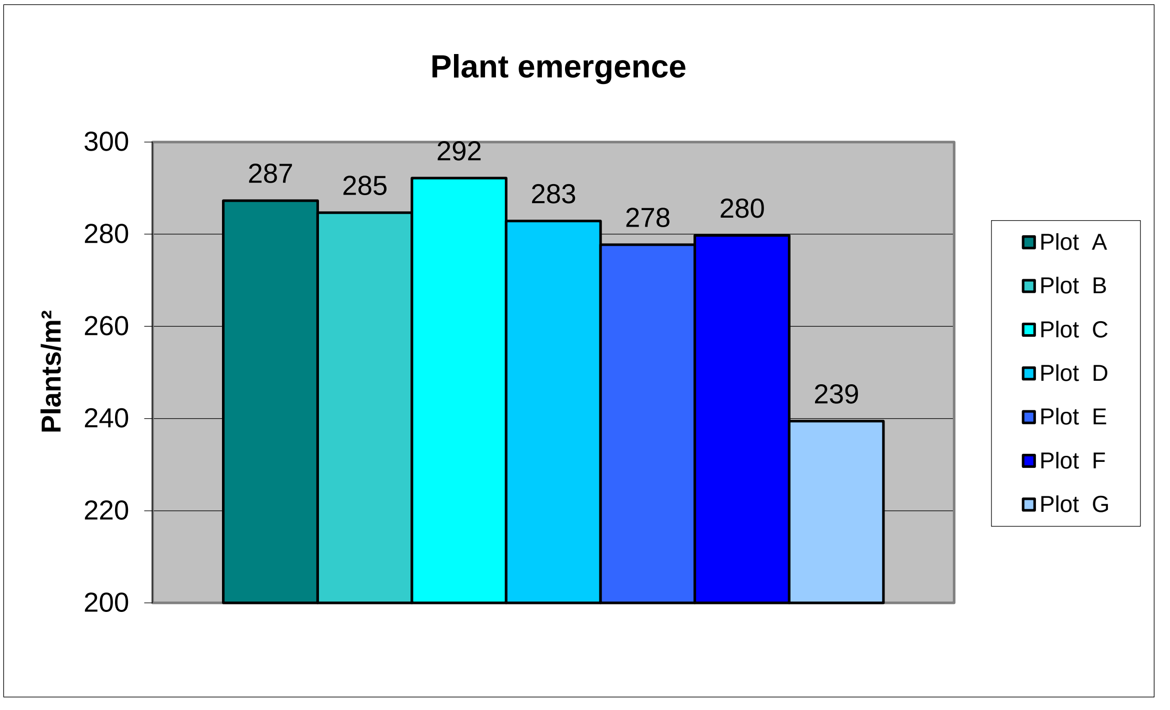
Plant emergence

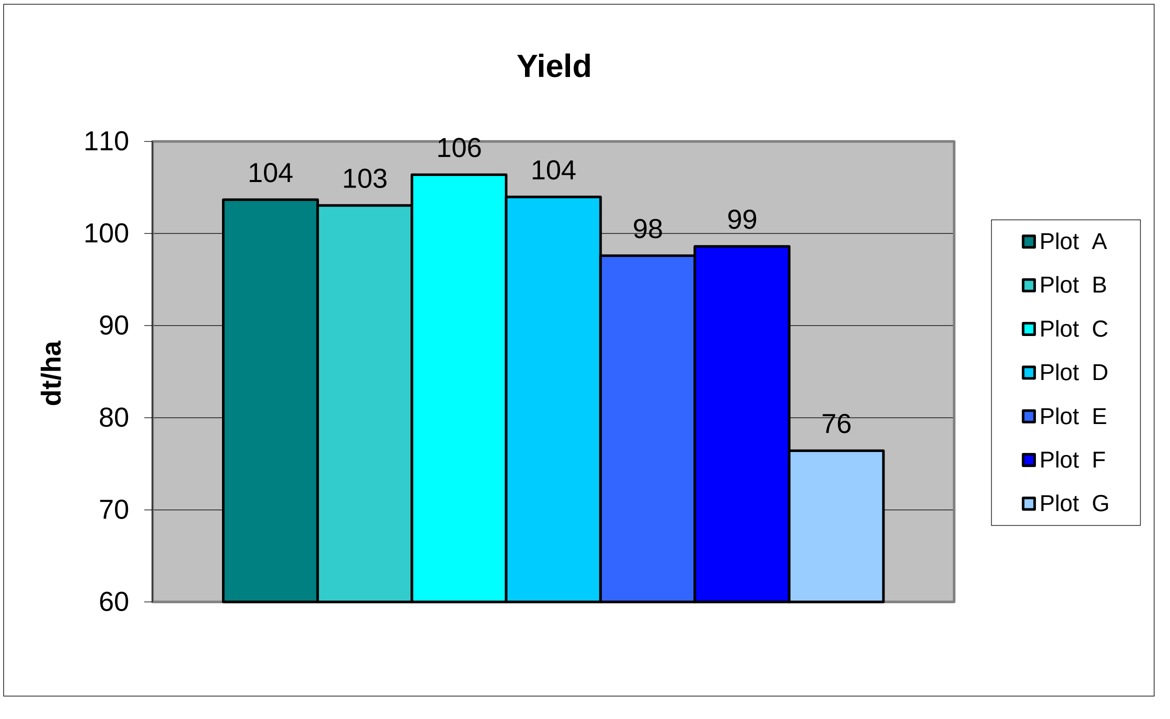
Data not collected
in this trials year!

Yield



Average trials results 03/04 – 10/11:



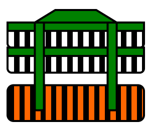


System techniques: Westerkappeln I trials site

Trial plots for tillage, seedbed preparation and sowing

	Plot A	Plot B	Plot C	Plot D	Plot E	Plot F	Plot G
Number of fertiliser applications	1	1	2	2	3	3	-
Stubble working	Catros 6 cm						
Tillage	Cenius 15cm						
Seedbed and seeding cereals, rape	KG - AD-P Super						

Stubble cultivation

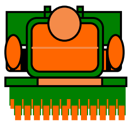


Catros
on all variants

Soil tillage

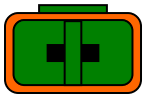
Cenius
on all variants

Sowing



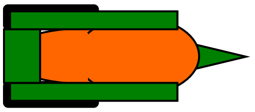
AD-P Super
on all variants

Fertilisation



ZA-M
on all variants

Crop protection



UX
on all variants

AMAZONE trials site in the Westerkappeln region (North Rhein Westfalia)

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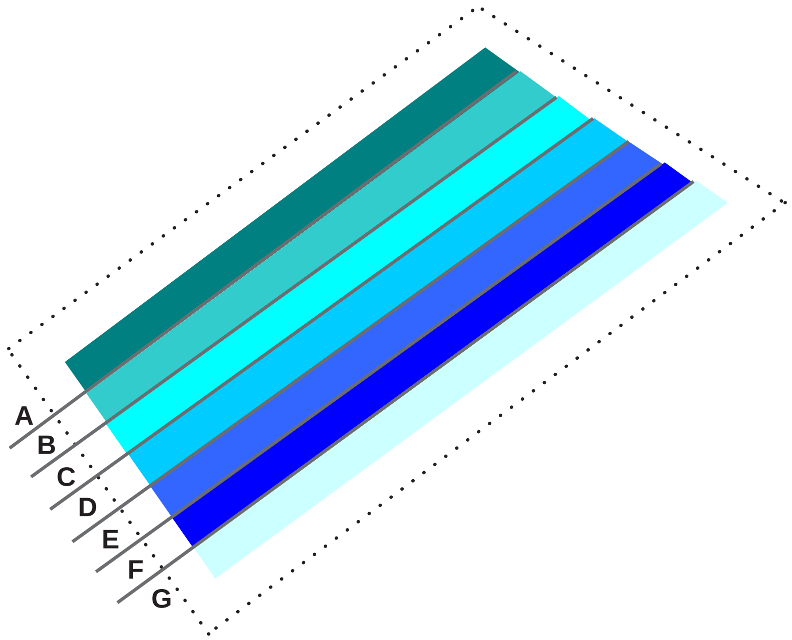
Alongside the trials site at the farm of Hermann Helmich in Westerkappeln



The plots A & B were fertilised with just one application, C & D with two and E & F with 3 applications. Plot G was left unfertilised.

As fertiliser, a Nitrogen stabilised fertiliser was used with and without Sulphur and as a farm-representative system CAN and ASS were also applied.

The same soil tillage applies to the complete trial. A stubble cultivation with a compact disc harrow followed by a soil tillage pass with a multi-row mulch cultivator (Cenius) at a depth of 15 cm.

For seeding there is also just one level of intensity; all the plots are sown with an active seed drill combination.

Site data	
Soil	Loamy sand/sandy loams, brown soil
Climate	Annual rainfall 800 mm, average temperature: 8.5°C
Crop rotation	Maize, winter wheat, winter barley
Tramline width	15 m

Trial results in an overview :

When mulch sowing methods are used, strategies with N-stabilised fertilisers produce better results than strategies with partially or non-stabilised fertilisers.

A relatively high first N application with stabilised fertilisers before the beginning of vegetation also turns out to be of advantage for mulch sowing systems.

Crop control via a two application strategy with N-stabilised fertilisers leads to optimum yields and profitability when they are combined with N-min sampling and/or the use of a N-sensor for the second application.

Trial plots for fertilisation

	Plot A	Plot B	Plot C	Plot D	Plot E	Plot F	Plot G
Number of fertiliser applications	1	1	2	2	3	3	-
1. application: beginning of vegetation	190 kg N/ha as Nstab+S	190 kg N/ha as Nstab	120 kg N/ha as Nstab+S	52 kg N/ha as ASS	52 kg N/ha as ASS	70 kg N/ha as CAN	-
2. application: ES 30–32 stalk extension	-	-	70 kg N/ha as Nstab	138 kg N/ha as Nstab	68 kg N/ha as CAN	60 kg N/ha as CAN	-
3. application: ear emergence	-	-	-	-	60 kg N/ha as CAN	60 kg N/ha as CAN	-

Yield results (dt/ha) in comparison

	Plot A	Plot B	Plot C	Plot D	Plot E	Plot F	Plot G
Number of fertiliser applications	1	1	2	2	3	3	-
Winter wheat 03/04							
Seed rate seeds/m²				300			
Seedling emergence (plants/m²)	270			255	284	272	205
Yield dt/ha	**97**			**98**	**98**	**96**	**71**
Winter wheat 04/05							
Seed rate seeds/m²				300			
Seedling emergence (plants/m²)	323	304	315	308	285	297	222
Yield dt/ha	**107**	**100**	**104**	**102**	**99**	**100**	**75**
Winter wheat 05/06							
Seed rate seeds/m²				300			
Seedling emergence (plants/m²)	289	272	290	278	280	283	224
Yield dt/ha	**103**	**93**	**101**	**93**	**99**	**93**	**77**
Winter wheat 06/07							
Seed rate seeds/m²							
Seedling emergence (plants/m²)	265	270	255	253	212	222	218
Yield dt/ha	**96**	**98**	**94**	**95**	**72**	**74**	**72**
Winter wheat 07/08							
Seed rate seeds/m²				300			
Seedling emergence (plants/m²)	287	279	294	305	315	289	268
Yield dt/ha	**109**	**104**	**112**	**117**	**113**	**109**	**84**
Winter wheat 08/09							
Seed rate seeds/m²				300			
Seedling emergence (plants/m²)	299	294	315	308	300	315	274
Yield dt/ha	**114**	**108**	**115**	**114**	**111**	**116**	**88**
Winter wheat 09/10							
Seed rate seeds/m²				300			
Seedling emergence (plants/m²)	278	289	284	273	268	280	265
Yield dt/ha	**108**	**112**	**106**	**103**	**99**	**101**	**70**
Winter wheat 10/11							
Seed rate seeds/m²							
Seedling emergence (plants/m²)							
Yield dt/ha	**94**	**107**	**112**	**109**	**88**	**100**	**74**
Average							
Seedling emergence (plants/m²)	287	285	292	283	278	280	239
Yield dt/ha	**104**	**103**	**106**	**104**	**98**	**99**	**76**

Appraisal of the trial results from Westerkappeln I

The average results from the years 2004 to 2011 clearly show that the plots with stabilised N fertiliser and Sulphur produced a yield up to 5 dt higher than that of the plots with non-stabilised fertilisers. Obviously it is advantageous to spread a relatively high first dose or only one dose with N-stabilised fertiliser. At the same time the trials show that a sufficient Sulphur supply is important for optimum N uptake and better root growth.

The results from the year 2007 in which due to extreme dryness in April and May only a reduced Nitrogen conversion of the high-nitrate fertilisers (plots E and F) could take place show that strategies with N-stabilised fertilisers (plots A to D) considerably reduce the risk of N shortage in case of spring drought.

2 application strategies offer more flexibility. For instance, the longer application period brings advantages in respect of a better distribution of working time capacities particularly on farms with work peaks in spring. In addition 1 and 2 application strategies are more economical. Machinery costs can be minimised by using bulk material broadcasters with wide tyres for early fertilisation. Because the relatively expensive third application (small tractor with row crop tyres for late fertilisation) is no longer necessary, the application costs can be reduced by 40 % to 50 %.

The trials show that the single-application strategy also produced maximum yields. There is, however, no possibility of correcting or adjusting the N-fertilisation in the course of the second application. Hence it may be useful, particularly on heterogeneous sites, to optimise the N-fertilisation in the course of a 2-application strategy by using sensor technology for the 2nd application.