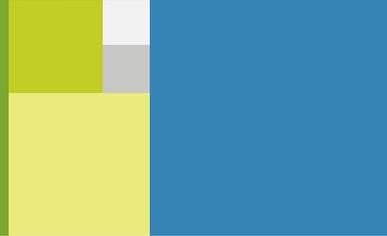




Knowledge grows

Yara N-Sensor

User manual - english



- 1) **Product Summary**
 - 1.1) Installation and components

- 2) **Introduction**
 - 2.1) N-recommendation

- 3) **Use N-Sensor software**
 - 3.1) Target rate application module
 - 3.2) N-application module
 - 3.3) Module selection via configuration icon
 - 3.4) Additional modules
 - 3.5) Status icons

- 4) **Disclaimer**

1) Product summary



optional
↔



(2 x) Brackets



(8 x) Bolts
M6x8

Delivery contains:



(2 x) N-Sensor Head ALS II
(left and right)
part no. 21-6500



(1 x) Elongation cable (4m)
Head to head
part no. 21-6581



(1 x) Y-cable (2m)
Head to power/LAN
part no. 21-6583

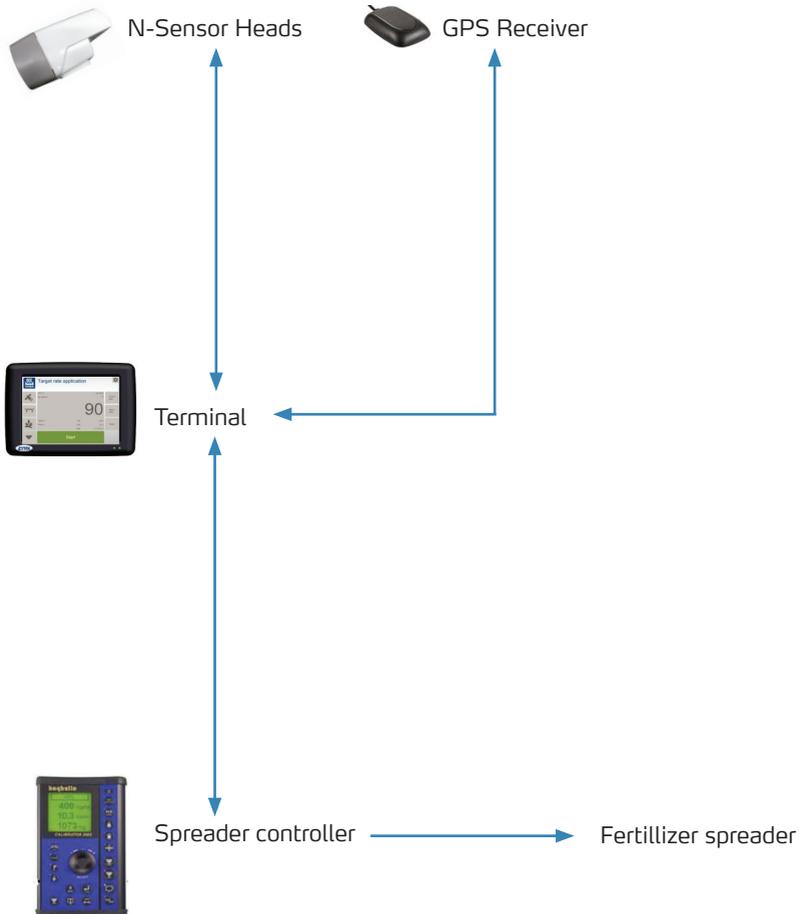


(1 x) Connection cable (3m)
Head to elongation
part no. 21-6582

1.1) Installation and components

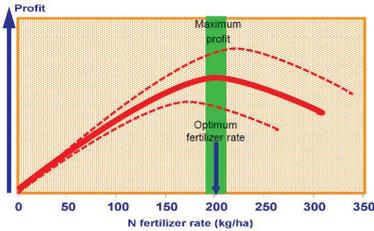
Please Note:

The installation of the Yara N-Sensor should only be done by your local N-Sensor distributor or service company. Yara N-Sensor head, terminal and spreader controller need to be configured properly. The installation is described in the Installation guide for technicians.

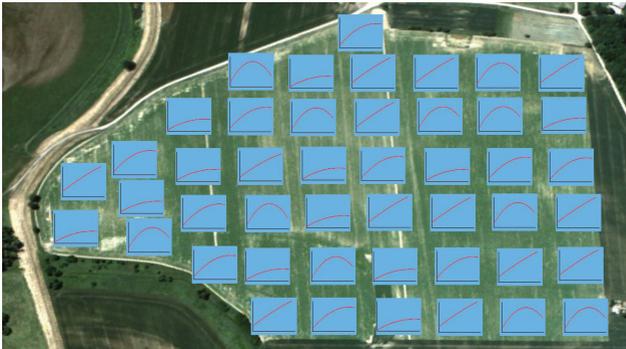


2) Introduction

Nutrient supply within a field can be highly variable. Uniform application of nitrogen fertilizer results in over- and under-fertilization. The challenge is to measure the current local nitrogen supply and adapt the fertilizer rate accordingly.



The target is to find the optimum nitrogen rate in order to maximize the farmer's profit and to protect the environment as much as possible.

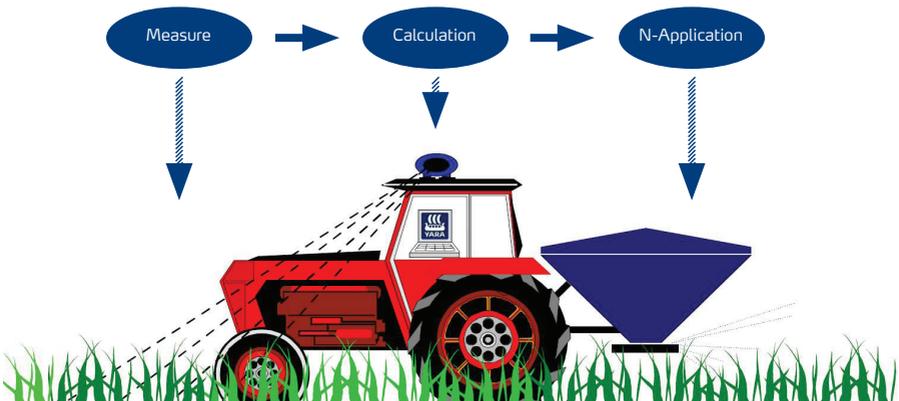


On heterogeneous fields, the optimum nitrogen rate can be different on every spot in the field.

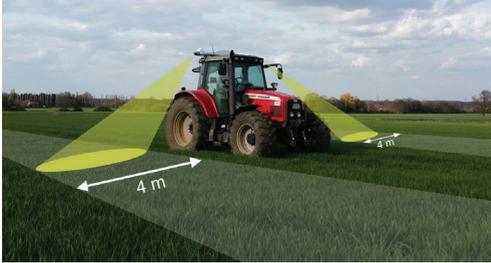
Heterogeneous fields are the rule.

Site-specific crop management is a logical consequence.

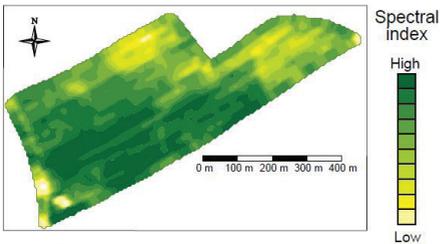
We use remote-sensing technology with tractor mounted sensors. The concept is:



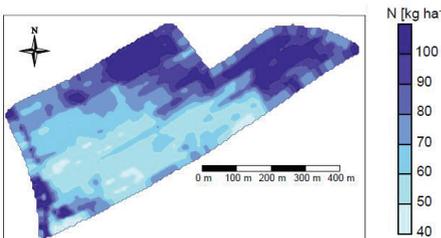
2.1) N-recommendation



The Yara N-Sensor measures light interaction with leaves. A specular reflectance of near infrared and visible light is transferred to an agronomic parameter. The measured N-uptake can then be interpreted.



The Yara N-Sensor records the collected data and show a map of the scanned field. Areas which need more N-supply will be identified automatically by the N-Sensor.



The Yara N-Sensor is connected to the spreader, which applies different N-rates during the scanning process. The minimum and maximum rates can be set in the terminal.

Benefits of using a N-Sensor:

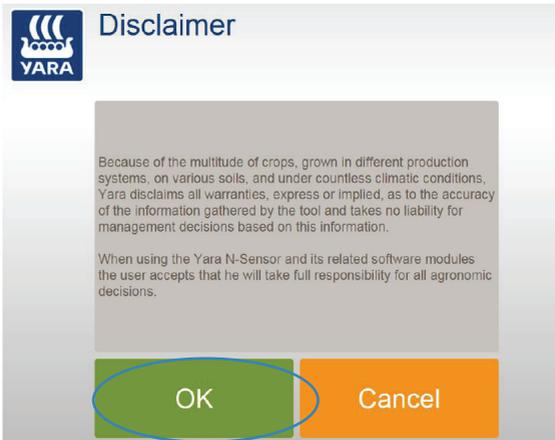
- Yield increase
- N savings
- Improved N balance
- Reduced risk of crop lodging
- Improved combine performance
- Enhanced and more even protein content

3) N-Sensor software

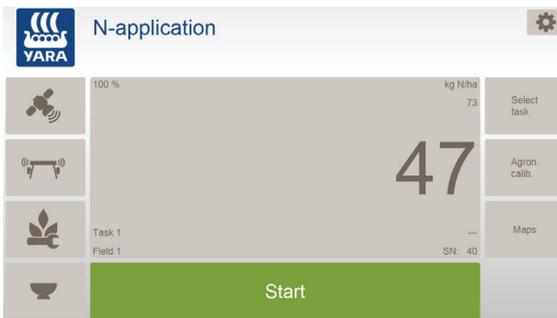
1) Starting the N-Sensor software



2) Accept Disclaimer

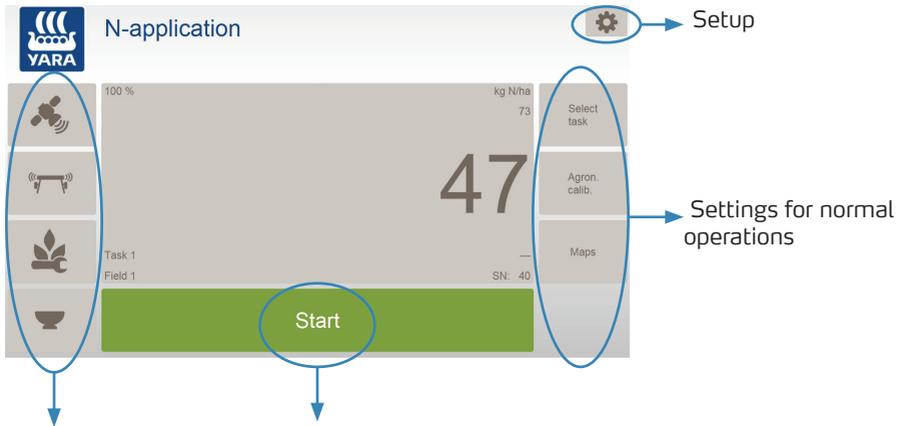


Press: ok



3) N-Sensor software

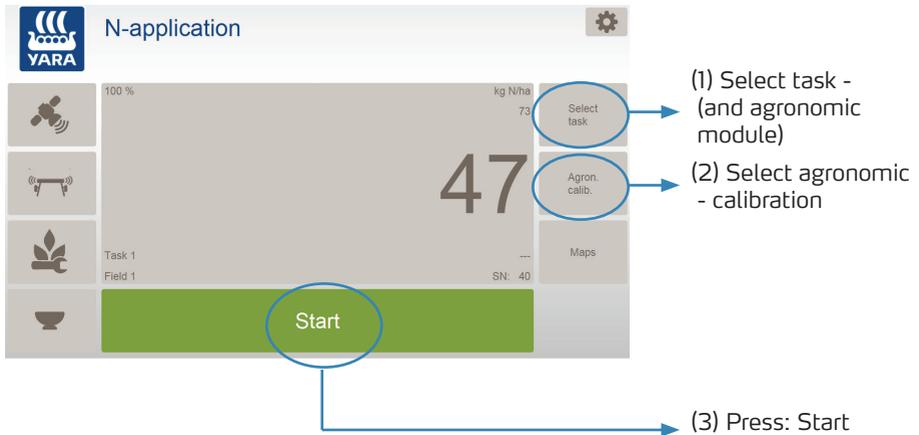
3) Menu overview



Status icons: Start/Stop button

- grey = Ok
- yellow = Warning
- red = Critical warning or malfunction

4) General steps to start N-Sensor software modules



3.1) Target rate application module

General information: Target rate application

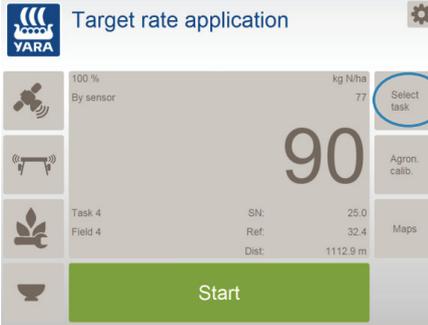
- The module *Target rate application* uses a “self-learning” calibration, which applies a pre-selectable average rate on a field.
- No in-field calibration is required, because the reference N-uptake is calculated in the background. The N-Sensor needs some measurements to approach the mean value.

Reference SN (N-uptake) calculated in the background



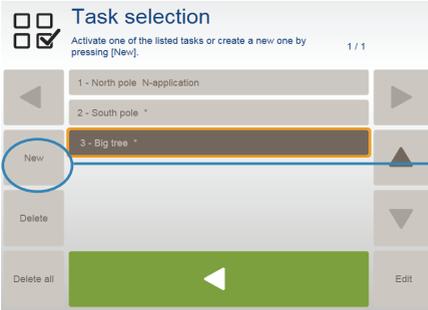
3.1) Target rate application module

5)



Press: Select task

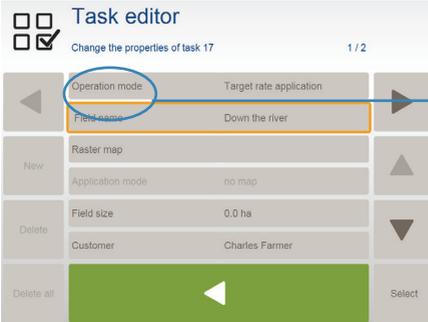
6)



Press: New

Remember: 1 task = 1 field

7)

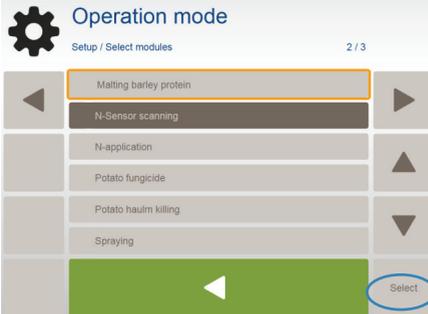


Press: **Operation mode**
Choose: **Target rate application**

Use **arrows** to navigate to:
Target rate application

Press: Select

8)



Select and fill in the task menu
the following optional information:

- Field name: (File name in logfile)
- Raster map: (Stored as information in the logfile - only available if a rastermap is present in the data directory)
- Field size
- Customer
- Comment

3.1) Target rate application module

9)



Press: Agron. calib.

10)



Choose and enter:

- **Crop**
- **Growth stage** (e.g. 37)
- **Application** (eg. booting)
- **N-content in fertilizer** in % (e.g. 25%)
- **Minimum rate** in kg/ha (e.g. 20 kg/ha)
- **Maximum rate** in kg/ha (e.g. 150 kg/ha)
- **Target rate** in kg/ha (e.g. 70 kg/ha)
- **Relative biomass cutoff** in % (e.g. 20%)

11)



Press: Start calibration

12)



Press: Start

- Drive over the field.
- The calibration works in the background
- Press "Stop" if you have finished N-application or if you want to exclude parts of the field in the background calibration.

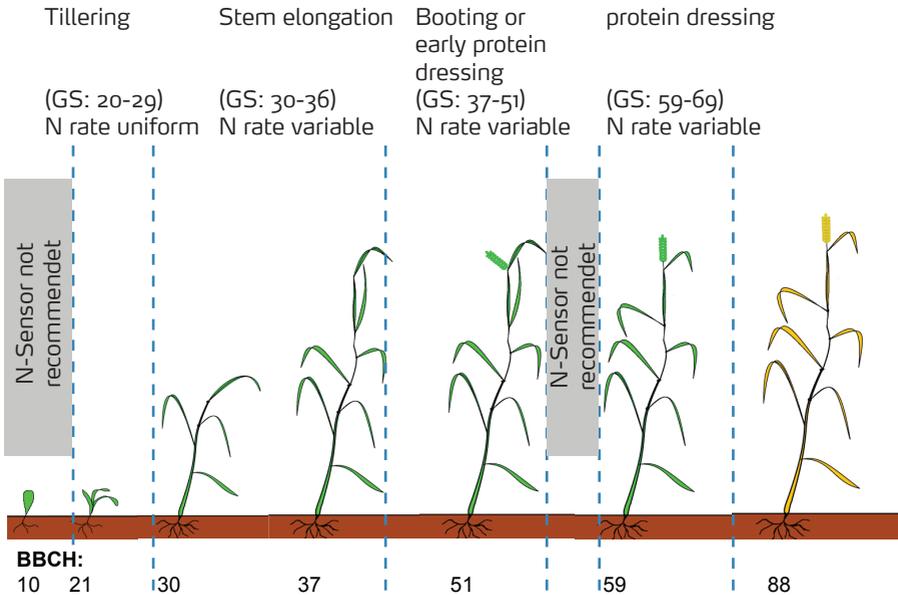


3.2) N-application module

General Information: N-application

- The N-application operation mode is the standard mode to use the N-Sensor for many crops. (cereals, OSR, potatoes, sugar cane, cotton, maize,...)
- Reference plot calibration is required before N-application. (i. e. through N-Tester, if available in your specific country)
- Calibration curve (slope, biomass cutoff) depends on crop type and growth stage.
- For cereals in growth stage 37-51 you can choose between two calibration curves ("booting" and "protein dressing")
- You can set the general biomass cutoff factor.

Example cereals:



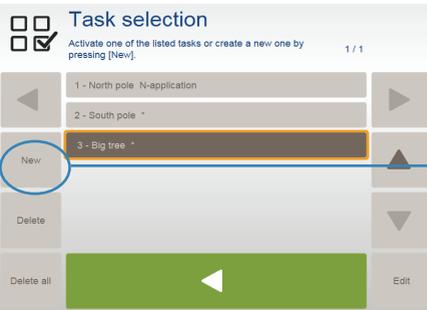
3.2) N-application module

13)



Press: Select task

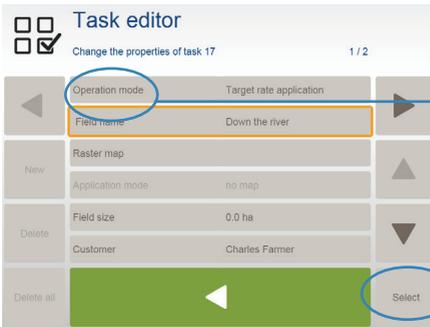
14)



Press: New

- Remember: 1 task = 1 field

15)



Press: **Operation mode**

- Choose: N-application

Use **arrows** to navigate to:
N-application

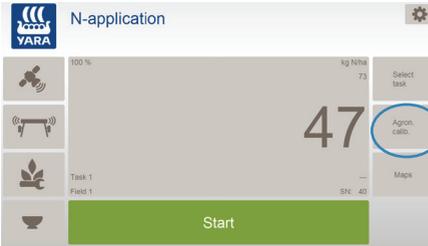
Press: Select

Select and enter in the Task Menu the following optional information:

- Field name:** (file name in logfile)
- Raster map:** (assigned to task, stored in in Data directory)
- Field size:** (information)
- Customer:** (information)
- Comment:** (stored in logfile)

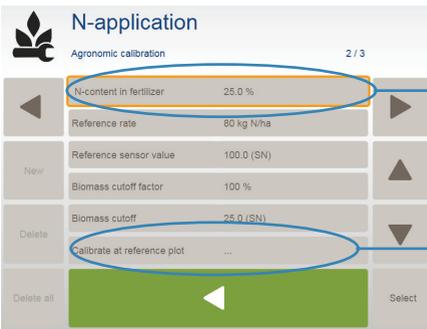
3.2) N-application module

16)



Press: Agron. calib.

17)



Press and choose: N-content in fertilizer

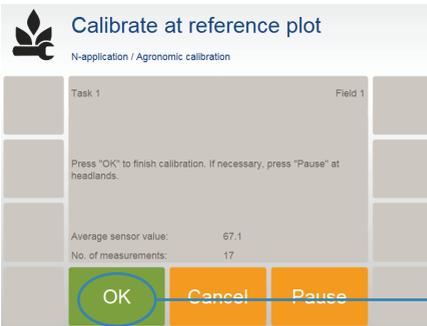
Press: Calibrate at reference plot

18)



Press: Start

19)



Press: Ok

▪ To finish calibration

3.2) N-application module

20)



Press: Reference rate

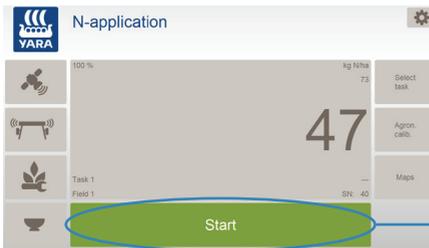
- To insert your reference N kg/ha

Please note:
The reference N kg/ha is valid for the reference area of the calibration and not for the average of the whole field.

21)



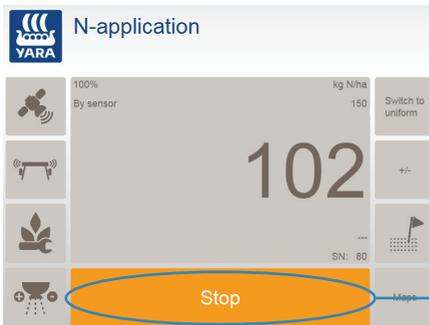
22)



Press: Start

- To start N-application during driving

23)

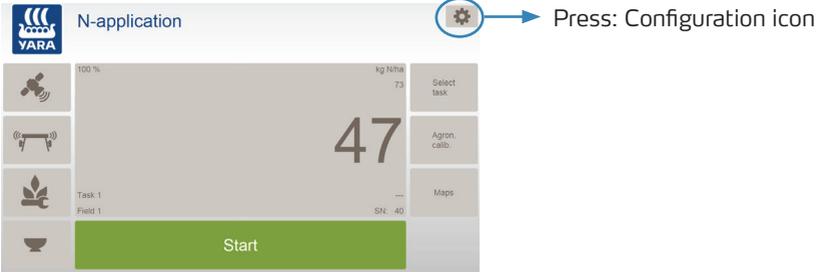


Press: Stop

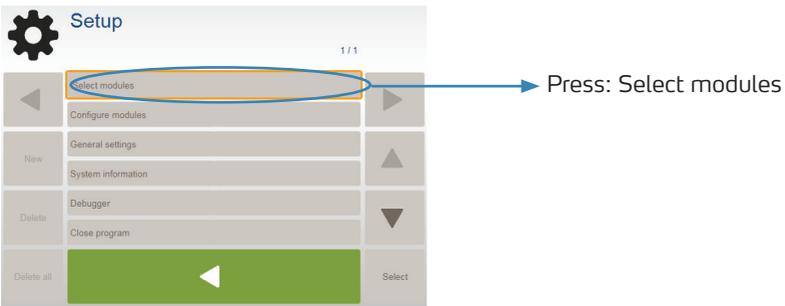
- If you want to finish or pause your N-application

3.3) Module selection via configuration icon

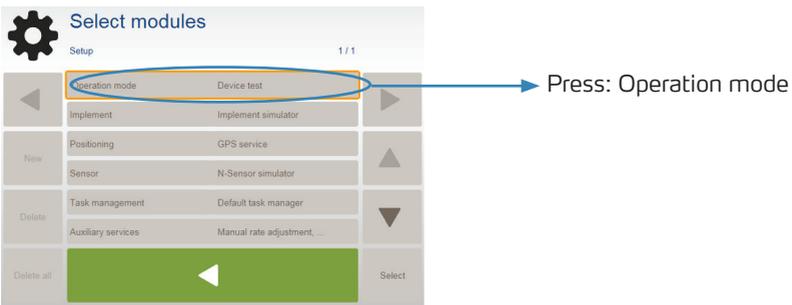
24) Example: N-application



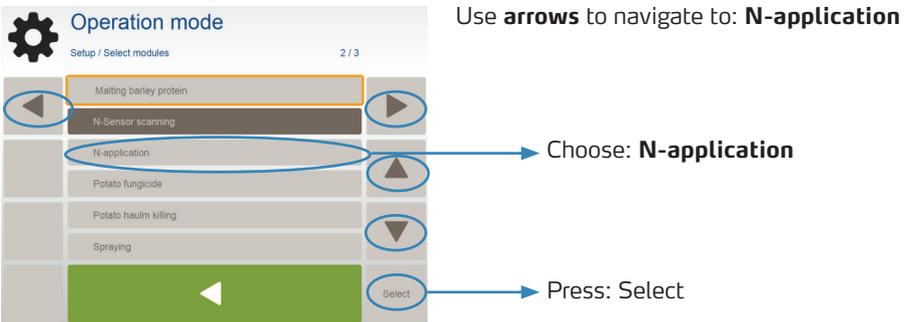
25)



26)



27)



3.4) Additional modules

1) Free calibration

- Two-point calibration
- Designed for crops and conditions where no other recommendation is available

Free calibration	
Agronomic calibration 2 / 4	
Reference rate 1	80 kg N/ha
Reference sensor value 1	100.0 (SN)
Reference rate 2	80 kg N/ha
Reference sensor value 2	100.0 (SN)
Biomass cutoff factor	100 %
Biomass cutoff	20.0 (SN)
	
Select	

2) N-Sensor Scanning

- Scan fields with the N-Sensor (S1, SN, GBI)
- Records data in standard log file format
- No on-line application
- No implement (spreader, sprayer) required
- Used for i. e. oilseed rape autumn scanning

N-Sensor scanning	
Agronomic calibration 1 / 2	
Crop	Spring wheat
Growth stage	37
Working width	24.0 m
	
Select	

3) Malting Barley Protein

- Absolute calibration for malting barley topdressing
- Developed for Swedish conditions
- Target: Achieve specific protein level at harvest

Malting barley protein	
Agronomic calibration 1 / 3	
Region	Norra Götaland
Seeding month	April
Seeding day	15
Growth stage	31
Variety	Tippel
Biomass cutoff	20 SN
	
Select	

4) Absolute N-Application OSR

- Application of N in winter oilseed rape based on absolute N-Sensor readings
- Assumptions:
 - No autumn application
 - Two applications in early spring
 - Yield level between 3 and 6 t/ha
 - Sufficient water supply

Absolute N-application OSR	
Agronomic calibration 1 / 3	
Application	2nd dressing
Growth stage	30
Yield expectation	4 - 5 t/ha
Mineralisation potential	medium
N-content in fertilizer	27.0 %
	
Select	

3.4) Additional modules

5) Spraying

- Application of farm chemicals
- User-defined calibration function (slope)
- Target rate approach



Parameter	Value
Crop	Winter wheat
Growth stage	31
Slope	1.0 %/SN
Minimum rate	0 l/ha
Maximum rate	150 l/ha
Target	80 l/ha

6) Herbicide Application

- Spot spraying of (green) weeds in a (brown) canopy
- Simple threshold approach (user-defined)
- Apply higher rate on green spots



Parameter	Value
Crop	Winter wheat
Growth stage	31
Minimum rate	20 l/ha
Uniform rate	80 l/ha
Biomass cutoff	50 SN

7) Base application

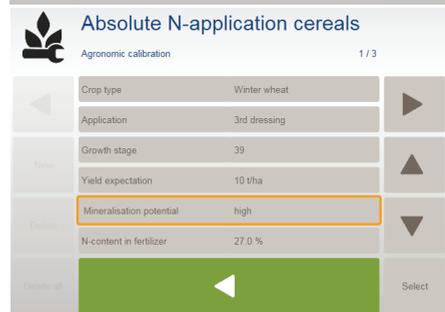
- Apply rates from a prescription map
- N-Sensor does not need to be present
- If present, N-Sensor readings are recorded, but not used for application
- Possible applications:
 - 1st Nitrogen dressing
 - Application of P and K
 - Liming



Parameter	Value
Uniform rate	90 kg/ha
Agent content	25.0 %
Map factor	50.0 %
Agent	P205
Unit	kg/ha

8) Absolute N-application cereals

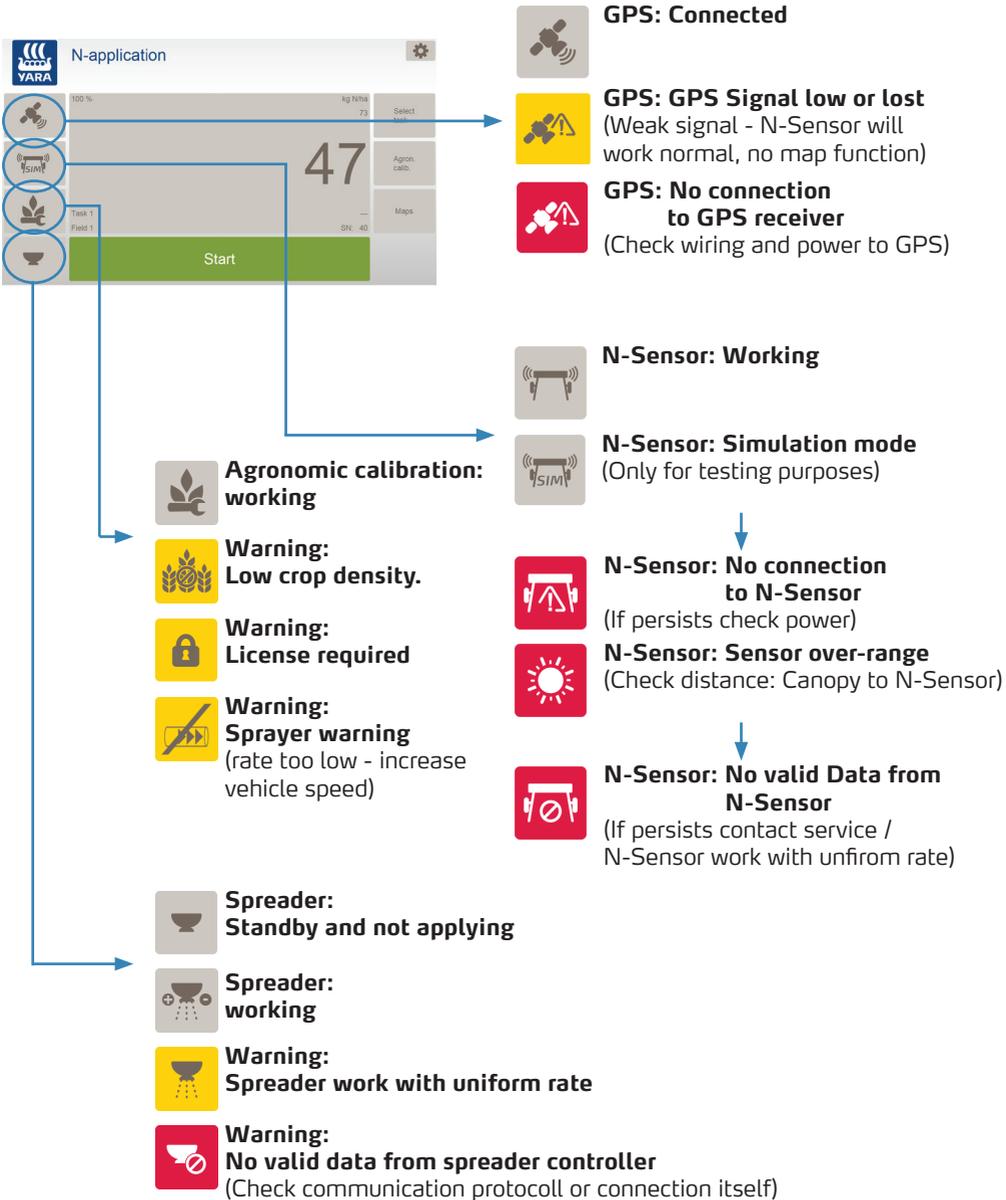
- Application of N in winter cereals based on absolute N-Sensor readings
- Assumptions:
 - Crop: Winter wheat (winter barley under development)
 - Farming practice with 3 topdressings
 - No additional dressings (i. e. protein dressing)
 - Sufficient water supply
 - Final yield between 6-12 t/ha



Parameter	Value
Crop type	Winter wheat
Application	3rd dressing
Growth stage	39
Yield expectation	10 t/ha
Mineralisation potential	high
N-content in fertilizer	27.0 %

Please Note: Further modules are available from third party companies

3.5) Status icons



4) Disclaimer

Please Note:

Because of the multitude of crops, grown in different production systems, on various soils, and under countless climatic conditions, Yara disclaims all warranties, express or implied, as to the accuracy of the information gathered by the tool and takes no liability for management decisions based on this information.

When using the Yara N-Sensor and its related software modules the user accepts that he will take full responsibility for all agronomic decisions.

If you have any questions, please do not hesitate to contact us.

V.15

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