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Portsmouth Water Trials

07/07/2022

This mornings presentation will cover:

- AAN Trial
 - Additional Available Nitrogen
- Undersown Maize Trial
 - Results from year 1
- Efficient N 28 Trial year 3
- Nitrogen Reduction Trial year 3



Nitrogen Sampling in the soil, understanding all the terms!

- **SMN** Soil mineral nitrogen. This analysis gives a reflection of what has been mineralised in the soil up until the date of sampling and is a measure of crop-available soil nitrogen.
- **AAN** Additionally available nitrogen. This is the N that will be mineralised in the soil between the time of sampling and harvest and taken up by the crop. Gives a better indication of true SNS when used in conjunction with SMN.
- **SNS** Soil nitrogen supply. SMN and AAN supplied by the soil combined with an estimate of N already taken up by the crop at the time of sampling. SNS is then used as a basis for calculating fertiliser application rates based on target yield.
- **NfUE** Nitrogen fertiliser use efficiency. The proportion of fertiliser nitrogen recovered by the crop at harvest. This typically varies between 50% and 80% in arable crops.



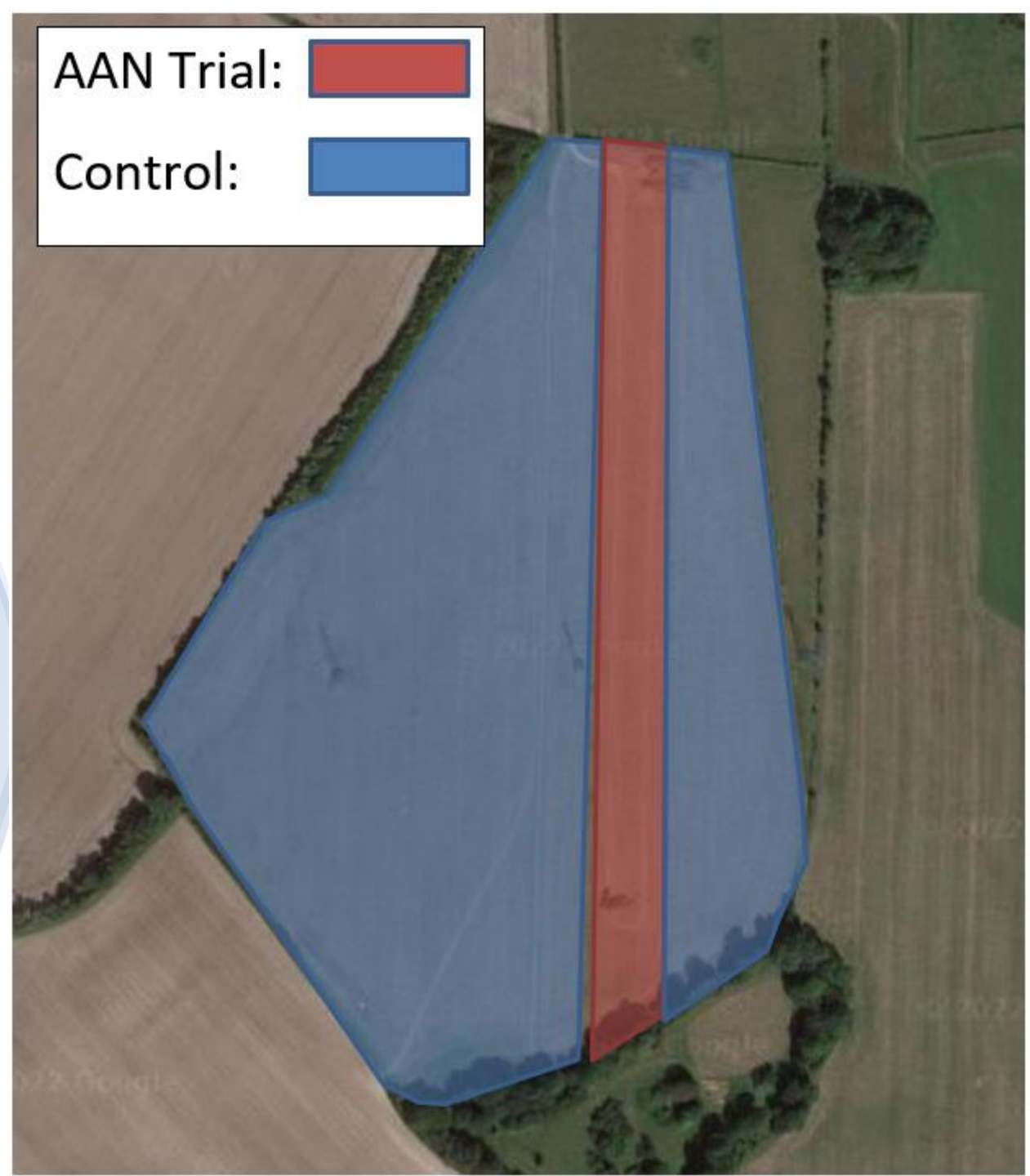


Portsmouth Water & AAN Sampling

- Promote the use of SMN and AAN sampling in the catchments to improve nutrient management planning.
- Explore AAN in more depth, questions over the reliability of the data.
- Incorporated into the carbon baseline project being run within the SDFG Cluster.

AAN Trial in Folley Field, Netherley Farm

- 17.71ha
- KWS Extase Group 2
- Drilled using a Horsch Sprinter
- Chalk Downland Soil
- Organic matter 8.1% using DUMAS



AAN Samples, taken January 2022

Results:

Summary

kg N/ha	Big Netherly	Falley 1	Falley 2
Measured Soil Mineral N	47	62	85
Estimated N in crop	25	25	25
AAN	63	79	51
Total SNS	135	166	161
Soil N Supply Index	4	5	5
Crop	WW	OSR	OSR
Previous Crop			

Analytical Results

Field Name	Lab Ref	Depth (cm)	Soil Texture	NO ₃ -N	NH ₄ -N	Total SMN
				(kg/ha)		
Big Netherly	2202668	0 - 30	ZCL	16.9	12.5	29.5
Big Netherly	2202669	30 - 60	ZCL	12.6	4.6	17.2
Falley 1	2202670	0 - 30	ZL	29.2	13.7	42.8
Falley 1	2202671	30 - 60	ZCL	14.4	4.6	18.9
Falley 2	2202672	0 - 30	ZL	50.6	14.8	65.4
Falley 2	2202673	30 - 60	ZCL	12.8	6.5	19.3

Folley Field Nitrogen Applications Plans 2022

AAN Trial Total N: 315kgN/ha	Normal Fertiliser Regime Total N: 300kg N/ha
SNS index 5 (using the 166kg/ha N in the soil from AAN sample)	SNS Index 2 (AAN SNS index 5) disregarded in the fertiliser program
75kgN/ha 215kg/ha of Ammonium Nitrate granular fertiliser Feb 2 nd . VR	75kgN/ha 218kg / ha of Ammonium Nitrate granular fertiliser Feb 2 nd . VR
40kgN/ha 137.5kg/ha of Sulphur Gold late March.	80 Kg N/ha 275kg /ha of Sulphur Gold late March. VR
40kgN/ha 137.5kg/ha of Sulphur Gold April.	80 Kg N/ha 231kg /ha of Ammonium Nitrate granular fertiliser May. VR
	60 Kg N/ha 174kg / ha of Ammonium Nitrate granular fertiliser late May. VR

AAN Trial through the growing season:

Tissue Samples taken 04/04/2022
Control

SAMPLE NAME: AAN TRIAL CON PRT1

CROP: WINTER WHEAT

ANALYSIS	RESULT	INTERPRETATION				
		Deficient	Low	Normal	High	Excessive
Nitrogen (N) [N:S Ratio]	2.67 %					
Sulphur (S) [16.5:1]	0.162 %					
Phosphorus (P)	0.332 %					
Potassium (K)	3.23 %					
Calcium (Ca)	0.329 %					
Magnesium (Mg)	0.089 %					
Manganese (Mn)	90.2 mg/kg					
Iron (Fe)	103 mg/kg					
Copper (Cu)	2.13 mg/kg					
Zinc (Zn)	26.1 mg/kg					
Boron (B)	4.15 mg/kg					

Trial Plots

SAMPLE NAME: AAN TRAIL PORT1

CROP: WINTER WHEAT

ANALYSIS	RESULT	INTERPRETATION				
		Deficient	Low	Normal	High	Excessive
Nitrogen (N) [N:S Ratio]	2.57 %					
Sulphur (S) [16.4:1]	0.156 %					
Phosphorus (P)	0.356 %					
Potassium (K)	3.12 %					
Calcium (Ca)	0.357 %					
Magnesium (Mg)	0.095 %					
Manganese (Mn)	100 mg/kg					
Iron (Fe)	119 mg/kg					
Copper (Cu)	2.54 mg/kg					
Zinc (Zn)	31.3 mg/kg					
Boron (B)	4.20 mg/kg					

AAN Trial through the growing season:

Tissue Samples taken 05/05/2022

Control

SAMPLE NAME: AAN TRIAL CONT 1

CROP: WINTER WHEAT

ANALYSIS	RESULT	INTERPRETATION				
		Deficient	Low	Normal	High	Excessive
Nitrogen (N) [N:S Ratio]	1.86 %					
Sulphur (S) [13.5:1]	0.138 %					
Phosphorus (P)	0.218 %					
Potassium (K)	2.38 %					
Calcium (Ca)	0.341 %					
Magnesium (Mg)	0.093 %					
Manganese (Mn)	80.0 mg/kg					
Iron (Fe)	192 mg/kg					
Copper (Cu)	4.01 mg/kg					
Zinc (Zn)	17.0 mg/kg					
Boron (B)	2.18 mg/kg					

Trial Plots

SAMPLE NAME: AAN TRIAL SAMPLE 1

CROP: WINTER WHEAT

ANALYSIS	RESULT	INTERPRETATION				
		Deficient	Low	Normal	High	Excessive
Nitrogen (N) [N:S Ratio]	1.55 %					
Sulphur (S) [14.6:1]	0.106 %					
Phosphorus (P)	0.189 %					
Potassium (K)	1.91 %					
Calcium (Ca)	0.235 %					
Magnesium (Mg)	0.074 %					
Manganese (Mn)	65.9 mg/kg					
Iron (Fe)	56.1 mg/kg					
Copper (Cu)	3.66 mg/kg					
Zinc (Zn)	13.4 mg/kg					
Boron (B)	1.21 mg/kg					

AAN Trial through the growing season:

Tissue Samples taken 06/06/2022
Control

SAMPLE NAME:AAN TRIAL CNTL 1

CROP: WINTER WHEAT

ANALYSIS	RESULT	INTERPRETATION				
		Deficient	Low	Normal	High	Excessive
Nitrogen (N) [N:S Ratio]	1.70 %					
Sulphur (S) [11.3:1]	0.150 %					
Phosphorus (P)	0.176 %					
Potassium (K)	1.89 %					
Calcium (Ca)	0.326 %					
Magnesium (Mg)	0.097 %					
Manganese (Mn)	69.5 mg/kg					
Iron (Fe)	63.5 mg/kg					
Copper (Cu)	2.86 mg/kg					
Zinc (Zn)	11.0 mg/kg					
Boron (B)	4.79 mg/kg					

Trial Plots

SAMPLE NAME:AAN TRIAL 1

CROP: WINTER WHEAT

ANALYSIS	RESULT	INTERPRETATION				
		Deficient	Low	Normal	High	Excessive
Nitrogen (N) [N:S Ratio]	1.36 %					
Sulphur (S) [11.9:1]	0.114 %					
Phosphorus (P)	0.148 %					
Potassium (K)	1.43 %					
Calcium (Ca)	0.301 %					
Magnesium (Mg)	0.086 %					
Manganese (Mn)	67.3 mg/kg					
Iron (Fe)	44.2 mg/kg					
Copper (Cu)	3.05 mg/kg					
Zinc (Zn)	12.6 mg/kg					
Boron (B)	4.06 mg/kg					

AAN Trial Data Collection Continues:

- Grain Analysis at harvest
- Yield Maps
- Post harvest SMN sampling
- Over winter Porous Pots

Whitewool Farm Undersown Maize Trial



Project outline:

- Understand the benefits undersowing maize can bring to growers and the environment:
 - Nutrient retention
 - Soil structure
- Monitor the amount of nitrogen lost in bare maize stubble vs maize with a grass under story

Trial Layout:

The original plan was to have three replicates:

1. Maize Undersown with spring beans
2. Maize Undersown with Italian Rye Grass
3. Over wintered Maize Stubble
- 4.

Unfortunately, the spring beans failed, so the trial ended up as:

1. Maize Undersown with Italian Rye Grass
2. Over wintered Maize Stubble



Drilling Technique 2021:

The adapted drilling system and specialized tractor allowed inter row drilling with the minimum damage to the standing maize crop.

- The rye grass was drilled at a seed rate of **14kg/ha**, being planted at the 6-leaf stage.
- At this stage, the maize has received all its herbicides and fertiliser applications and is past the vulnerable competition stage.



SMN (Soil Mineral Nitrogen) Results:

Field Reference	Undersown (Y/N)	April 2021 SMN (kgN/ha)	October 2021 SMN (kgN/ha)	January 2022 SMN (kgN/ha)
Top Down 1 (Control)	N	25.2	129.1	67
Top Down 2	Y	55.2	90.1	76
Top Down 3	Y	39.5	98.3	86
Average		39.97	105.83	76.33

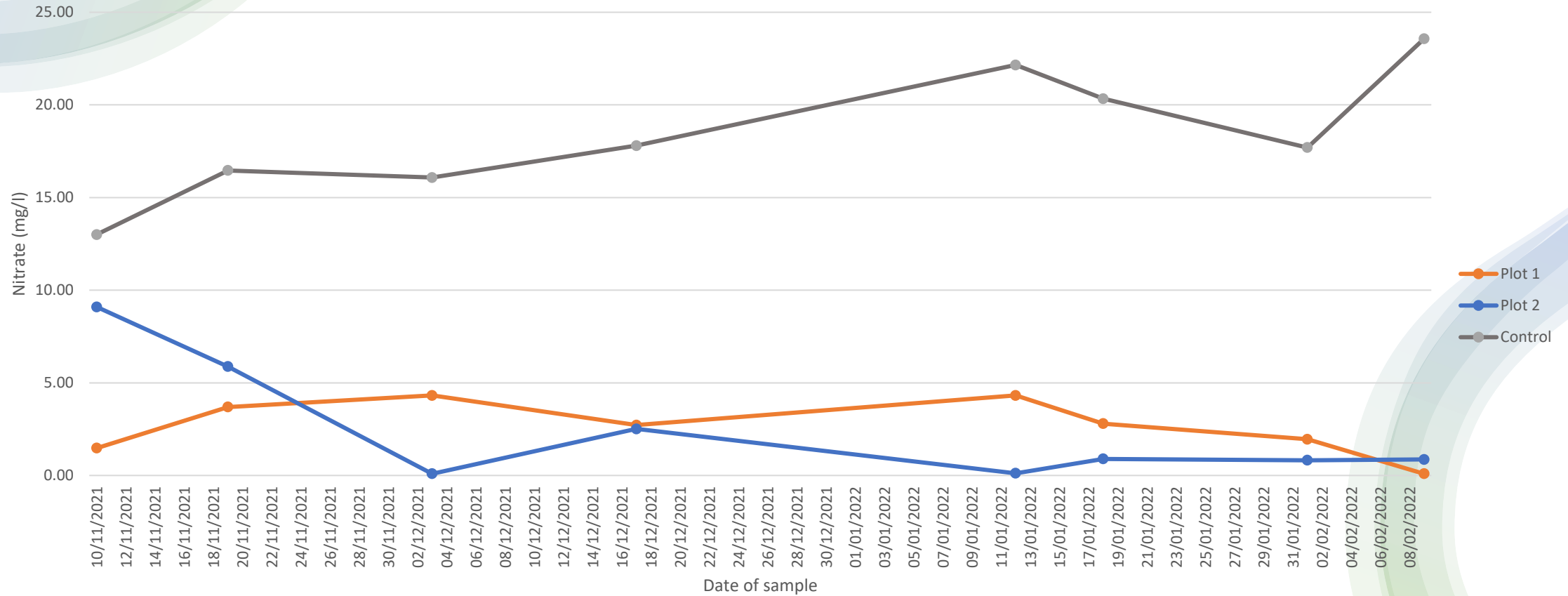
Soil Results (P, K, Mg, pH):

SOIL ANALYSIS REPORT

Laboratory Sample Reference	Field Details			Index			mg/l (Available)		
	No.	Name or O.S. Reference with Cropping Details	Soil pH	P	K	Mg	P	K	Mg
520986/21	1	TOP DOWN 1 <i>Into Forage Maize</i>	7.6	6	3	2	103.2	249	59
520987/21	2	TOP DOWN 2 <i>Into Forage Maize</i>	7.8	5	2+	2	84.6	222	56
520988/21	3	TOP DOWN 3 <i>Into Forage Maize</i>	7.8	5	2+	2	82.2	185	52

Porous Pot Results:

Whitewool Farm Undersown maize trial porous pot nitrate results



Conclusions from 2021 trial:

- Having maize Undersown with grass over winter reduced nitrated levels being recorded in the porous pots by 100%.
- Herbicide program was not effected. Problem weeds where still controlled.
- Provided useful sheep grazing over winter.
- Did remove a crop of Winter Wheat from the normal rotation.



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Any questions?