

Trial Title: Saxmundham Experiment Site

Centre: Saxmundham, Suffolk **Trial Code:** WW17-9513 **Variety:** Reflection

Objective: To measure benefits to crop and soil from the application of fertilisers and manures

Mentor theme: Long-term monitoring

Background: The Saxmundham Experimental site was started in 1899 and has been managed by various organisations since this time including Rothamsted Research; the site is currently supported through TMAF and the NIAB Morley Educational Training and Outreach (MENTOR) initiative. Despite falling out of service in recent years, through the intervention of TMAF, NIAB and local farmers, the long-term experimental work has been resurrected. The treatments are as described in Table 1 and going forward the rotation will be based ostensibly on combinable cropping rotations. The trial studies the effects of cumulative application of P and/or K fertilisers and farmyard manure (FYM) (and also an historic bone-meal based treatment). Each plot is approximately 40m x 5.5m with four blocks of ten treatments (with uneven treatment replication in each block). While there have been some specific changes since the experiment started, the principals of the trial have largely remained consistent for over 100 years.

Summary: This report outlines the findings of the MENTOR research examining the benefits to crop and soil from the application of fertilisers and manures. Presentation of all data in this report is as a mean of the treatments for which there are either one or two iterations per block. In 2016/17 the study was in winter wheat, however, a high number of winter barley volunteers were present across the trial. Despite this, through adapting data collection methods (e.g. hand harvesting) meaningful data was collected. Results show that the FYM treatment produced the highest spring GAI, fertile tiller counts and yield at maturity. In addition, plots that have received annual FYM showed an increased soil organic matter. However, this requires monitoring closely over the coming years as previous year's results has shown little difference between treatments.

Table 1. Treatments and rotational approach

Rotational approach	Dose	Comment / details
Untreated (Unt)	-	
Bone Meal (BM)	-	Not applied in recent seasons
Cattle farm yard manure (FYM)	25 t/ha	Dose dependant on composition analysis of amendment
P ₂ O ₅ (P)	75 kg/ha	
K ₂ O (K)	60 kg/ha	
P ₂ O ₅ + K ₂ O (PK)	75 kg/ha + 60 kg/ha	

	Historical	2014	2015	2016	2017
Crop	Various	1 st WW	2 nd WW	W Barley	1 st WW

- The crop was drilled with Winter Wheat (cv. Reflection) on 08/10/2016 at 170 kg/ha. With the exception of manures and all fertilisers containing P and/or K, all inputs were as farm standard. The percent of plot that was volunteer barley was assessed in May with the results presented in Figure 1. Across all treatments the trial was made up of 71 % winter wheat and 29% volunteer barley. The highest proportion of volunteers were found in the FYM, P and PK plots.

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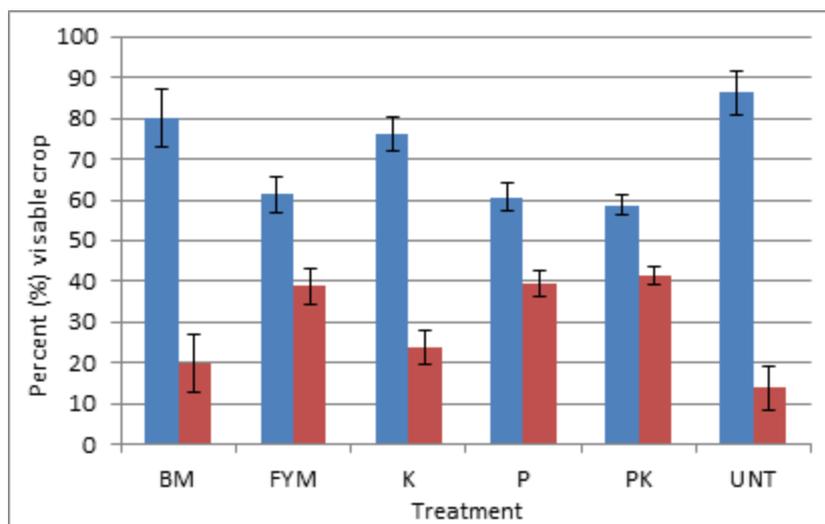
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- Whole plot Green Area Index (GAI) was visually assessed in May. The results in Figure 2 indicate FYM plots had the highest GAI scores (2.25) with the PK plots the second highest (1.91). The untreated displayed the smallest GAI (1.2) although those of the K and BM where also comparably low (<1.5).
- Soil nutrient summary results shown in Table 2 are from a bulked sample for each plot averaged by treatment. The nutrient values are largely as expected across the treatments following long-term application The 'untreated' plots resulted in: P; 5 mg/l (Index 0) and K; 119 mg/l (Index 1) compared to FYM plots with P; 26 mg/l (Index 3) and K; 224 mg/l (Index 2+).
- In previous years no marked difference in soil organic matter (SOM) between treatments has been reported, However, in 2017 SOM ranged from 3.6%-4.6%. The FYM was 0.8% higher than the untreated (the next highest). Suggesting the long term application of FYM increases SOM, however, this needs to be monitored over coming years to support this trend that has not previously been seen.
- Ear counts (Figure 3) counted on a 2 meter row length so barley volunteers could easily be discounted followed similar trends to previous years. The FYM resulted in 348 ears/m² significantly more than all other treatments. The Untreated resulted in the lowest with 256 ears/m².
- Due to such a high proportion of barley volunteers (29%, Figure 1) harvesting using a plot combine could have biased plots where higher numbers of volunteers were rcorde. Therefore, 4 x 2m row lengths per plot that had few barley volunteers where hand harvested. These samples where then bulked and over dried to provide a representative plot yield that could then be averaged by treatment. Crop yields (Figure 4), across the trial where relatively low (average 5.8 t/ha), likely a result of competition for resources from volunteer barley. Despite this, differences between treatment yields were pronounced. The untreated yielded 4.22 t/ha while the K (5.14 t/ha) PK (5.68 t/ha) and BM (5.53 t/ha) yielded slightly higher with the FYM (6.94 t/ha) and P (6.82 t/ha) yielding considerably higher.

Figure 1 Visual assessment of percent (%) winter wheat and percent (%) volunteer winter barley (Error bars are standard error of the mean)



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Figure 2 Visual assessments of percent (%) winter wheat and percent (%) volunteer winter barley (Error bars are standard error of the mean)

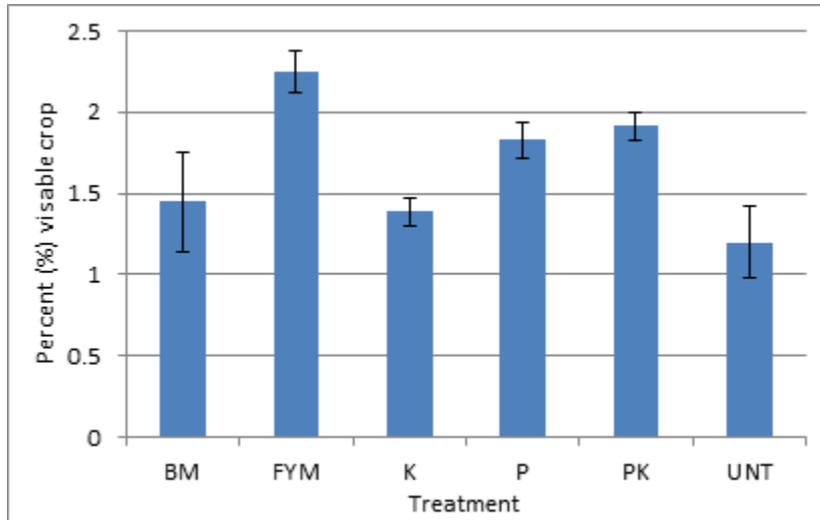
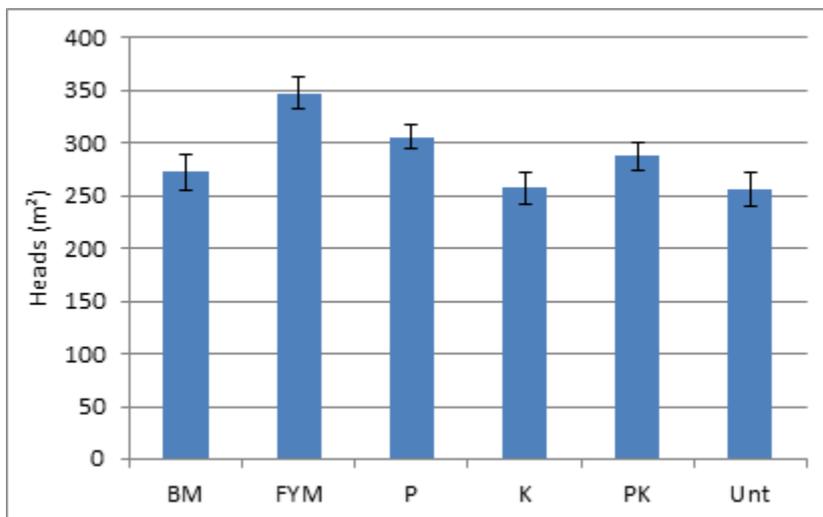


Table 2: Soil nutrient status; January 2017

Treatment	P mg/l (Available)	K mg/l (Available)	Mg mg/l (Available)	Soil pH	Soil OM (0-15cm)
FYM	26	224	93	7.9	4.6
BM	8	114	64	8.1	3.7
P	31	115	62	7.8	3.7
K	11	270	56	7.9	3.6
UNT	5	119	59	7.9	3.8
PK	38	242	59	7.8	3.7

Figure 3. Ear counts per m², July 2017 (Error bars are standard error of the mean)



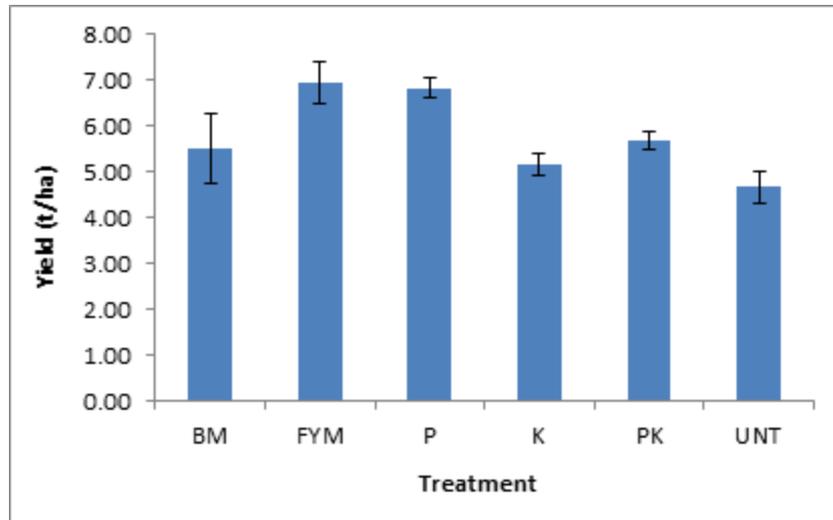
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Figure 4. Crop yield, harvested by hand from 2m row length (Error bars are standard error of the mean)



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Field details & overall applications to crop

Crop:	Winter Wheat
Trial ID:	WW17-9513
Location: Name and 6 fig grid ref	Saxmundham, Suffolk
Variety:	Reflection
Seed rate:	170 kg/ha
Soil type:	Beccles/Ragdale series, sandy clay loam
Previous crop:	Winter Barley
Drill date: dd/mm/yy	08/10/2016
Harvest date: dd/mm/yy	21/07/2017
Drilled plot size: m2	40.25 x 5.5 m ²
Harvested plot size: m2	4 X 2m row lengths (hand harvested)
Replicates:	X 4

Input type	Product	Product rate	Date
Herbicide	Atlantis	0.4 l/ha	16/03/17
PGR:	CCC	1.25 l/ha	31/3/17
	Moddus	0.1 l/ha	31/3/17
	Freeze	0.75 l/ha	14/04/17
	CCC	0.1 l/ha	14/04/17
Fungicide :	Cortez	0.3 l/ha	31/03/17
	Piper	1.0 l/ha	31/03/17
	Piper	1.0 l/ha	14/04/17
	Adexar	1.0 l/ha	14/04/17
	Librax	1.0 l/ha	18/05/17
	Bravo	1.0 l/ha	18/05/17
	Proline	0.4 l/ha	02/06/17
	Toledo	0.4 l/ha	02/06/17
	Bravo	0.8 l/ha	02/06/17
	Comet	0.4 l/ha	02/06/17
Adjuvant:	Biopower	1.0 l/ha	16/03/17
Fertilizer:	Double Top (27% N; 35% SO ₃)	54 kg/ha	13/03/17
	Nitram (34.5% AN)	35 kg/ha	30/03/17
	Nitram (34.5% AN)	52 kg/ha	10/04/17
	Urea (46% N)	46 kg/ha	20/04/17
	Urea (46% N)	46 kg/ha	16/05/17

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