CONTRACT DEVELOPMENT TRIALS 2010: NRS 1 & 2

FOR BOLAND ORGANIC SOLUTIONS

THE EFFECT OF FYTALI

FOLIAR SPRAY

ON THE YIELD AND QUALITY OF

WHEAT AND BARLEY

IN THE CALEDON DISTRICT OF THE WESTERN CAPE

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ABSTRACT

Two field trials were done in the Overberg Region of the Western Cape to evaluate the effect of Fytali foliar spray on the yield and quality of Wheat and Barley. The trials were done on the farms Chavonnes and Uitkyk in the Caledon district.

Fytali was applied at various application rates and two application dates or two growth stages of the wheat and barley and compared with a standard foliar spray and control (no foliar application) treatments. The two trials were harvested and the wheat and barley samples were weighed and graded to determine the quality. At the wheat trial the Fytali foliar spray showed statistically

significant differences in yield where Fytali was applied when compared to the untreated experimental plots.

The barley trial results were negatively influenced by the low rainfall and insect damage in the field an no conclusion could be made from the yield datat.

KEY WORDS

WHEAT (CULTIVAR SST 88), BARLEY (CULTIVAR SST 564) FOLIAR APPLICATIONS PRODUCT FYTALI. YIELD KG/HA, PROTEIN CONTENT, HECTOLITER MASS, % NITROGEN, % PLUMP KERNEL AND % SCREENINGS.

SUMMARY

TRIAL NR:BOLAND ORGANIC SOLUTIONS 2010/11 TRIALS 1 & 2

TITLE: THE EFFECT OF FYTALI ON WHEAT AND BARLEY YIELD AND QUALITY

OBJECTIVE: To establish the effect of Fytali foliar spray on yield and quality, in comparison to a standard foliar spray and untreated control

DESIGN: Randomized block design with 6 replicates
Plots 2,0 m width and 10,0 m length.

CULTIVARS: Wheat (SST 88), Barley SST 564

LOCATIONS: CHAVONNES FARM AND UITKYK FARMS CALEDON DISTRICT

APPLICATION: Foliar applications

STAGE: First application: 3/5 leaf stage
Second application 7/8 leaf stage

SPRAYING EQUIPMENT: **First application:** The plots were sprayed with an experimental sprayer (T jets Yellow Tecnoma 4 nozzle boom (2 meter width) with pressure regulator and pressure gauge). Pressure 1.5 Bar. Water application rate 210 liter/ha.

Second application: Metabi knapsack with pressure regulator set at 2.0 Bar. Water application rate 200 liter/ha.

ASSESSMENT: Effect on growth and phyto-toxicity 14, 28 and 60 Days after application.

Yield response of various treatments

Effect on quality of various treatments

HARVESTING: The trial plots were cut (10 meter length) with a BCS cutter-bar mower (1 meter width blade). Ten m 2 per plot was harvested.

The material was threshed with a Winter Steiger Experimental Harvester/Thresher. The threshed samples were weighed with an electronic scale (1 gram interval) and gram mass per plot could be directly converted to kg/ha.

STATISTICAL ANALYSES: The MSTAT program (ANOVA 2 WAY) was used for the statistical analysis of the yield data and quality of the wheat and barley samples.

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REPORT

1.0 THE EFFECT OF FYTALI ON THE YIELD AND QUALITY OF WHEAT AND BARLEY

1.1 INTRODUCTION

The objectives of the two trials were to determine the effect of Fytali foliar application on the yield and quality of wheat and barley and to compare to a standard foliar spray.

The two trials were planted on two farms Chavonnes and Uitkyk in the Caledon district. In Table 1 a summary of trial application rates and application dates is shown.

TABLE 1: TRIAL APPLICATION DATES AND RATES

TRIAL NR/FARM: ACTIVITY:	TRIAL CHAVONNES	TRIAL UITKYK
CROP:	WHEAT	BARLEY
CULTIVAR:	SST 88	SSG 564
PLANTING DATE:	11 MAY 2010	18 MAY 2010
SEEDING RATE:	120 KG/HA	90 KG/HA
FYTALI FOLIAR APPLICATIONS:		
1 ST APPLICATION DATE:	5/7/2010	5/7/2010
2 ND APPLICATION DATE:	14/8/2010	14/8/2010
HARVESTING DATE:	9/11/2010	10/11/2010

1.2 TREATMENTS

The two trials consisted each of 7 Treatments and 6 Replications (randomized block design) as shown in Tables 2 and 3 (p. 2).

TABLE 2: TRIAL 1 - WHEAT TRIAL - FARM CHAVONNES - TREATMENTS

1. **FYTALI 1 000 ml/Ha - Two applications 3/5 leaf stage and 7/8 leaf stage**
2. **FYTALI 2 000 ml/ha - Two applications 3/5 leaf stage and 7/8 leaf stage**
3. **FYTALI 2 000 ml/ha - One application 3/5 leaf stage**
4. **FYTALI 4 000 ml/ha - Two applications 3/5 leaf stage and 7/8 leaf stage**
5. **FYTALI 2 000 ml/ha - One application 7/8 leaf stage**
6. **CONTROL NO TREATMENT:**
7. **STANDARD FOLIAR SPRAY - Two applications 3/5 leaf stage and 7/8 leaf stage 2 000 ml/ha**

TABLE 3: TRIAL 2 - BARLEY TRIAL - FARM UITKYK - TREATMENTS

1. **FYTALI 1 000 ml/Ha - Two applications 3/5 leaf stage and 7/8 leaf stage**

2. **FYTALI 2 000 ml/ha - Two applications 3/5 leaf stage and 7/8 leaf stage**

3. **FYTALI 2 000 ml/ha - One application 3/5 leaf stage**

4. **FYTALI 2 000 ml/ha + Chlorsulfuron 17.5 gram/ha - One application 3/5 leaf stage**

5. **CONTROL NO TREATMENT**

6. **CONTROL NO TREATMENT + Chlorsulfuron 17.5 gram/ha - first application:**

7. **STANDARD FOLIAR SPRAY - Two applications 3/5 leaf stage and 7/8 leaf stage 2 000 ml/ha**

2.0 DISCUSSION TRIAL RESULTS AND STATISTICAL ANALYSIS

2.1 Wheat Yield

The results of the various treatments are shown in Tables 4 (a) and 4 (b) p.3.

TABLE 4 (a) : SUMMARY OF TRIAL RESULTS - YIELDS (KG/HA)

TRIAL 1: WHEAT TRIAL FARM: CHAVONNES FARM

TREATMENTS	YIELDS (KG/HA)
1. FYTALI 2 x 1 000 ml/ha - two applications	1 773.83
2. FYTALI 2 x 2 000 ml/ha - two applications	**1 835.83**
3. FYTALI 1 x 2 000 ml/ha - first application	1 794.83
4. FYTALI 2 X 4 000 ml/ha - two applications	1 737.33
5. FYTALI 1 X 2 000 ml/ha - second application	**2 006.00**
6. STANDARD PRODUCT 2 X 2 l/ha - two applications	**1 928.30**
7. CONTROL: NO TREATMENT	**1 544.50**

LSD (0.05) = 300.8 Kg/ha **LSD (0.10) = 250.7 Kg/ha**
COEFFICIENT OF VARIATION % (CV %) = 14.3%

SUMMARY - STATISTICAL ANALYSIS TREATMENTS	LEVEL OF SIGNIFICANCE (0.05)	(0.10)
1. FYTALI 2 x 1 000 ml/ha - two applications	ab	abc
2. FYTALI 2 x 2 000 ml/ha - two applications	**ab**	**ab**
3. FYTALI 1 x 2 000 ml/ha - first application	ab	abc
4. FYTALI 2 X 4 000 ml/ha - two applications	ab	bc
5. FYTALI 1 X 2 000 ml/ha - second application	**a**	**a**
6. STANDARD PRODUCT 2 X 2 l/ha	**a**	**ab**
7. CONTROL: NO TREATMENT	**b**	**c**

Same letters indicate that there is no statistical difference between treatments.

TRIAL 1: WHEAT TRIAL FARM: CHAVONNES FARM TREATMENTS	**PERCENTAGE INCREASE** IN YIELD ABOVE **CONTROL**
1. FYTALI 2 x 1 000 ml/ha - two applications	+ 14.85%
2. FYTALI 2 x 2 000 ml/ha - two applications	**+ 18.86%**
3. FYTALI 1 x 2 000 ml/ha - first application	+ 16.20%
4. FYTALI 2 X 4 000 ml/ha - two applications	+ 12.48%
5. FYTALI 1 X 2 000 ml/ha - second application	**+ 29.88%**
6. STANDARD PRODUCT 2 X 2 l/ha - two applications	**+ 24.84%**
7. CONTROL: NO TREATMENT	**00.00%**

The Fytali treatment showed a significant increase (at the 0.05 level) especially where the Fytali was applied at 2 000 ml/ha during the second application (Treatment 5). At the 0.10 level, the two Fytali applications each at 2 000 ml/ha (Treatment 2) also showed a significant yield increase as shown in Table 4 (a) above.

2.2 Wheat Quality

The trial results did not show any statistically significant difference in quality (hectoliter mass) between the various treatments (see Table 4 (b). The Fytali applied at 2 000 ml/ha at the second application date showed a hectoliter mass of 1.17 more than the control or untreated plots.

TABLE 4 (b) SUMMARY OF TRIAL RESULTS - QUALITY HECTOLITER MASS

TRIAL 1: WHEAT TRIAL FARM: CHAVONNES FARM TREATMENTS	**HECTOLITER MASS**
1. FYTALI 2 x 1 000 ml/ha - two applications	73.16
2. FYTALI 2 x 2 000 ml/ha - two applications	**73.33**
3. FYTALI 1 x 2 000 ml/ha - first application	72.92
4. FYTALI 2 X 4 000 ml/ha - two applications	72.33
5. FYTALI 1 X 2 000 ml/ha - second application	**73.67**
6. STANDARD PRODUCT 2 X 2 l/ha	**73.25**
7. CONTROL: NO TREATMENT	**72.50**

LSD (0.05) = 2.286 HLM **CV % = 2.66 %**

SUMMARY - STATISTICAL ANALYSIS TREATMENTS	LEVEL OF SIGNIFICANCE (0.05)
1. FYTALI 2 x 1 000 ml/ha - two applications	a
2. FYTALI 2 x 2 000 ml/ha - two applications	**a**
3. FYTALI 1 x 2 000 ml/ha first application	a
4. FYTALI 2 X 4 000 ml/ha	a
5. FYTALI 1 X 2 000 ml/ha second application	**a**
6. STANDARD PRODUCT 2 X 2 l/ha	**a**
7. CONTROL: NO TREATMENT	**a**

Same letters indicate that there is no statistical difference between treatments.

In Table 4 (c) the protein content of the various treatments are shown.

TABLE 4 (c) SUMMARY OF TRIAL RESULTS - PROTEIN CONTENT (%)

TRIAL 1: WHEAT TRIAL FARM: CHAVONNES FARM TREATMENTS	**PROTEIN CONTENT (%)**
1. FYTALI 2 x 1 000 ml/ha - two applications	14.282
2. FYTALI 2 x 2 000 ml/ha - two applications	**14.162**
3. FYTALI 1 x 2 000 ml/ha - first application	14.157
4. FYTALI 2 X 4 000 ml/ha - two applications	14.152
5. FYTALI 1 X 2 000 ml/ha - second application	**13.915**
6. STANDARD PRODUCT 2 X 2 l/ha	**14.073**
7. CONTROL: NO TREATMENT	**14.368**

LSD (0.05) = .304 Not significant CV % = 1.82 Under 20% is acceptable.

SUMMARY - STATISTICAL ANALYSIS TREATMENTS	LEVEL OF SIGNIFICANCE (0.05)
1. FYTALI 2 x 1 000 ml/ha - two applications	a
2. FYTALI 2 x 2 000 ml/ha - two applications	**a**
3. FYTALI 1 x 2 000 ml/ha first application	a
4. FYTALI 2 X 4 000 ml/ha	a
5. FYTALI 1 X 2 000 ml/ha second application	**a**
6. STANDARD PRODUCT 2 X 2 l/ha	**a**
7. CONTROL: NO TREATMENT	**a**

Same letters indicate that there is no statistical difference between treatments.

2.3 Barley Yields

The barley yield results of the various treatments are shown in Table 5(a) below.

TABLE 5 (a): SUMMARY OF TRIAL RESULTS - YIELDS (KG/HA)

TRIAL 2: **BARLEY TRIAL** FARM: UITKYK **TREATMENTS**	**YIELDS (KG/HA)**
1. FYTALI 2 x 1 000 ml/ha - two applications	1 318.67
2. FYTALI 2 x 2 000 ml/ha - two applications	1 310.00
3. FYTALI 1 x 2 000 ml/ha - first application	**1 461.00**
4. FYTALI 1 X 2 000 ml/ha + Chlorsulfuron 17.5 gram/ha - first application	1 299.17
5. CONTROL: NO TREATMENT	**1 474.60**
6. CONTROL + Chlorsulfuron 17.5 gram/ha - first application	**1 184.83**
7. STANDARD PRODUCT 2 X 2 l/ha	**1 281.16**

LSD (0.05) = 343.33 Kg/ha CV % = 22.42 %

SUMMARY - STATISTICAL ANALYSIS **TREATMENTS**	LEVEL OF SIGNIFICANCE (0.05)
1. FYTALI 2 x 1 000 ml/ha - two applications	a
2. FYTALI 2 x 2 000 ml/ha - two applications	a
3. FYTALI 1 x 2 000 ml/ha - first application	**a**

4. FYTALI 1 X 2 000 ml/ha + Chlorsulfuron 17.5 gram/ha - first application	a
5. CONTROL - NO TREATMENT	**a**
6. CONTROL + Chlorsulfuron 17.5 gram/ha - first application	**a**
7. STANDARD PRODUCT 2 X 2 l/ha	**a**

Same letters indicate that there is no statistical difference between treatments.

The coefficient of variation %(CV %) for the barley yield in this trial was 22.42 % which is unacceptably high. These results were influenced by the low rainfall and insect damage resulting in uneven growth in the specific field. A yield of more than 2 000 kg/ha is required to cover input costs. The Least significant difference (LSD) at the 0.05 level also shows that there is no significant difference between any of the treatments.

No conclusions can therefore be made with regards to the different treatments made, or the results obtained in the trials.

2.4 Barley Quality

In Table 5 (b) the results of the various treatments on quality of the barley is summarized.

TABLE 5 (b): SUMMARY OF TRIAL RESULTS - QUALITY: PLUMP KERNEL %

TRIAL 2: BARLEY TRIAL FARM: UITKYK TREATMENTS	**PLUMP KERNEL %** > 2.5 mm
1. FYTALI 2 x 1 000 ml/ha - two applications	95.50
2. FYTALI 2 x 2 000 ml/ha - two applications	96.33
3. FYTALI 1 x 2 000 ml/ha - first application	**96.33**
4. FYTALI 1 X 2 000 ml/ha + Chlorsulfuron 17.5 gram/ha - first application	96.17
5. CONTROL: NO TREATMENT	**96.83**
6. CONTROL + Chlorsulfuron 17.5 gram/ha - first application	**96.33**
7. STANDARD PRODUCT 2 X 2 l/ha	**96.33**

LSD (0.05) = 1.056 % **CV (%) = 0.93 %**

SUMMARY - STATISTICAL ANALYSIS TREATMENTS	LEVEL OF SIGNIFICANCE (0.05)
1. FYTALI 2 x 1 000 ml/ha - two applications	a
2. FYTALI 2 x 2 000 ml/ha - two applications	a
3. FYTALI 1 x 2 000 ml/ha - first application	**a**
4. FYTALI 1 X 2 000 ml/ha + Chlorsulfuron 17.5 gram/ha - first application	a
5. CONTROL - NO TREATMENT	**a**
6. CONTROL + Chlorsulfuron 17.5 gram/ha - first application	**a**
7. STANDARD PRODUCT 2 X 2 l/ha	**a**

*Same letters indicate that there is no statistical difference between treatments.*As the yield (kg/ha) results are not significant, the differences in plump kernel % would therefore also not be of any significance. An increase in plump kernel % result in a higher yield/h

TABLE 5 (c): SUMMARY OF TRIAL RESULTS - QUALITY: SCREENINGS %

TRIAL 2: BARLEY TRIAL FARM: UITKYK TREATMENTS	**SCREENINGS % < 2.2 mm**
1. FYTALI 2 x 1 000 ml/ha - two applications	2.167
2. FYTALI 2 x 2 000 ml/ha - two applications	1.833
3. FYTALI 1 x 2 000 ml/ha - first application	**1.667**
4. FYTALI 1 X 2 000 ml/ha + Chlorsulfuron 17.5 gram/ha - first application	2.667
5. CONTROL: NO TREATMENT	**2.333**
6. CONTROL + Chlorsulfuron 17.5 gram/ha - first application	**2.000**
7. STANDARD PRODUCT 2 X 2 l/ha	**2.167**

LSD (0.05) = 0.554 % **CV(%) = 22.42 %**

SUMMARY - STATISTICAL ANALYSIS TREATMENTS	LEVEL OF SIGNIFICANCE (0.05)
1. FYTALI 2 x 1 000 ml/ha - two applications	a
2. FYTALI 2 x 2 000 ml/ha - two applications	a
3. FYTALI 1 x 2 000 ml/ha - first application	**a**
4. FYTALI 1 X 2 000 ml/ha + Chlorsulfuron 17.5 gram/ha - first application	a
5. CONTROL - NO TREATMENT	**a**
6. CONTROL + Chlorsulfuron 17.5 gram/ha - first application	**a**
7. STANDARD PRODUCT 2 X 2 l/ha	**a**

Same letters indicate that there is no statistical difference between treatments.

The CV % of 22.42 % is also too high to draw any conclusion with regards to the effect of any of the treatments.

In Table 5(d) the nitrogen (N) content of the various treatments are shown.

TABLE 5 (d): SUMMARY OF TRIAL RESULTS - QUALITY: NITROGEN %

TRIAL 2: BARLEY TRIAL FARM: UITKYK TREATMENTS	**NITROGEN (%)**
1. FYTALI 2 x 1 000 ml/ha - two applications	1.743
2. FYTALI 2 x 2 000 ml/ha - two applications	1.722
3. FYTALI 1 x 2 000 ml/ha - first application	**1.710**
4. FYTALI 1 X 2 000 ml/ha + Chlorsulfuron 17.5 gram/ha - first application	1.723
5. CONTROL: NO TREATMENT	**1.722**
6. CONTROL + Chlorsulfuron 17.5 gram/ha - first application	**1.732**
7. STANDARD PRODUCT 2 X 2 l/ha	**1.752**

LSD (0.05) = 0.065 KV% - 3.19 9 (Under 20% acceptable)

SUMMARY - STATISTICAL ANALYSIS TREATMENTS	LEVEL OF SIGNIFICANCE (0.05)
1. FYTALI 2 x 1 000 ml/ha - two applications	a

2. FYTALI 2 x 2 000 ml/ha - two applications	a
3. FYTALI 1 x 2 000 ml/ha - first application	**a**
4. FYTALI 1 X 2 000 ml/ha + Chlorsulfuron 17.5 gram/ha - first application	a
5. CONTROL - NO TREATMENT	**a**
6. CONTROL + Chlorsulfuron 17.5 gram/ha - first application	**a**
7. STANDARD PRODUCT 2 X 2 l/ha	**a**

Same letters indicate that there is no statistical difference between treatments.

3.0 SUMMARY: RECOMMENDATIONS AND CONCLUSION

At the wheat trial the Fytali treatments had a significant effect on the yield as compared to the control or untreated plots.

From the barley trial no conclusions can be made with regards to the treatments as a result of the climatic conditions and insect damage in the trial. The yield difference between the control with and without Chlorsulfuron as compared to the Fytali is something that may justify further investigation. The possibility does exist that a product like Fytali may reduce the phyto-toxcity of Chlorsulfuron herbicide especially under severe moisture stress conditions.