SMART Farm Fungicide Trial
Limbe Leaf

2022-2023
Malawi

The fungicide product trial comprises 7 treatment of Defender 250 EC (fungicide) in a single, double, or triple application combination. Rizoliq (inoculum), was used in all treatments. The "Tikolore" seed variety (SeedCo) was planted in 3x5 m plots with a 5cm seed spacing. Each plot contained 4 rows with a 75cm row spacing.

OVERVIEW

7 Randomized Treatment Groups

3 Fungicide Applications

4 Replications

Kasungo
-12.96, 33.68
1391 m.a.s.l.

Weather Conditions

	Minimum Temp. (°C)	Maximum Temp. (°C)	Rainfall (mm)
November	19.4	30.2	1.5
December	18.3	25.9	137.9
January	17.0	23.5	209.0
February	17.6	23.9	100.4
March	17.4	23.3	52.8
April	16.2	23.8	14.7
May	14.0	25.2	0

= left to right: Minimum and Maximum Average Temperature

BACKGROUND: PRODUCTS

Product				*Application*	
Product Type	Source	ID	Name	Growth Stage	Total Amount Used
Fungicide	Arysta Life-Science	De1	**Defender (1st Application)**	R1	1.5 ml/180 ml
		De3	**Defender (2nd Application)**	R3	2.0 ml/240 ml
		De5	**Defender (3rd Application)**	R5	1.5 ml/180 ml
Seed	SeedCo		**Tikolore***	-	3,360 seeds
Inoculant	Rizobacter		**Rizoliq***	-	1.4 ml

** = No product ID necessary due to the same seed application amount for all treatment groups. The inoculant treated all seeds prior to planting.*

BACKGROUND: TREATMENTS

Product Amount Per Treatment (TRT) Group						
1	**2**	**3**	**4**	**5**	**6**	**7**
-	0.5	-	-	0.5	-	0.5
-	-	0.5	-	0.5	0.5	0.5
-	-	-	0.5	-	0.5	0.5
480	480	480	480	480	480	480
0.2	0.2	0.2	0.2	0.2	0.2	0.2
Control	**De1**	**De3**	**De5**	**De1+De2**	**De2+De3**	**De1+De3+ De5**

TRIAL CALENDAR

Germination Test / Rate
7-Dec-22 / 95.0%

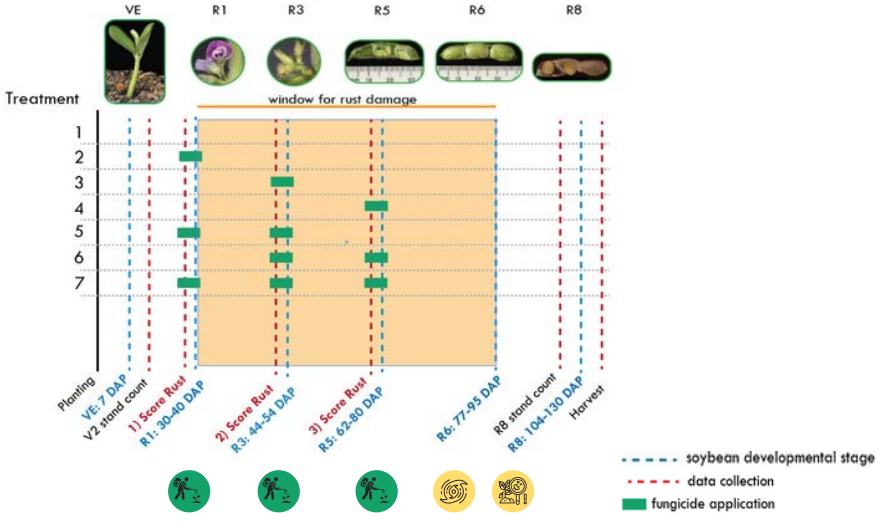
Planting Date:
21-Dec-22

Fungicide Application Dates:
1st 26-Jan-23
2nd 8-Feb-23
3rd 7-Mar-23

Cyclone Freddy

Rust first observed approximately: 15-Mar-23

Harvest Date:
12-Apr-23



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Interested to learn more? Let us know!

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Soybean Innovation Lab
Feed the Future Innovation Lab for Soybean Value Chain Research

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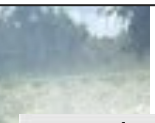
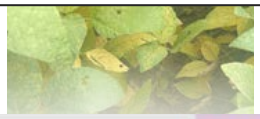
COST ASSUMPTIONS

Item	$USD
Input Costs per Hectare	
Defender (1 Application)	8.40
Defender (2 Applications)	16.80
Defender (3 Applications)	24.80
Rizoliq	7.80
Tikolore	270.00
Labor Costs	
Land preparation, planting, harvesting, bagging, etc.	221.21
Soybean Selling Price	
Grain Price ($USD/kg of seed)	0.48
Grain Price ($USD/MT of seed)	480.00

DISCUSSION

Key Takeaways

1. Planting early allowed the plants to establish before Cyclone Freddy. With the establishment of the crop, the plants are more able to defend against rust.
2. Soybean rust was first observed during the third week of March, after all fungicide applications were completed. Soybean rust damages soybean plants most between the R1 and R5 developmental stages when flowers, pods, and seeds are still growing.
3. Due to rust pressure later in soybean development, grain yields in treatments without fungicide application were still above 3.0 MT/ha.
4. The treatment group De1+De2 performed the highest in terms of yield (3.88 MT/ha) and gross margin (USD $1,346.21) output.

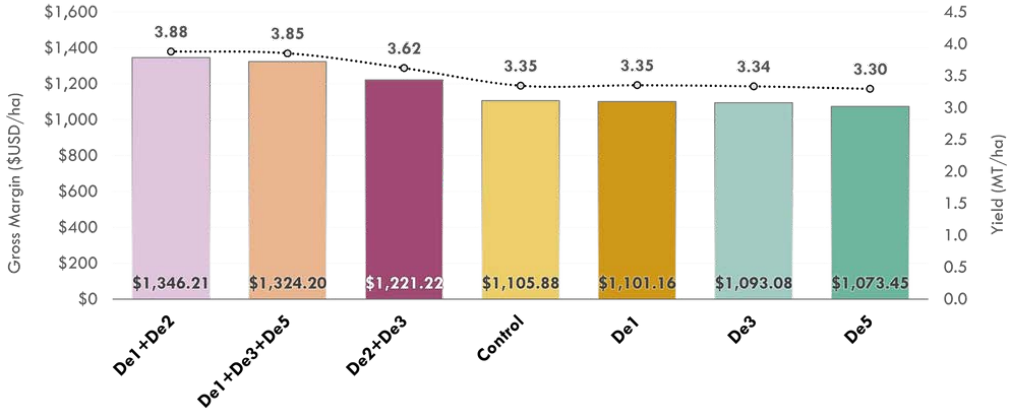



RESULTS

Agronomic Results	De1+De2	De1+De3+De5	De2+De3	De1	Control	De3	De5	AVG	LSD	P-Value	CV %
Rank Yield	1	2	3	4	5	6	7				
Yield (MT/ha)	3.88	3.85	3.62	3.35	3.35	3.34	3.30	3.53	0.56	0.18	7.26
V2 Stand Count (cm)	153.50	156.50	168.50	171.25	169.25	167.75	168.50	165.04	19.76	0.44	4.24
Rust Score: 1st Fungicide Application (1-5)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.00	0.00	-	0.00
Rust Score: 2nd Fungicide Application (1-5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.00	0.00	-	0.00
Rust Score: 3rd Fungicide Application (1-5)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.00	0.00	-	0.00
R8 Stand Count (cm)	135.00	130.25	135.50	152.75	149.75	161.75	150.75	145.11	27.01	0.23	7.98
Seed Moisture (%)	12.5	14.3	12.7	13.3	14.1	13.6	13.1	13.35	2.68	0.78	5.14




Cross Anaylsis: Gross Margin & Yield



LIMITATIONS

Termites were present in January, and were under control in mid-February.

In March of 2023, after the last scheduled rust scoring, the longest-lasting cyclone - Cyclone Freddy- struck Malawi. The stressful weather conditions may have impacted the crops health and contributed to the transmission of soybean rust.

CONCLUSION

Treatment group De1+De2 had the highest average yield and gross margin at 3.88 MT/ha and $1,346 USD/ha, respectively. Despite soybean rust occurring later in soybean development, after the stage when soybean yields are most vulnerable to the disease, treatments with two or more applications of fungicide generated the highest yields in the trial. This suggests that fungicide applications help protect soybean plants from other lesser fungal infections, generating average yield and gross margin increases of 0.43MT/ha and $190 USD/ha, respectively, compared to the control. At the cost of $8.40 USD per application (not including application labor), fungicides can be a cost-effective way to maintain soybean yields even when rust is not present.

Interested to learn more? Let us know!

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