

SOIL COVER – WHY I’M A CONVERT

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INTRODUCTION

- Findings to be discussed today have their origins in a soil-borne disease investigation funded by the Maize Trust, KZN Agriculture and Omnia Fertilizer
- Involved personnel with skills in plant pathology, nematology, microbiology, soil science and agronomy.



The A - team

- Treatments bring compared to a maize-wheat no-till system include:
 - Alternative winter rotations (canola, crambe, black oat, stouling rye, maize fallow and bare fallow).
 - Biocontrol agents
 - Chemical biocides (methyl bromide & anhydrous ammonia)
 - Tillage
 - Extra cover – **a late starter**



Winter phase of trial at Winterton



Applying anhydrous ammonia



Wheat emerging



Planting maize

Maize through
wheat



Maize through
rye & oats



**Why has extra cover been called
“a late starter”?**



Soya – fallow – maize (back) vs Soya – wheat – maize (front)



Applied extra cover



Bare fallow

Today's discussion will include

- Effects of extra cover on maize grain yield
- Effects on topsoil moisture content
- Effects on earthworm numbers and infiltration rates



Catching earthworms

**Perhaps some issues might be
relevant to your industry?**

Table 1. Cover effects on Maize grain yield over five seasons

TREATMENT	SEASON				
	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
	-----kg/ha-----				
Anhydrous minus straw	14880	17390	13120	15450	15780
Anhydrous plus straw	-	17890	13980	15650	14990
Bare fallow	-	-	11340	12450	13400
Maize fallow minus straw	12270	15150	11650	12637	12610
Maize fallow plus straw	-	14820	12730	14112	13030
Methyl bromide minus straw	12540	16110	11810	13129	14680
Methyl bromide plus straw	-	17180	13270	14640	15440
Tilled minus straw	12900	16200	11710	12783	13490
Tilled plus straw	-	16580	13190	14215	13900
Wheat-maize	13820	14370	13470	14066	12240
Soya-fallow-maize	12390	-	-	-	-
Soya-wheat-maize	13430	-	-	-	-
LSD (0.05)	671	928	1084	802	1182
Rainfall (mm)	670	792	667	604	940

Table 2. Topsoil (0-60mm) moisture content as affected by cover at three stages during the 2009/2010 season

TREATMENT	DAYS AFTER PLANTING		
	28	73	135
	-----% Moisture-----		
Anhydrous minus straw	7.5	6.0	14.3
Anhydrous plus straw	15.2	12.6	20.7
Bare fallow	12.9	11.5	15.0
Maize fallow minus straw	18.6	9.9	18.7
Maize fallow plus straw	23.4	16.6	26.0
Methyl bromide minus straw	5.6	5.8	12.9
Methyl bromide plus straw	11.8	12.7	17.3
Tilled minus straw	4.8	5.5	9.6
Tilled plus straw	9.6	12.8	19.7
Wheat-maize	20.6	15.4	24.6
LSD (0.05)	3.8	3.6	4.6

Table 3. Earthworm counts and infiltration rates 135 DAP in 2009/2010 and averaged over three assessments in 2010/2011

TREATMENT	2009/2010		2010/2011	
	WORMS (No./m ²)	INFILTRATION (Min./20L)	WORMS (No./m ²)	INFILTRATION (Min./20L)
Anhydrous minus straw	7	5.1	36	5.4
Anhydrous plus straw	14	1.8	60	2.8
Bare fallow	0	33.4	3	236
Maize fallow minus straw	17	18.5	25	60
Maize fallow plus straw	43	6.0	68	39.3
Methyl bromide minus straw	3	10.5	19	31.5
Methyl bromide plus straw	19	5.6	44	5
Tilled minus straw	9	5.5	15	9.2
Tilled plus straw	12	1.8	41	5.2
Wheat-maize	45	4.6	59	12.9
LSD (0.05)	19	6.3	23	34

So, what are we seeing?

- Marked benefits of extra cover on plant growth in average seasons and improved moisture availability and porosity in almost all seasons
- Clearly, 30-40% cover considered necessary for erosion control not nearly optimal
- Earthworm populations appear to play a pivotal role

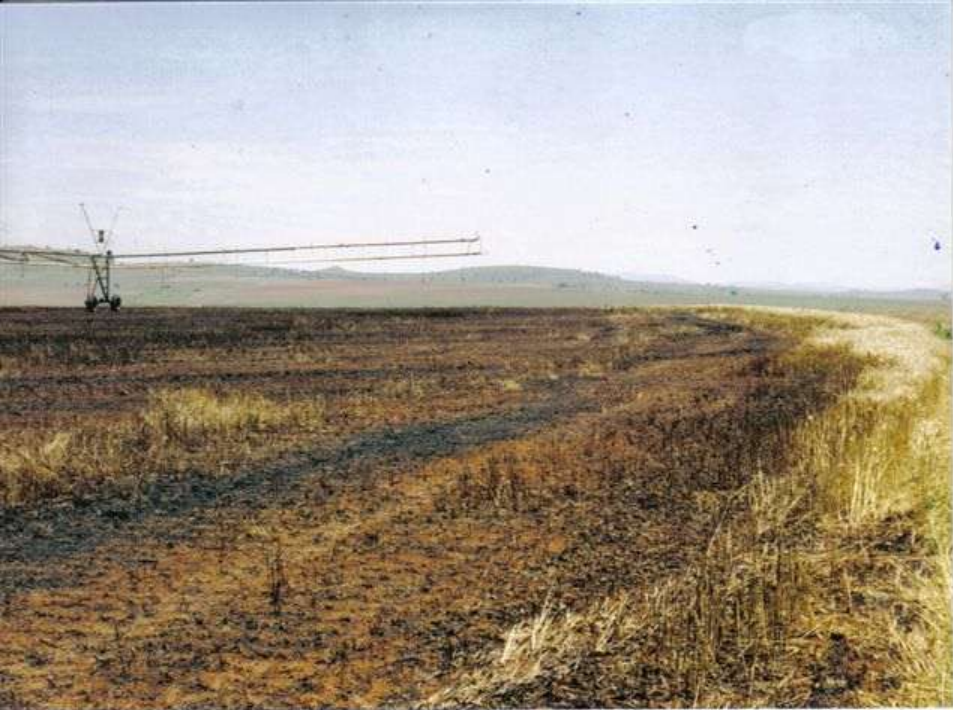
Now, some visual evidence

Bare fallow vs cover



**Can we afford to throw the baby
out with the bath water?**

“The red dog”




Cover wasted



Cover being eaten





3.1 t/ha
52 min/20L

9.4 t/ha
11 min/20L

Winter fire effect on Summer maize

Conclusions

- In annual cropping systems 30-40% cover is not nearly optimal
- Even 10t/ha of stover is not enough
- Perhaps this also has relevance in your industry?
- Chris Garnett's experience suggests to me that it has!!