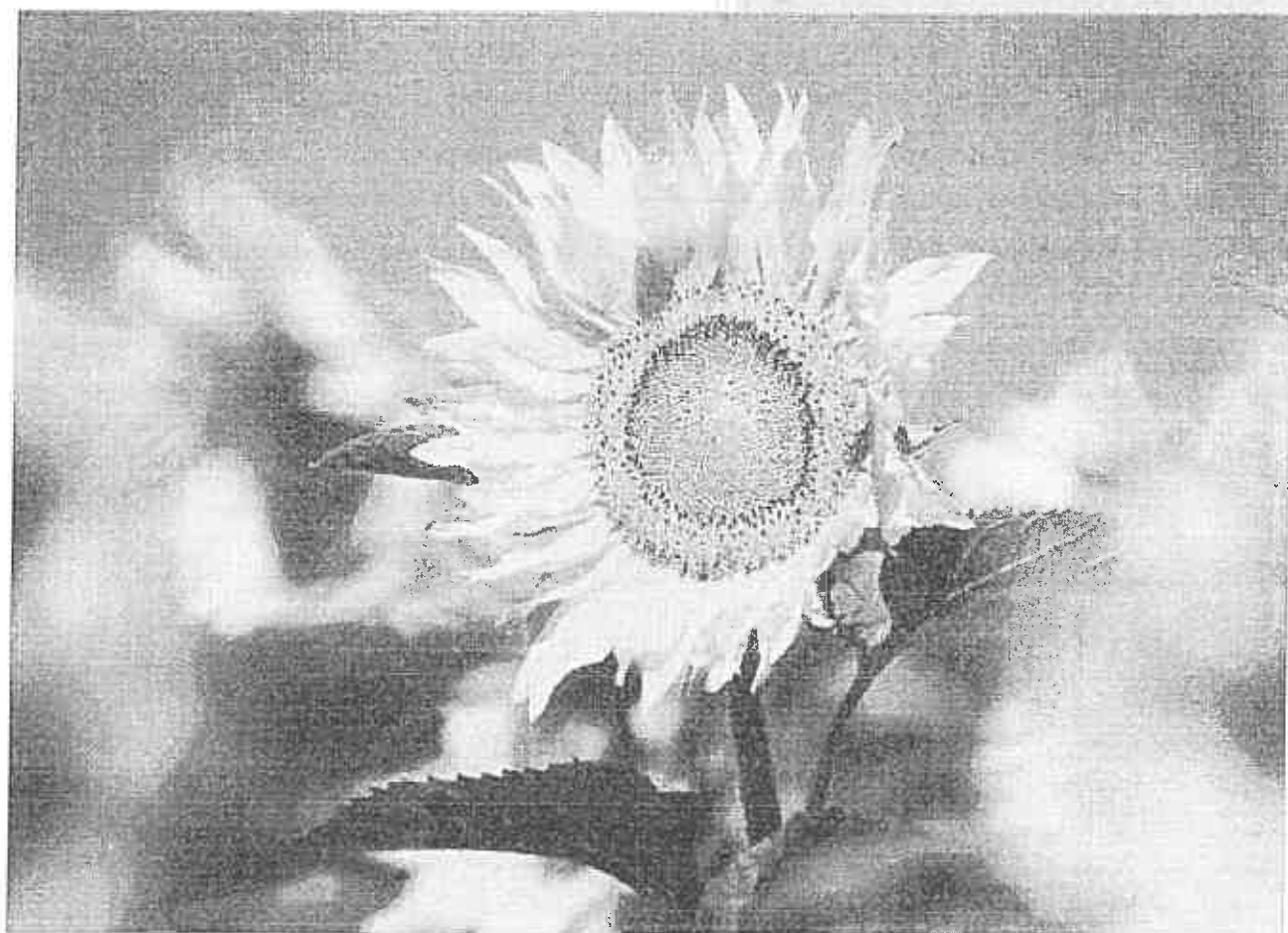


SOIL REPORT FOR THE OTTOSDAL NO-TILL CLUB 2015

This report describes the different scenarios of the farmers involved in the Ottosdal No-Till Club. The physics, chemistry and root development of the various soil types are discussed.



SGS Nvirecrop
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Junie 2015

SGS

DIRK LAAS

1.1 Maize grown on fields previously under pasture with a Hutton soil form

These particular fields were under grasslands and meadows four years ago.

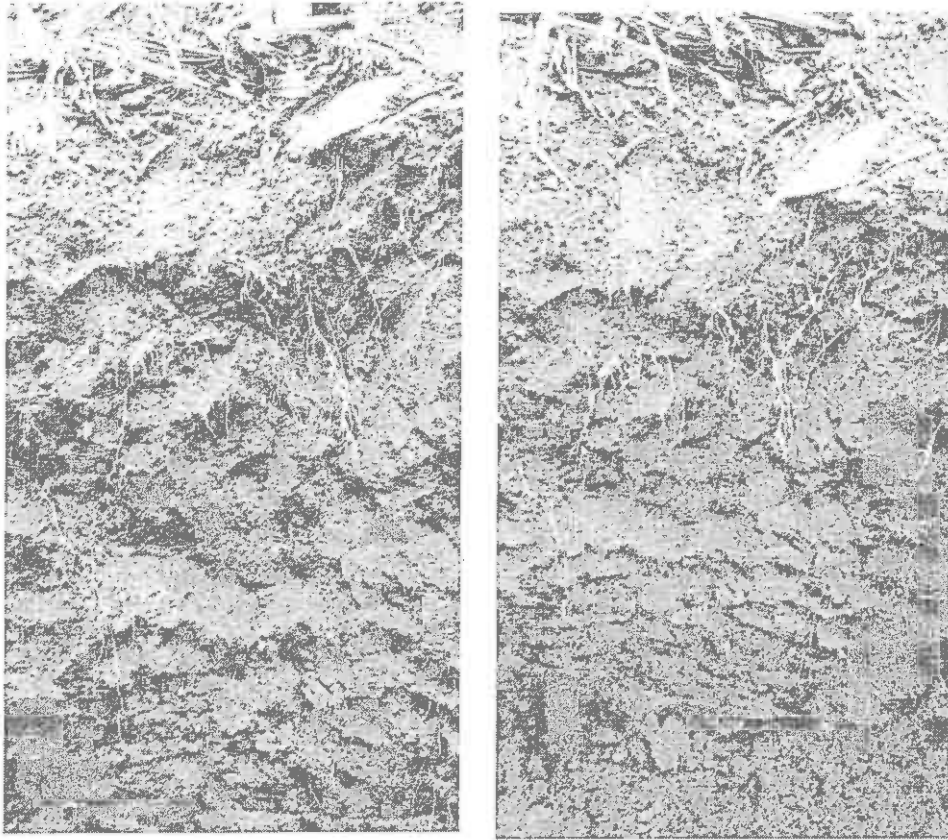


Fig. 1.1.1 and 1.1.2: The darker spots in the soil indicate a very good root development.

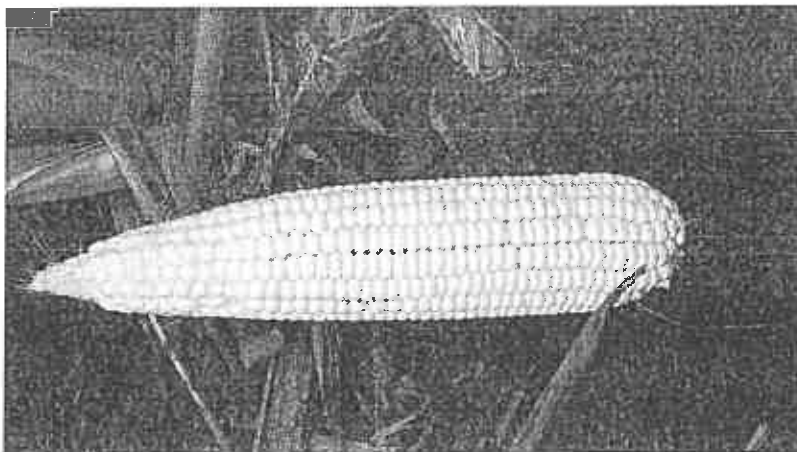


Fig. 1.1.3: Relatively good cob development.



Fig. 1.2.4: Maize cob on the left was grown on the lands that were previously meadow fields. Maize cob on the right was grown on old maize lands.

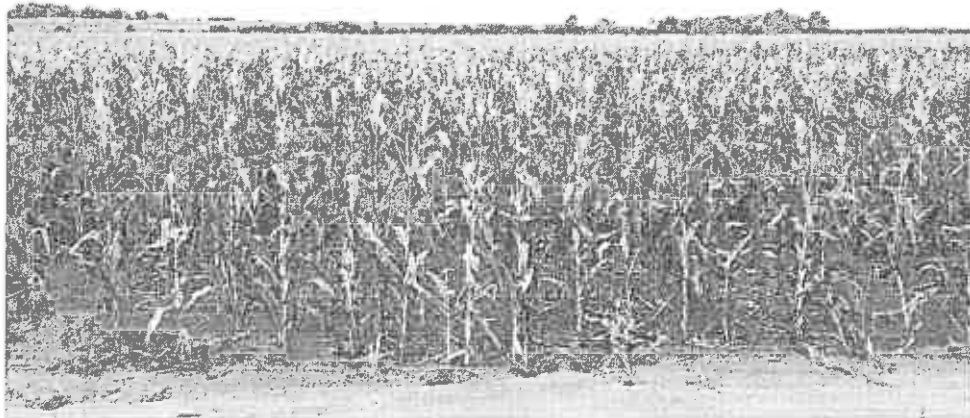


Fig. 1.2.5: A good, uniform plant population with exceptional cob development considering the drought conditions that have occurred.

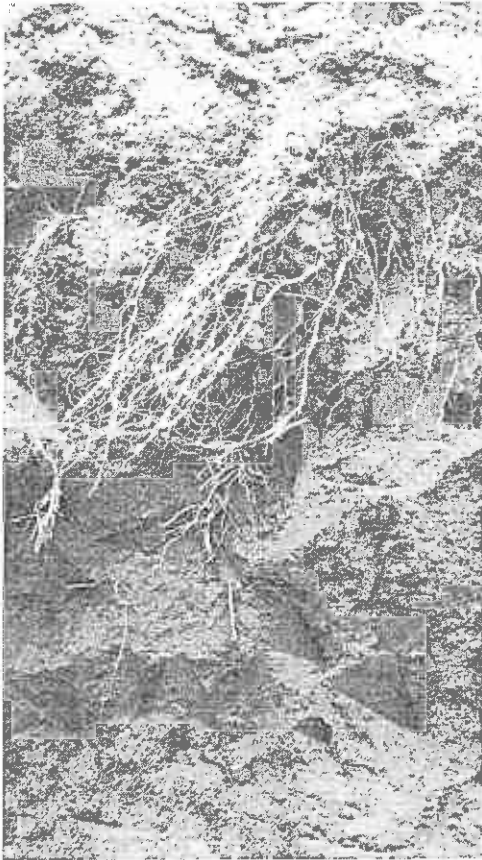


Fig. 1.3.2 (left): V-shaped compaction caused by planter tines but not impenetrable by roots.



Fig. 1.3.3 (right): Subsoil roots found in the C horizon, which is full of quartz fragments.

- The root development has improved significantly compared to the 2014 season as a result of the steps taken such as liming and using deeper penetration of the planter tines. The Ca and Mg levels increased from the liming and the results can clearly be seen in the cob development, even in a drought year like 2015.
- The C content in the topsoil is still higher even after 4 years of cultivation in the red analysis.

Table 1.2:

Reference no,	Na	%Na	Ca Mg	(Ca+Mg)/K	Mg.K	S-Value	Na K	Fe	Mn	Cu	Zn	S	B
Pastures top 10-20	5	0.3	2.8	7.5	2.0	6.3	0.0	40.1	148.5	1.02	4.51	8.5	0.14
Pastures middle 20-40	5	0.6	2.7	7.7	2.1	3.9	0.1	30.9	87.3	1.58	2.57	4.1	0.12
Pastures sub 50-70	8	1.2	1.9	5.3	1.8	3.0	0.1		68.5	1.77		9.6	0.08
Maize top 10-20	4	0.5	2.7	7.5	2.0	3.9	0.0	40.2	184.6	1.62	3.99	4.0	0.08
Maize middle 20-40	7	0.6	4.6	29.6	5.3	5.0	0.2	32.8	140.0	2.10	1.05	2.5	0.05
Maize sub 50-70	8	0.7	14.5	47.4	3.1	4.9	0.3	29.9	103.7	2.06		1.4	0.05
Coarse top 10-20	5	0.6	2.9	12.1	3.1	3.4	0.1	42.8	134.8	1.15	4.90	2.1	0.08
Coarse middle 20-40	6	1.2	2.4	8.0	2.3	2.3	0.1	31.9	77.5	1.44	2.61	7.8	0.05
Coarse sub 50-70	6	1.0	5.2	21.9	3.6	2.8	0.2		49.3	1.50		5.8	0.04

(Red blocks are an indication of values under the norm)



Fig. 1.3.4: Good cob development

The same trend occurred on the sunflower crop; the topsoil was compacted but some of the roots managed to go through into the subsoil.

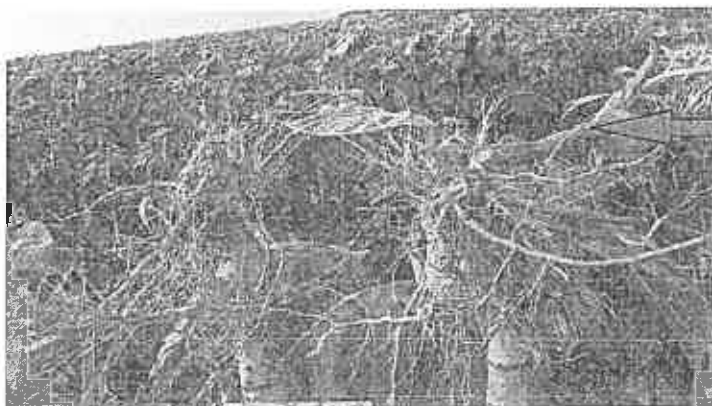


Fig. 2.3: Compaction pan at a depth of 20cm seen by the sunflower roots growing laterally.

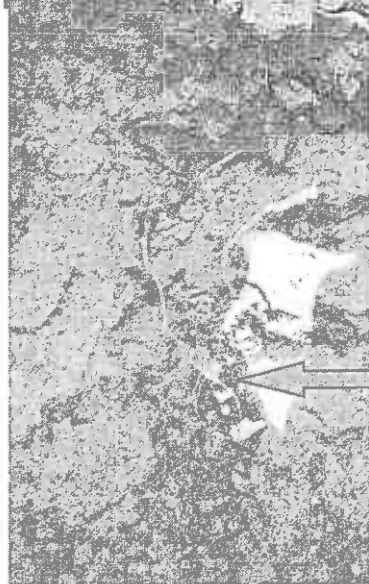


Fig 2.4: Some taproots going through into the subsoil.

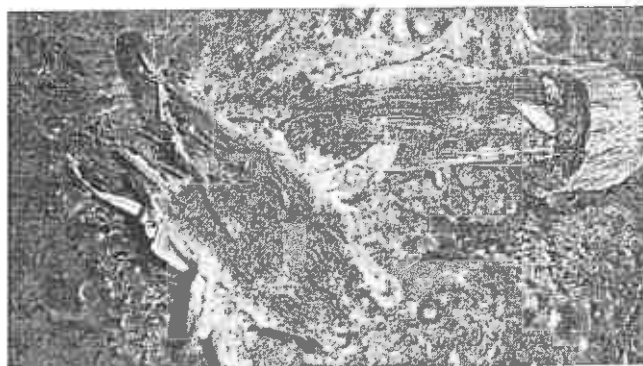


Fig. 2.5: A close up of Charcoal Rot in maize.



Fig. 2.6: The comparison between a healthy maize plant (on the right) and one affected by Charcoal Rot (on the left).

3. Naas Brits

Naas Brits from Dankbaar Boerdery has primarily Hutton soils with a high sand content (6 % clay).

History 2014:

Sunflower lands:

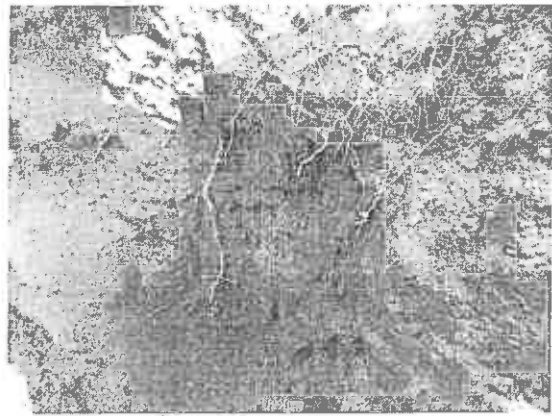
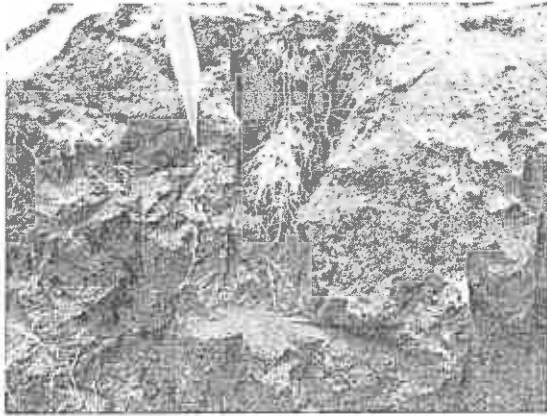


Fig. 3.1 and 3.2: Some of the profiles had excellent root development and others had very poor development.

Maize lands:

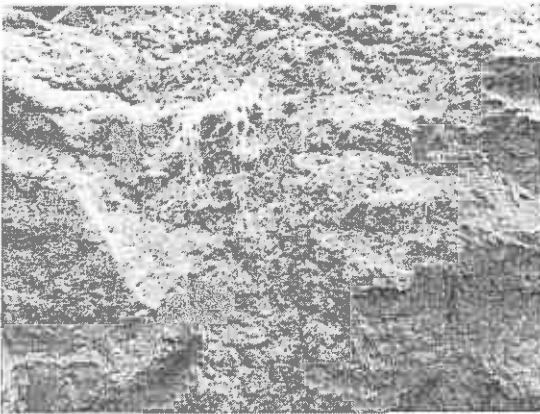


Fig. 3.3: Effect of the compaction pan.

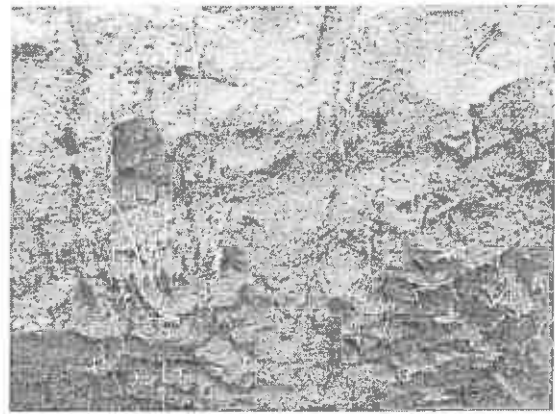


Fig. 3.4: Good subsoil root development.

Sunflower lands:

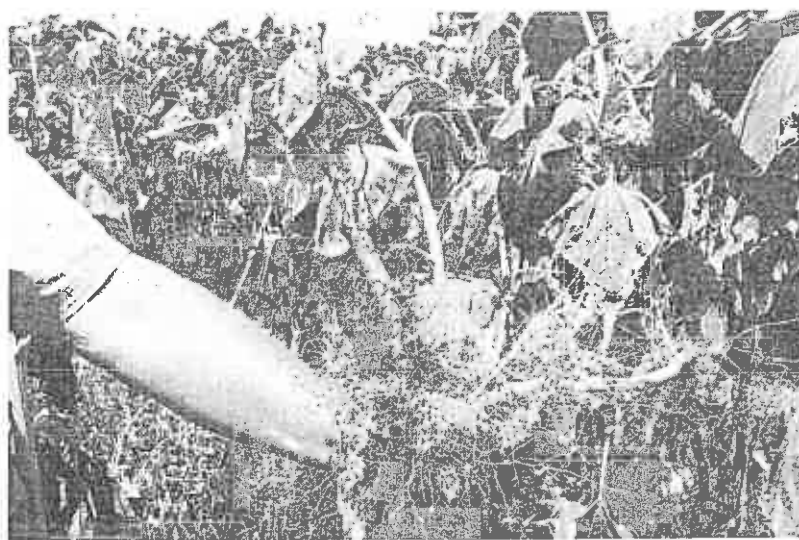
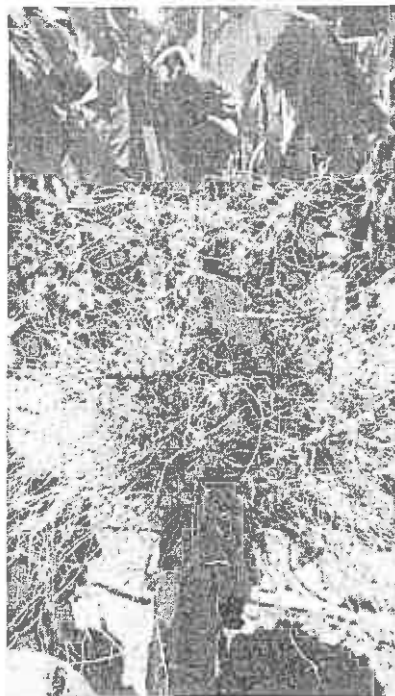


Fig. 3.9, fig. 3.10, fig. 3.11 and fig. 3.12: Examples of the different root development in sunflower grown by Naas Brits. The taproot firstly grew sideways and after finding a breaking level it grew laterally into the subsoil. Deeper hair roots were found at a depth of 60 -100cm, which is a good indication that the initial compaction was not solid and the roots could finally grow into the subsoil.

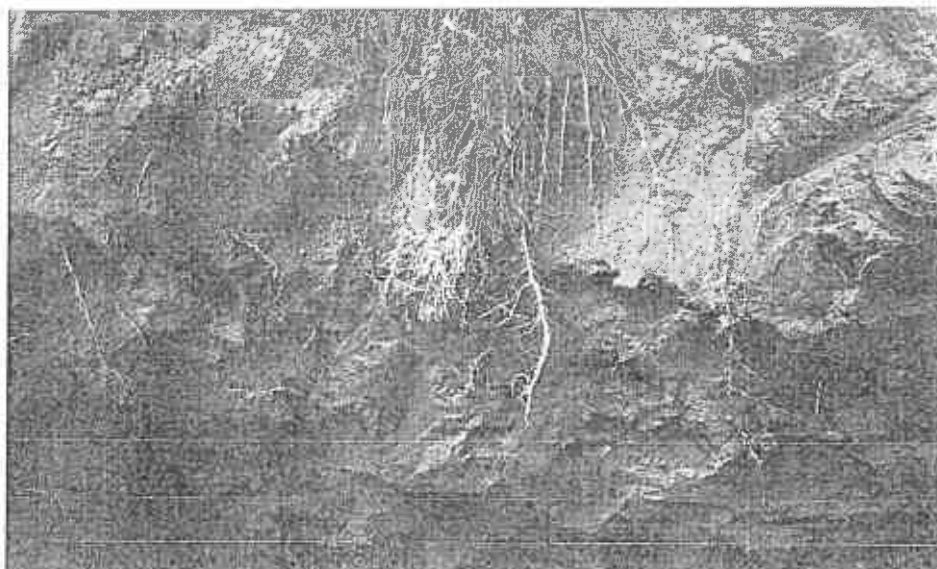


Fig. 3.15

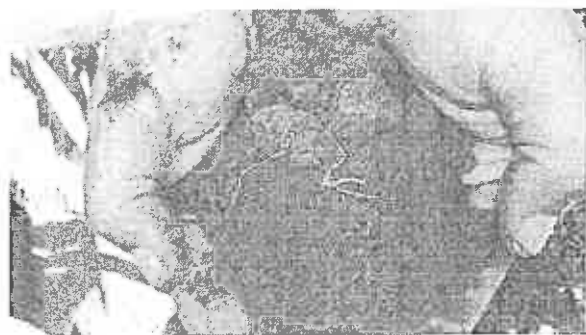


Fig.3.16: Maize roots found at a depth of 1m.

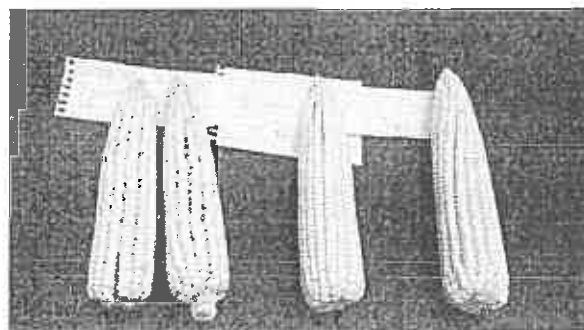


Fig. 3.17: Comparison between cob sizes on different plant populations.

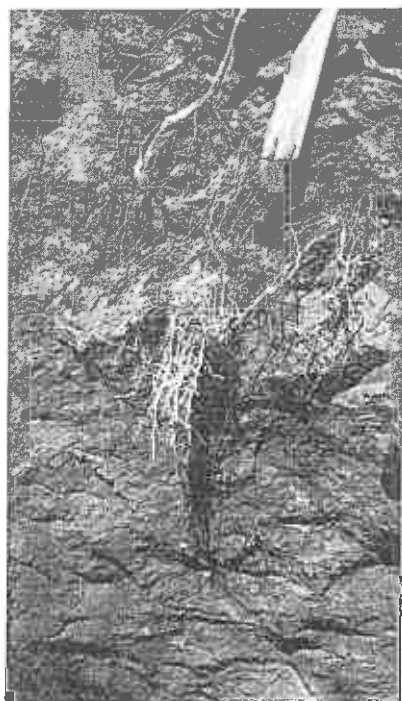


Fig. 3.18: Field R5: Some of the maize plants still show the presence of a compaction pan. Good root development in the topsoil but almost no root development in the subsoil. This specific site was planted prior to the rain and this may be the explanation for the pan. The clay plus silt percentage is very low (14%) and the Ca is also low at 208ppm. This strengthens the theory that problems can occur with low clay plus silt and low Ca content in the soil.

4.1 Gert van Rensburg

Soya lands:

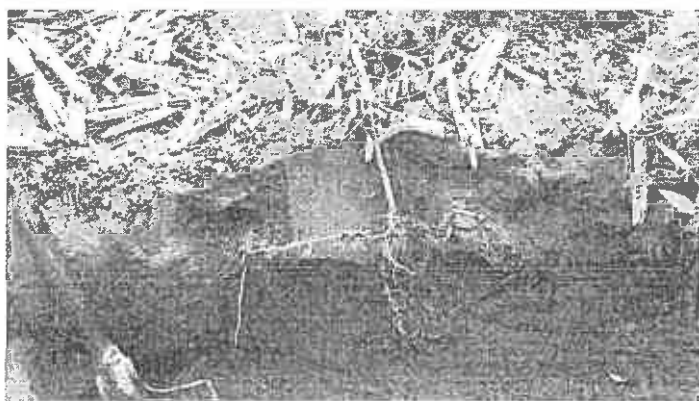


Fig. 4.1.1: A good pod set with reasonable root development.

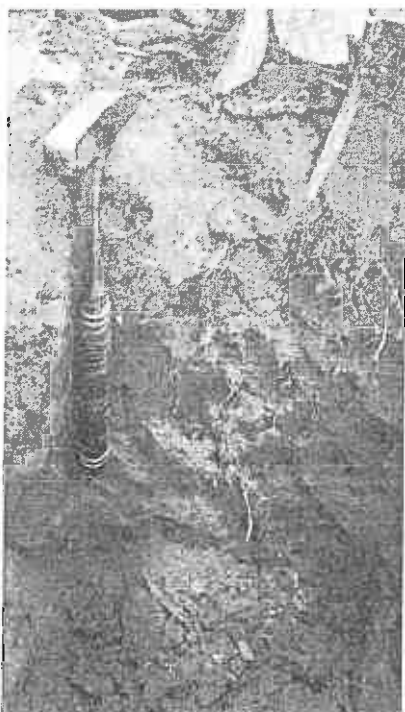


Fig. 4.1.2

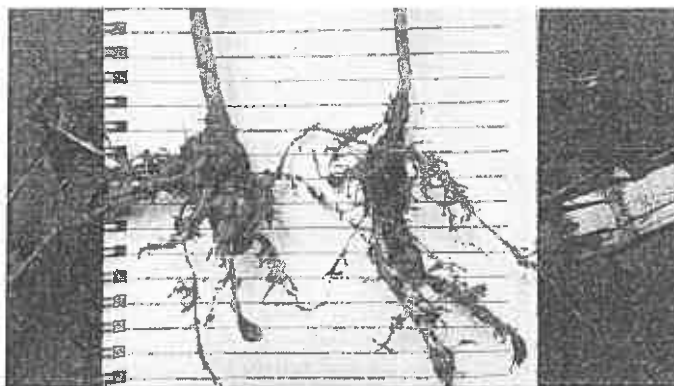


Fig.4.1.3: Some plants have nematodes.



Fig. 4.1.6: Soya beans in the same field as fig. 4.5 but on sandy soils (Pinedene), 4% silt and clay. This is an example of the variations which can occur in the same crop but on different soil types.

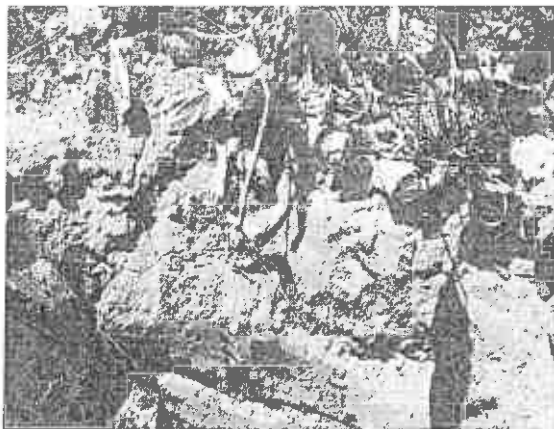


Fig. 4.1.7: A compaction pan.

- It is still a challenge to fix the non-uniformity of the no-till fields on some farms.
- The maize plants shown above were planted close to each other and all the practices where the same.
- The texture is almost the same but the chemicals differ.
- In the case of the maize which has performed better, the Ca content was higher.

Table 4.1.1: Chemical analysis for Gert van Rensburg.

Reference no	pH (KCl)	P Mehlich mg/kg	K mg/kg	Na mg/kg	Ca mg/kg	Mg mg/kg	Exchangeable H ⁺ cmol(+)/kg	%Ca %	%Mg %	%K %	%Na %	ACID.V %	Ca:Mg 1.5 - 4.5	(Ca+Mg)/K 10.0 - 20.0	Mg:K 3.0 - 4.0
G v Rensburg maize good top	5.8	17	183	8	470	132	0.00	59.7	27.6	11.9	0.8	0.0	2.2	7.3	2.3
G v Rensburg maize good sub	4.3	3	209	16	688	436	0.10	44.6	46.3	6.9	0.9	1.3	1.0	13.1	6.7
G v Rensburg maize poor top	4.4	17	167	5		64	0.09	49.4	25.0	20.3	1.1	4.3	2.0	3.7	1.2
G v Rensburg maize poor sub	4.6	4	99	4	518	196	0.03	57.6	35.7	5.6	0.4	0.7	1.6	16.6	6.4
G v Rens Soya good Top	4.6	13	146	5	258	91	0.03	52.5	30.4	15.1	0.9	1.1	1.7	5.5	2.0
G v Rens Soya good Sub	4.7	3	105	7	431	141	0.02	59.4	31.8	7.4	0.8	0.6	1.9	12.3	4.3
G van Rens spoel top Soya poor	4.3	23	81	4		30	0.09	48.1	22.5	19.0	1.7	8.6	2.1	3.7	1.2
G van Rens spoel sub Soya poor	4.3	3	87	4		22	0.11	55.4	14.9	18.7	1.6	9.4	3.7	3.8	0.8

4.2 COMPARISON BETWEEN 2 FIELDS: NO-TILL AND CONVENTIONAL, NEXT TO EACH OTHER

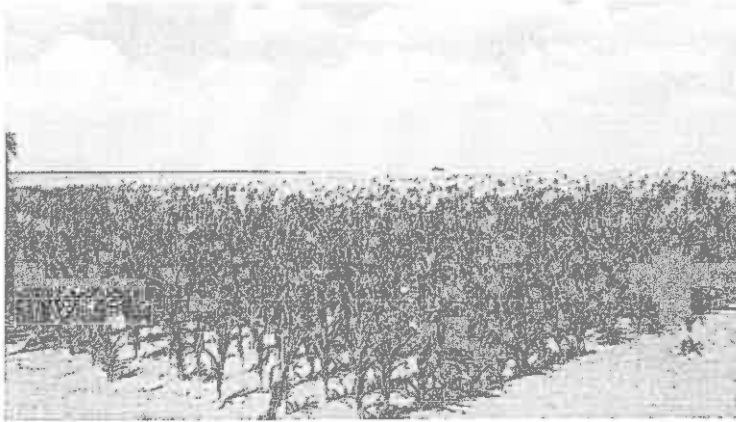


Fig. 4.2.1: No till maize between Schweizer Reneke and Wolmaransstad.

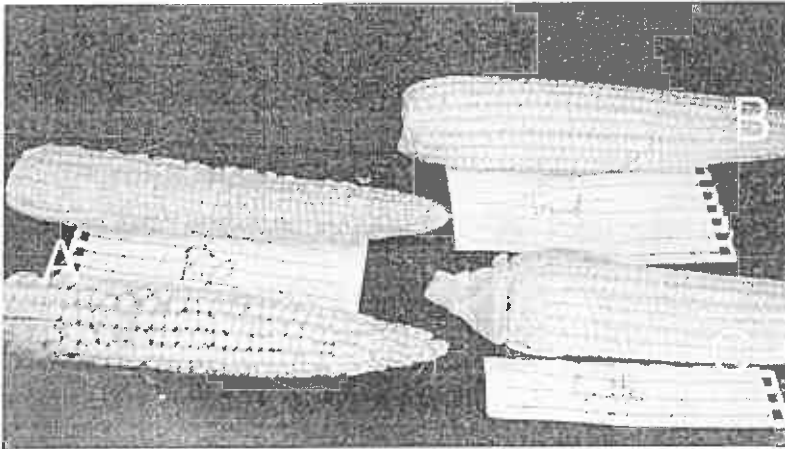


Fig. 4.2.2: The difference in cob sizes on different practices. **A:** Cobs from conventional rip tillage. **B:** No-till maize with a tine planter. **C:** No-till maize with a Coulter planter.

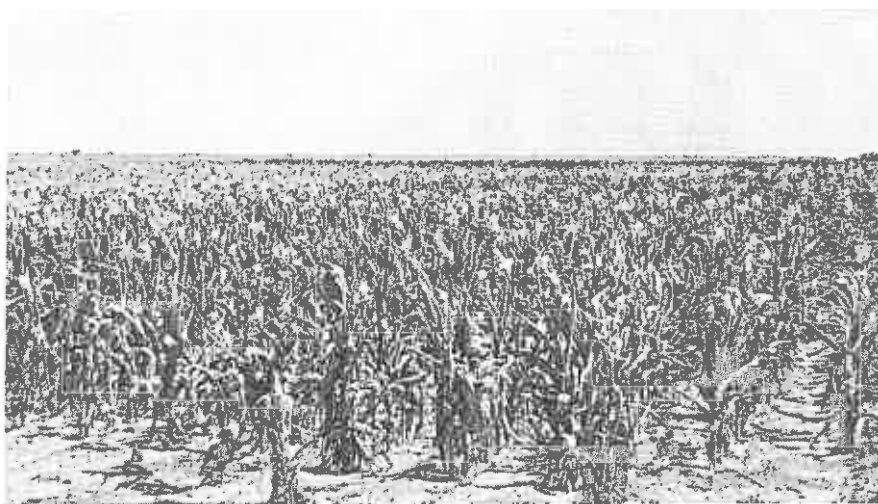


Fig. 4.2.3: Conventional maize planted next to the field-described above (field was ripped prior to planting).

Table 4.3.1:

Reference no	pH (KCl)	P Mehlich	K	Na	Ca	Mg	Exchangeable H+	%Ca	%Mg	%K	%Na	ACID.V	Ca Mg	(Ca+Mg)/K	Mg K
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	cmol(+)/kg	%	%	%	%	%	1.5 - 4.5	10.0 - 20.0	3.0 - 4.0
G van Rens Roos Top	4.4	24	138	5	225	58	0.07	55.2	23.1	17.3	1.1	3.4	2.4	4.5	1.3
G van Rens Roos Sub	4.8	5	120	5	332	74	0.02	63.5	23.3	11.8	0.8	0.6	2.7	7.4	2.0
G v Rens Hout Top	4.5	19	147	2		37	0.06	55.6	17.9	22.4	0.5	3.5	3.1	3.3	0.8
G v Rens Hout Sub	4.4	23	120	1	302	47	0.09	66.0	16.7	13.4	0.3	3.7	4.0	6.2	1.2
G v Rens Hout Top	6.3	34	180	5	1187	50	0.00	86.9	6.0	6.8	0.3	0.0	14.5	13.7	0.9
G v Rens Hout Sub	6.6	5	67	2	1348	46	0.00	92.3	5.2	2.3	0.1	0.0	17.7	41.5	2.2

Table 4.3.2:

Reference no	S-Value	Na K	CEC	Density	Fe	Mn	Cu	Zn	S	B	C	P (Bray1)	Clay	Silt	Sand
	cmol(+)/kg			g/cm ³	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	%	%	%
G van Rens Roos Top	2.0	0.1	2.04	1.476	35.7	87.6	0.52	1.70	3.7	0.05	0.20	24	4	6	90
G van Rens Roos Sub	2.6	0.1	2.61	1.380	31.5	83.5	0.71	0.28	4.4	0.05	0.20	5	6	10	84
G v Rens Hout Top	1.6	0.0	1.67	1.465	39.7	69.5	0.12	0.94	2.6	0.05	0.20	19			94
G v Rens Hout Sub	2.2	0.0	2.29	1.410	41.8	73.6	0.07	0.68	3.2	0.06	0.36	23	4	6	90
G v Rens Hout Top	6.8	0.0	6.83	1.380	23.3	96.5	1.07	2.56	1.7	0.08	0.20	17	4	6	90
G v Rens Hout Sub	7.3	0.1	7.30	1.337	17.6	104.9	0.77	0.46	2.7	0.12	0.20	3	4	6	90





Fig. 5.3: Tine

There is basically no difference between the tine- and coulter no-till planter. Root development was good in both cases.

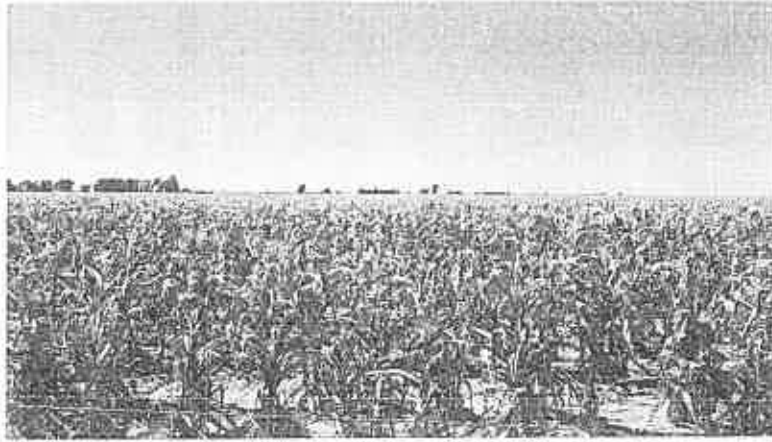
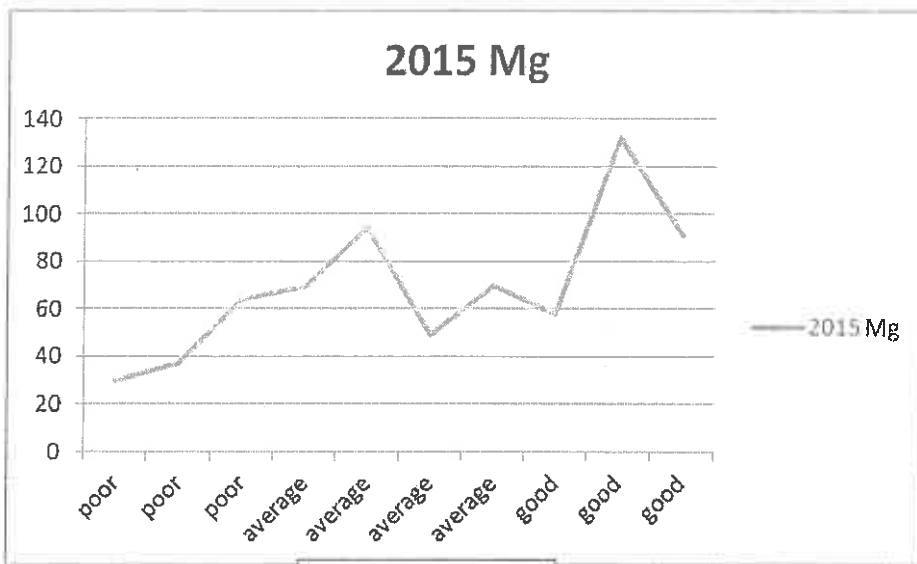
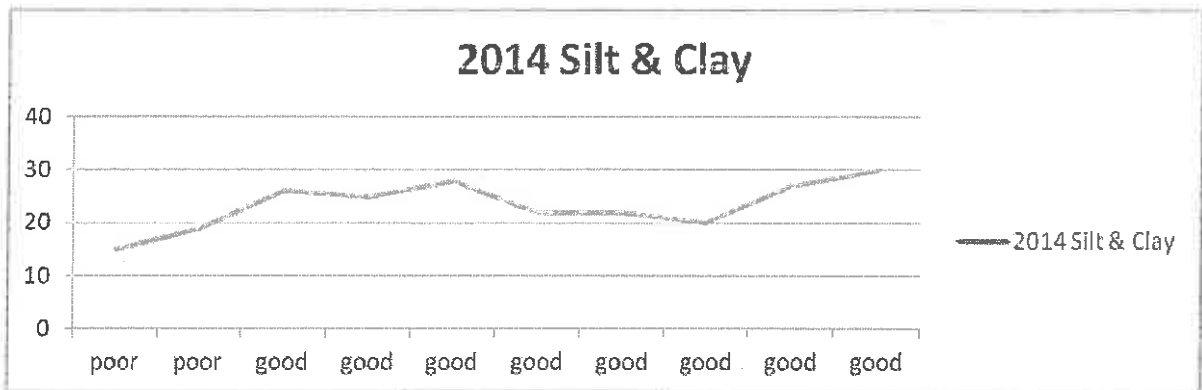


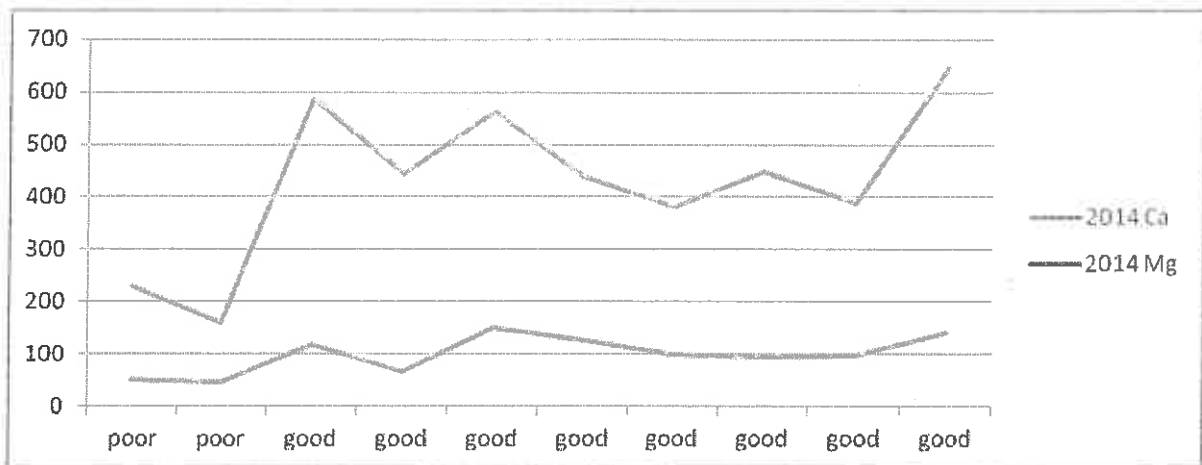
Fig. 6.2: Maize in a no-till system. Due to the non-uniformity of the maize and the Charcoal Rot, the yield was only 1 ton/ha.



Root development



Root development



Root development

