

SOUTH AFRICAN SUGAR INDUSTRY
AGRONOMISTS' ASSOCIATION

Code: FTZn3/79/P

Cat. No.: 1251

Title: LEVELS OF ZINC ON A SANDY SOIL

1. Particulars of the project:

This crop : Plant
Site : SASA La Mercy
Region : Coast Lowlands
Soil system : Umzinto C Lowlands
Soil form/series : Kroonstad/Kroonstad
Design : Repeated Latin Square
x 6 reps
Variety : NCo 376
Fertilizer/
Ameliorants : N P K
 141 45 141
+ 1 000 kg/ha Dolomitic lime broadcast

Soil analysis: Date: 25/1/80

<u>pH</u>	<u>OM %</u>	<u>CLAY %</u>	<u>PDI</u>
5,3	-	6	-

ppm

<u>P</u>	<u>K</u>	<u>Ca</u>	<u>Mg</u>	<u>Al</u>	<u>Zn</u>
28	36	142	39	7	0,87

Age: 18,1 months Dates: (1/2/79-5/8/80)

Rainfall: 965 mm LTM: 1 430 mm

Irrigation: Nil

2. Objectives:

To test the current soil zinc threshold on a sandy soil.

3. Treatments:

- Z0 = No zinc
- Z1 = 50 kg/ha zinc fertilizer material (22%)
- Z2 = 100 kg/ha zinc fertilizer material (22%)

3.1 Notes on fertilizer:

200 kg/ha 1.0.1(47) + 400 kg/ha single superphosphate (11,3%) was applied in the planting furrow of all plots.

3.2 400 kg/ha 1.0.1(47) was topdressed 10 weeks later.

3.3 Zinc fertilizer material was applied in the planting furrow once the supers and 1.0.1 had been covered with soil.

3.4 Dolomitic lime at 1 t/ha was broadcast to correct the Ca & Mg deficiency prior to ridging out.

4. Results:

4.1 Yield

Treatments	t/ha Cane	Ers % Cane	Suc % Cane	t/ha Ers	t/ha Suc
Zo = No zinc	86	14,0	15,5	12,1	13,4
Z1 = 50 kg/ha zinc fertilizer material	89	14,1	15,6	12,6	14,0
Z2 = 100 kg/ha zinc fertilizer material	82	14,1	15,6	11,5	12,7
Mean	86	14,1	15,6	12,1	13,4
CV %	16,5	6,2	4,5	21,6	20,1
SE of treatment mean +	5,77	0,36	0,28	1,06	1,10
LSD (0,05)	20,0	1,24	0,99	3,69	3,79
(0,01)	30,2	1,87	1,49	5,58	5,75

4.2 Harvested crop characteristics and yield/100 mm rainfall

Treatments	Stalk counts $\times 10^{-3}$ /ha	kg/stalk	Stalk length (cm)	tc/ha/100 mm	t ers/ha/100 mm
Zo = No zinc	104	0,82	143	8,9	1,25
Z1 = 50 kg/ha zinc fertilizer material	114	0,78	150	9,2	1,31
Z2 = 100 kg/ha zinc fertilizer material	106	0,76	138	8,5	1,19
Mean	108	0,79	144	8,9	1,25

4.3 3rd leaf zinc values (ppm)

Age at sampling	Treatments	No zinc control	50 kg/ha Zinc fert. mat.	100 kg/ha Zinc fert. mat.
1,7 months	23/3/79	18	28	38
2,7 "	25/4/79	18	21	23
8,6 "	19/10/79	22	25	28
9,7 "	23/11/79	19	22	23
10,6 "	20/12/79	21	24	28
11,6 "	18/1/80	20	19	19

4.4 Soil zinc (sampled 12 months after planting)

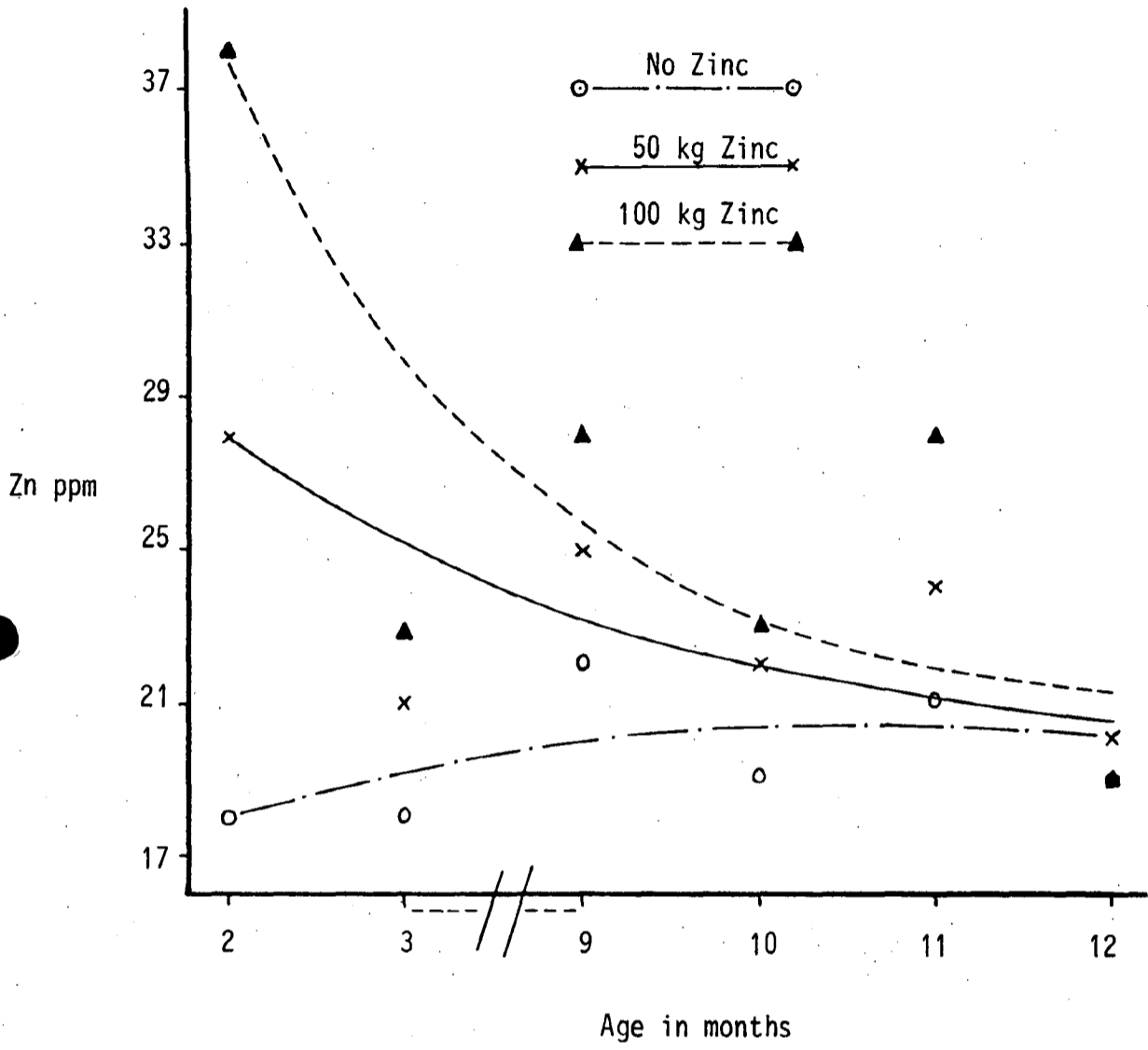
Zo = 0,87 ppm
 Z1 = 1,05 ppm
 Z2 = 1,13 ppm

5. Comments:

- 5.1 In a dry period yields were relatively low averaging 4,8 tc/ha/m and a high yield per 100 mm rainfall (8,9).
- 5.2 Despite the low soil Zn value at the start of the trial, 0,87 ppm, there was no indication of a growth or yield response to applied zinc. Growth variability within the site was high and cane yield showed a CV % of 16,5.
- 5.3 Treatments were well reflected in the soil samples taken 12 months after planting.
- 5.4 Third leaf zinc values show a high zinc uptake where zinc was applied but the Zn levels in samples from the control plots were also well above the current leaf threshold of 15 ppm.
- 5.5 The current soil Zn threshold appears to be too high for light soils.

PKM/HDN

THIRD LEAF ZINC VALUES



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Code No.: FT Zn 3/79/R1

Cat. No.: 1251

TITLE: Levels of zinc on a sandy soil

1. Particulars of the project

This crop : 1st Ratoon
Site : SASA La Mercy
Region : Coast Lowlands
Soil system : Umzinto Coastal Lowlands
Soil form/series : Kroonstad/Kroonstad
Design : Repeated latin sq. x 6 replications
Variety : NCo 376
Fertilizer : N P K
 141 - 144

Soil analysis: Date: 5 August 1980

<u>pH</u>	<u>O.M.%</u>	<u>Clay %</u>	<u>P.D.I.</u>
5,1	-	6	-

<u>ppm</u>					
<u>P</u>	<u>K</u>	<u>Ca</u>	<u>Mg</u>	<u>Z0=0,86</u>	<u>A1</u>
37	42	158	41	<u>Z1=1,50</u>	8
				<u>Z2=1,35</u>	

Age: 14,1 months Dates: (5 August 1980-9 October 1981)

Rainfall: 1 506 mm L.T.M.: 1 098 mm

Irrigation: Nil

2. Objectives

To test the current soil zinc threshold on a sandy soil.

3. Treatments

No further zinc material was applied so the residual effects of Zn applied to the plant crop were tested.

	<u>Plant</u>						<u>R1</u>			
Z0 = No zinc										Nil
Z1 = 50 kg/ha Zinc fertilizer material (22%)										Nil
Z2 = 100 kg/ha Zinc fertilizer material (22%)										Nil
<u>1980/81</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	
Actual rainfall (mm)	26	382	43	117	94	225	128	35	11	
L.T.M. (mm)	38	62	109	114	114	125	118	127	76	
<u>1981</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Total</u>				
Actual rainfall (mm)	139	19	21	159	107	= 1 506 mm				
L.T.M. (mm)	49	35	28	38	62	= 1 095 mm				

4. Results4.1 Yield

Treatments (residual from plant cane)	t/ha cane	Ers % cane	Suc % cane	t/ha ers	t/ha suc.
Z0 = No Zinc	46	12,1	13,8	5,6	6,3
Z1 = 50 kg/ha Zinc fertilizer material	52	11,9	13,5	6,2	7,0
Z2 = 100 kg/ha Zinc fertilizer material	47	11,8	13,4	5,6	6,3
Mean	48	11,9	13,6	5,8	6,6
C.V. %	25,6	4,9	4,0	27,4	26,9
S.E. of Treatment mean ±	5,05	0,24	0,22	0,65	0,72
L.S.D. (0,05)	15,9	0,74	0,70	2,04	2,27

4.2 Harvested crop characteristics and yield/100 mm rainfall

Treatments (residual from plant crop)	Stalk counts $\times 10^{-3}/ha$	kg/ stalk	Stalk length (cm)	tc/ha/ 100 mm	ters/ha/ 100 mm
Z0=No Zinc	87	0,53	138	3,1	0,37
Z1=50 kg/ha Zinc fertilizer material	88	0,59	152	3,5	0,41
Z2=100 kg/ha Zinc fertilizer material	87	0,54	138	3,1	0,37
Mean	87	0,55	143	3,2	0,38

Third leaf zinc values ppm

Age at sampling	Treatments	No zinc control	50 kg/ha zinc fertilizer mat.	100 kg/ha zinc fertilizer mat.
3,8 months	28 November 1980	15	23	44
4,6 months	22 December 1980	14	21	31
5,3 months	16 January 1981	19	23	29
6,4 months	17 February 1981	19	21	24
7,3 months	13 March 1981	19	21	21

Soil zinc values at the end of 1st ratoon (ppm)

Z0	0,70
Z1	1,25
Z2	1,70

5. Comments

- 5.1 There were no residual effects of applied zinc on crop growth or yield.
- 5.2 The crop was low yielding and variable due presumably to poor rainfall distribution. Stalk populations were particularly low for NCo 376.
- 5.3 The applied Zn in the planting furrow was clearly reflected in results of soil samples taken after harvesting the plant and first ratoon crops.
- 5.4 The uptake of Zn by the plant was shown clearly in the third leaf data particularly when the crop was young at three to five months. The leaf data from the control plots showed the Zn level to be generally slightly above the threshold value.
- 5.5 The current soil Zn threshold value appears to be high for the lighter soils such as the Kroonstad series.
- 5.6 Due to the high coefficient of variation and no indication of a growth response to Zn, the trial will be terminated.

PKM/VJ
29 October 1981

Third leaf zinc values

