agriculture
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agriculture
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PROVINCE OF KWAZULU-NATAL

SOIL FERTILITY RESEARCH
CONSERVATION AGRICULTURE(CA) : NO-TILL

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INTRODUCTION

Over the last 26 years no-till has progressed in leaps and bounds amongst the farming community, dispelling Dr JB Mallet's concern, where on retirement; at the end of his lifelong pioneer work on no-till, that without farmer acceptance, his research would get no further than the library. The benefits of no-till in soil conservation and improved aggregate stability, is a force unto itself. With ongoing scientific research and farmer-support, soil acidification and other challenges facing existing no-till farmers today will soon become a thing of the past, documented in history.

Strategies and methodologies developed over the years of the development of conservation agriculture will become guidelines for future generations.

No-Till Research 2014 at Loskop to investigate if surface lime can correct acidification in No-till systems

Stand of No-Till Maize at Denleigh Farm, Karkloof

LIME & GYPSUM

Occur naturally. Should not be used Interchangeably.

Material	CCE(%)
Pure calcium carbonate	100
Calcitic agricultural limestone	70-100
Dolomitic agricultural limestone	70-109
Hydrated lime(slaked agricultural lime	120-136
Burned lime(unslaked agricultural lime)	179

Table1: Calcium carbonate equivalent of some lime (1)

Different Limes and gypsum

- Lime is a carbonate, oxide or hydroxide of calcium
- Lime has alkaline properties
- Lime raises the pH of soils by neutralizing hydrogen ions
- Lime may be used as a source of Cain low-Ca soils
- Lime won't effectively reclaim sodic soils unless elemental sulphur or sulphuric acid is added
- Lime may slightly improve water penetration in some soils – improvement decreases as pH rises

- Gypsum is a sulphate of calcium
- Gypsum is a neutral salt in water(neither alkaline nor acid)
- Gypsum will not neutralise acid soils or effectively raise pH
- Gypsum may be used as a source of Ca and S
- Gypsum reclaims sodic soils by replacing Na with Ca
- Gypsum may improve water penetration when very pure (low salt) water is used for irrigation. Gypsum won't improve the drainage of poorly drained soil. It has no effect on plough pans, clay pans or hardpans.

Liming by hand on a small scale

SOIL ACIDITY INTERACTIONS WITH NITROGEN(N) UNDER NO-TILL

Key elements to the investigation conducted by Mr Thibaud over a period of 11 years at Karkloof included:
Soil acidification and the efficacy of surface applied lime, N requirement, the effect of N source.

Treatments included:

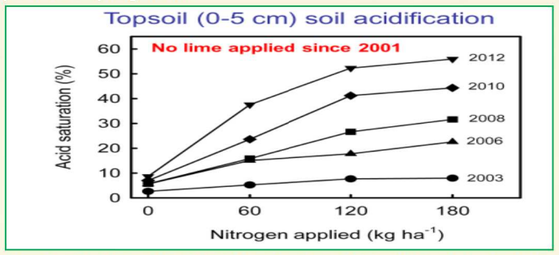
N rates (0,60,120,180 kg ha-1), annual surface applied lime (0,0.75,1.5 Mg ha-1), N source (LAN & urea)

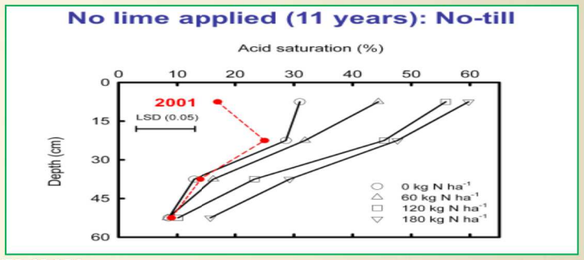
Results

Soil acidity is problematic in a no-till situation.

Advice

Advice to farmers who are considering converting to CA are advised to resolve existing topsoil and subsoil acidification issues prior to adopting no-till.





NITROGEN RESPONSE OF MAIZE SILAGE FOLLOWING RAIN-FED WINTER COVER CROPS

Silage maize leave little crop residue a challenge to farmers wanting to practice no till. Trial research was conduced by Dr Manson.

Materials & Methods included a trial layout; consisting of 27 main plots (9 treatments and 3 replicates) these plots were split for nitrogen. (Refer to hand out for details)

Results

Vetch as a cover crop, planted alone or with a temperate grass can allow N fertilizer savings of up to 80 kg N/ha. Cover crops provide the necessary mulch suited to no-till.

Cover crops with zero cover over control plots taken by drone camera

Vetch, legume strong rooting system.

BENEFITS OF COVER CROPS

Improves soil fertility
Soil quality management
Erosion control
Water management
Weed, disease and pest management