

LIMEX70

clubroot

protect your crop
and your profits

LimeX70, produced by British Sugar, is the ultimate performer in managing clubroot in brassicas



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UK's No.1
Liming product
for correction
of soil acidity



Consult your
certification body

success with LimeX70

T H Clements and Son

farm more than 1600 hectares on predominantly Wisbech series silts, with annual cropping exceeding c.2000 hectares with some double cropping of more than 1400 hectares of field brassicas.

Neil Sharpe has used LimeX for more than ten years to manage clubroot. Results have been impressive, with the majority of hot spot areas no longer showing any symptoms in fields that can grow six brassica crops in four years.

Current practice is to backload LimeX during the sugar beet processing season, and store it prior to applying 7 tonnes per hectare of LimeX pre-planting. Then mid-way through the brassica cropping programme a further 5 tonnes per hectare is added to boost the available calcium level to maintain protection from clubroot. As a result, crops are now more uniform, benefiting timelines at harvesting, and more significantly, marketable yield has improved. Furthermore, Neil values the integral nutrient package, with the sulphur content being a major benefit.



Neil Sharpe, Head of Farming (left) and Dean Allwood, Wissington Area Manager

S Leggate and Sons

grow around 160 hectares of brassicas with some double cropping in rotation with 40 hectares of potatoes on Wisbech series soils close to Boston.

Historically, clubroot was partially managed using spot applications of limestone, however ten years ago this practice changed. Current practice is to apply LimeX at 10 tonnes per hectare overall, in advance of the brassica programme, for the combined benefits of the integral nutrient package and clubroot management. Furthermore, some clubroot resistant varieties are grown to good effect.

David Leggate reports that the routine overall application has been effective, with no evidence of clubroot showing in the susceptible varieties. In summary, LimeX gives him peace of mind that clubroot will not be a problem in fields that were traditionally problematic.



David Leggate (left) and Barry Goodale, Wissington Area Manager

All brassica crops are at risk from clubroot!



Clubroot is caused by a minute resting spore *Plasmodiophora brassicae* that can lay dormant for at least two decades before striking at a valuable crop. In badly infested land entire crops can be completely wiped out, but even with more patchy infection the disease causes uneven maturity, low yields and poor quality. In many cases the affected crop is simply not worth harvesting.

Managing Clubroot requires active husbandry tackling the conditions that favour the pathogen responsible, principally:

- acidic (low pH) soil
- calcium deficiency
- poor drainage

LimeX70 is the ideal way to correct acidity. Proven for more than ninety years, it is an easily spreadable, high quality liming material:

- corrects soil acidity for optimum soil pH
- is fast-acting and long-lasting due to its fine particle size
- contains beneficial nutrients assisting the long-term fertility of the soil
- improves soil structure at higher application rates
- can be stored outside for maximum flexibility



Independently tested and verified >>

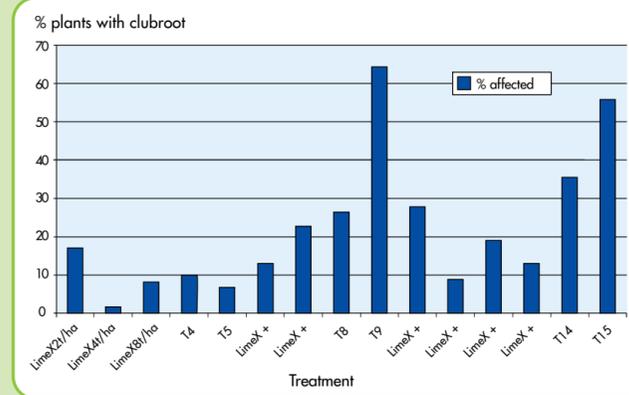
Following three years of Defra-funded research into clubroot control measures, undertaken by ADAS Terrington and SAC Edinburgh, a number of conclusions were drawn from a combination of glasshouse and field experiments.

From the range of treatments investigated for the control or suppression of clubroot, the most effective treatments were those containing calcium. The Kirton site exhibited a moderate level of disease (30% clubroot in untreated plots), and LimeX gave 92 - 97% control at rates of between 4 and 8 tonnes/hectare.

Clubroot Incidence at Kirton Trial Site:

The fineness of lime is essential to ensure a rapid two-fold effect; firstly to raise the pH to above 7.2, and to make calcium more readily available.

Therefore, the extremely fine particle size of LimeX delivers readily available Ca²⁺ ions and raises pH rapidly to inhibit the early stage of clubroot infection.

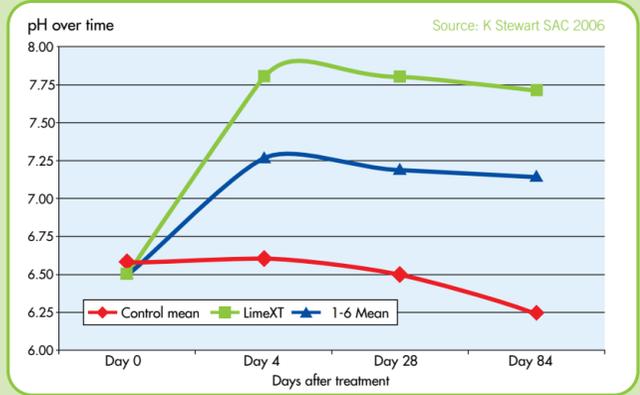


pH Change at Crail, Fife:

At the Crail site, the field pH was 6.5. The LimeX treatment, three days after treatment, increased this rapidly to 7.8, and also raised the available calcium level to 6500mg/l Ca²⁺.

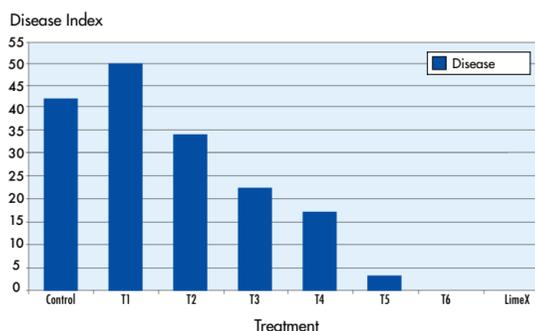
The disease level was very severe (93% clubroot in untreated plots). Despite this, LimeX achieved a significant reduction in disease and the greatest yield response.

The pH change graph for SAC site at Crail (right) shows a response to modest applications of applied LimeX was significantly better than the majority of the other treatments, despite the high natural background pH.



Performance of Lime Products in SAC Glasshouse

The SAC glasshouse experiment in 2006 took the most promising of forty eight potential control treatments examined in 2004 and 2005 forward for a final replicated experiment. The only treatment combinations effective were those containing calcium products and there was no improvement in the control effect achieved in combination. The performance of LimeX at 4 tonnes/hectare is demonstrated in the graph, below:



During 2009 further clubroot research was carried out under the leadership of Dr. Roy Kennedy (University of Worcester), working alongside clubroot affected growers in Fife. LimeX was the chosen cultural control treatment in a crop of calabrese in a fully replicated trial.

The trial results once again reinforced the positive message that LimeX suppresses clubroot. Dr. Kennedy concluded that "Each of the different rates of LimeX were successful in reducing clubroot on plants."



Pip Horsnail (British Sugar R&D) hand spreading LimeX in Fife, June 2009

In July 2010, another replicated trial was established on the same farm by Dr. Kennedy, to investigate optimum application rates. The trial site had previously cropped with a brassica, and soil sampling estimates showed an inoculum level greater than 1 million resting spores per gram of soil.

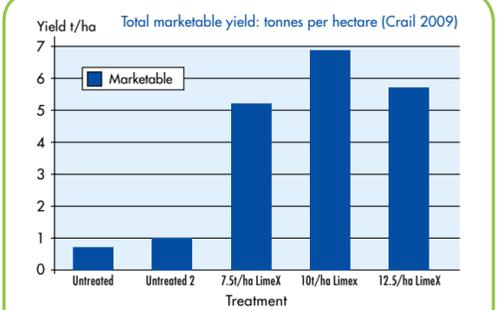


LimeX and limestone as applied pre-planting in 2010

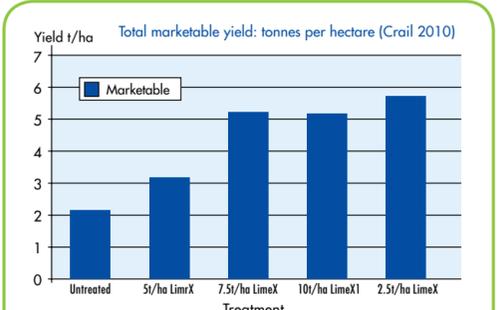
In comparison to 2009, disease pressure was seen to be greater, due to increased rainfall and higher soil moisture. The yield differences from LimeX are shown in graphs 1 and 2, right.

The optimum rate for LimeX70 is dependent upon the existing and target pH. However, there is a correlation between the rate and the level of resting spores during and post cropping that will support future crop protection from clubroot. Overall, the optimal application rate was observed to be between 7.5 to 10.0 tonnes/hectare to suppress the massive level of disease pressure.

The 2010 results confirm the earlier findings that LimeX can be used to control clubroot in heavily infested land whilst maintaining commercially competitive marketable yields. Furthermore, this suppression of clubroot will significantly reduce inoculum build up, so disease pressure will be reduced over time.



1 Trial results illustrating yield effect from LimeX compared to two controls without LimeX (Crail 2009, c 1 courtesy of Dr. Roy Kennedy).



2 Trial results illustrating yield effect from LimeX compared to a control without LimeX and a local limestone alternative (Crail 2010, courtesy of Dr. Roy Kennedy).

Realising the nutrient value

A unique advantage of LimeX70, and an important one regarding overall farm costs, is the value of the nutrients integral in the product. The information below shows the minimum levels for three important nutrients and their value to your enterprise using the Fertiliser Manual (RB209 8th Edition 2010) as a guide.

Sulphate (SO₃)

- Minimum of 6kg in every tonne of LimeX70
- At a LimeX70 application rate of 10 tonnes/hectare (4t/acre) this equates to 60kg/hectare of SO₃ worth £6
- This is a valuable contribution and will significantly reduce the risk of SO₃ deficiency
- Add 50kg/hectare of SO₃ where sulphate content of soil is low

Phosphate (P₂O₅)

- Minimum of 10kg in every tonne of LimeX70
- At a LimeX70 application rate of 10 tonnes/hectare (4t/acre) this equates to 100kg/hectare of P₂O₅ worth £65
- This is sufficient maintenance phosphate for brassicas at P Index 2

Magnesium (MgO)

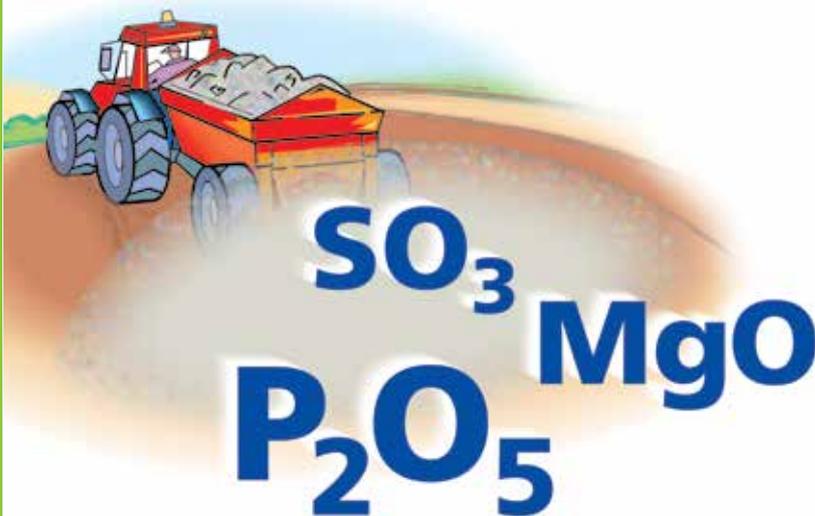
- Minimum of 7kg in every tonne of LimeX70
- At a LimeX70 application rate of 10 tonnes/hectare (4t/acre) this equates to 70kg/hectare of MgO worth £28
- Apply 100kg/hectare MgO for brassicas at Mg Index 1

The combined value of these integral nutrients is around

£110 per hectare

inclusive of the saving of application.

LIMEX70



pH-nutrient maintenance

The above values are based on the market-average price of proprietary nutrients and were correct at the time of printing.

The most up-to-date values are available on our website limex.co.uk

To discuss your liming requirement or for technical enquiries, contact our **Helpdesk 0870 240 2314** or visit our website limex.co.uk

Alternatively, e-mail us at limex@britishsugar.com

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