

AHDB potatoes - Crop Protection Treater Group

Group Technical Secretary, Anne Stone
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Minutes of the 33rd Meeting (calcium)

Held by kind invitation at British Sugar offices Peterborough on March 1st 2018

Attendees

Mark Taplin
John Sarup
Dennis Walsh
Jeff Beever
David Turner
Laurence Power
Anne Stone
James Holmes, AHDB
Glenn Carlisle, British Sugar
Nick Winmill (by phone)
Eric Anderson (by phone)
Jon Knight, AHDB, (by phone)

Speakers

Dr Apostolos Papadopoulos, Crop Intellect.
Dr Richard Colgan, University of Greenwich, (by phone)
Richard Cogman, British Sugar
Joe Martin, AHDB

Apologies Glyn Harper, John Limmer (BPTA), Paul Overton, Dan Hubbard, Matt Back, Chris Allen, Paul Goddard, Andy Evans.

Welcome and matters arising

The chairman thanked British Sugar for hosting the event and Richard Cogman in particular for arranging a conference call and distribution of presentations so that some speakers and members were able to participate at a distance; given the heavy snow in some areas this week.

It was agreed that Anne Stone should arrange for the risk assessment for FLN project and the PCN grower guide to be circulated to the group for comments.

The minutes of the last meeting at JHI on Nov 1st 2017 were accepted as a true record.

Apostolos Papadopoulos (Tolis), Crop Intellect. Calcium Uptake by Potato Tubers

Tolis explained his role as a developer of technologies for agriculture and working with multinationals to take products to market.

Calcium can enter through the foliage, which can be a better route since in soil other minerals can interfere. Calcium nitrate is a very soluble form, but the calcium is over diluted

by the nitrogen when applied in soil. Some chelated Ca is less available than calcium chloride.

Only the roots of stolon and the tuber itself take up the calcium that enters the tuber. To obtain calcium in tubers, it must be applied in a form so that it can dissolve in the soil in the vicinity of the stolon and tubers. Calcium can be applied foliarly to strengthen the plant reducing the stresses of the growing tuber and it is essential to apply on the foliage at tuber initiation.

Q Our main concern related to calcium deficiency is internal rust spot (IRS): are you saying that Tecal and other foliar products cannot help? **Ans** Yes, you're correct since foliar application of calcium won't go into tubers. However, there may conceivably be an indirect effect, because calcium in above ground parts will reduce stress on plants as a whole.

Q What is the threshold for Ca deficiency? **Ans** from R Cogman; 2,250ppm avail Ca +/- 250ppm. It may be that the reality of plant response to avail Ca is also affected by CEC, hence sands may have an optimal level of say 1500, and a clay soil 3000 ppm, but at least we are now measuring it and thinking about it as a macro nutrient.

Q If growing salad or seed pot on calcareous Yorkshire Wold soils how can tuber numbers be kept up? **Ans** Although increasing calcium is correlated to lower tuber numbers in some contexts, the series of Limex trials saw no reduction in tuber numbers with increasing Ca.

Q High K can reduce Ca uptake. What is high in practice? **Ans** from R Colgan, threshold in fruit tissue is elemental K 30 x Ca. **Note** After the meeting AHDB staff in resource use were asked, and it seems that threshold ratios of Ca, K and Mg which inhibit uptake of Ca are not known.

Q If Ca:Mg ratio > 15:1 then will Mg will not be taken up? **Ans** Yes, Mg and K compete for binding sites and can displace Ca and vice versa, so Tecal contains Mg as well as Ca.

Q What is a better way to apply calcium nitrate in potatoes?

Ans For ready uptake of Ca some of the soil applied N should be replaced with CaN fertiliser. A split application is best e.g. with irrigation.

Q How does Tecal work? **Ans.** It releases Ca from vacuoles in cells resulting in deposition to cell walls where it is of more value. The plant stores about 80% of the Ca in the vacuoles.

Q How can IRS be reduced? **Ans.** (from John Sarup) In my experience IRS has been reduced by Calcifert S pre-planting, in the top 20cm at 200-300kg/ha. The S may have an influence.

Comment Reference was made to a project report 807/191 by Denis Buckley which found increased calcium in tubers from calcium sulphate application, but not from agricultural lime or foliar calcium nitrate.

Dr Richard Colgan, University of Greenwich. Calcium Nutrition of Potatoes

Richard emphasised that only Ca around the tuber is taken up into it. It is difficult to increase uptake into tubers so instead choose varieties which are insensitive to low calcium.

Cell walls. Potatoes have little pectin (0.1%) which is a Ca reserve and released during maturation. In maturation the bridges in cell walls break down releasing Ca, a process which affects their elasticity. Breeding lines with more elasticity in cell wall get less pitting and control turgor better. With less Ca in rapidly expanding tissue its less elastic.

If calcium inhibitors or chelating agents are used, scab can be exacerbated.

K and Mg interact with active sites so can inhibit Ca uptake. If the ratio is greater than than 30:1 K to Mg in fruit its too much.

In the AHDB Project at James Daw's calcium affected dry matter in the middle of tubers. In the 2nd year at James Daw's there was no clear benefit from use of Tropicote (calcium nitrate), to Ca in tuber or to fry colour. The responses depended on potato variety.

Questions:

Q what ratio of K: Mg: Ca in soil would indicate a problem with Ca uptake? **Ans** (Richard) The relevant data for fruit trees is the content in leaf and fruit; data on ratios in soil is lacking. **Ans** (Tolis) Sampling error is common with tissue analysis.

Q What was the soil calcium in James Daw's field? **Ans** 15mg/kg Ca (1500ppm) in 2nd year, though Richard was unsure.

Q What was the project number of the Ca trial at James Daw's, and is the report on the AHDB website? **Ans** 11140003. It will complete in Sept 2018, and then the report will be put on the web site.

Q Are breeders looking for elasticity in cell walls and tolerance to low Ca? **Ans** Breeders are interested in cell elasticity though its not a breeding target. **Ans** from Tolis, Breeders in N America do look for performance under low Ca.

Richard Cogman, British Sugar. Limex and potatoes

The calcium carbonate particles in Limex are very fine, 2-15um in diameter. Most is used on sugar beet land but 25-35,000 tonnes are sold each year for use pre-Brassica, much of which is in potato rotations, in Lincolnshire especially. Growers have questioned whether this might affect potato skin finish, leading to the trials described in the presentation attached. These were conducted independently of British Sugar, by Tolis and others. All the trials were with Maris Piper due to the importance of this variety and its susceptibility to common scab.

Ca content in scab affected skin is high, which may be the cause of the belief that liming exacerbates common scab.

In 2012 there was a linear marketable yield response to Limex, in a replicated trial. Glasshouse trials showed visually clean tubers. SASA analysis found less colony forming bacteria when either Limex or gypsum were applied than on the control.

British Sugar recommend incorporation of Limex at secondary cultivation pre-potato or in rotation pre Brassica.

Comment from Eric Anderson. The trials showed no increase in common scab with a starting pH of > 7.0. But in Scotland initial pH is often around 6.0, and liming increases common scab. Such different results from different initial soil pH can be explained by Canadian research finding that adjusting the pH to a point unfavourable to the scab organism reduces damage.

Q. Did you ever look at internal rust spot or did that not occur in your trials? **Ans** Did not occur.

Q Could there be an effect of Limex on powdery scab? **Ans.** Possibly on Scottish seed potato.

Q Does Limex consistently increase dry matter content? Does this represent a bruising risk? **Ans** There is either an upward trend or a significant increase in dry matter content with Limex. High dry matter can be desirable. Bruising tends to be a risk in Maris Piper, so crops are often lifted early if dry matter starts to rise.

Q Is there an effect of Limex on cavity spot? **Ans** A beneficial reduction of cavity spot from Limex was shown in AHDB research.

Q Lime is much used on Brassica. Is there a good effect of Limex on common scab in the 2nd year when applied to the Brassica? **Ans** only anecdotally from growers who say potatoes following Brassica usually have good skin finish. This could be due to Limex, but Dennis Walsh suggested its due to the breakdown product of the Brassicas themselves.

Joe Martin AHDB, Sceptre Plus

The original Sceptre ended in 2014. Lasted 5 years. There has had a gap due to funding but also to allow more actives to come along. The new Sceptre started in 2017. First there was a gap analysis in horticulture. The potatoes gap analysis will be done by Harper Adams University in the next 4 months and will cover seed through to storage.

Sceptre plus has a steering Group chaired by Ed Moorhouse and with broad representation. AHDB Horticulture will invest £1.4 million over 4 years. Year 1, last year, also benefitted from £50,000 from industry. 22 test crops were selected.

For weed control it had been hoped to include non-chemical approaches such as electric weeding, but the technology may not be sufficiently advanced yet.

KT is embedded in trials which has been interesting. Joe Martin was surprised at how much phytotoxicity damage carrot growers would expect and accept. CRD staff have been willing to attend events, and this involvement is welcome.

Questions:

Q Why are CRD involved, just re EAMUs? **Ans.** It shows a change in mindset at CRD. The data can also be used for on label recommendation, but this isn't easy. Emergency approvals are another route, though these can be too slow to meet an emergency; as happened with diamond back moth last year.

Q Do EAMUs have any value for potato, which isn't a minor crop? **Ans** Possibly minor uses on a major crop can obtain EAMUs.

Comment from Jeff Beever. The PPA discuss needs and gaps and have discussed incorporation with Sceptre plus.

Q Do biologicals and biopesticides need to gain CRD approvals? **Ans** Biopesticides have to go through approval process, but biostimulants are still a grey area.

Q Do we need to wait for the gap analysis? **Ans** Yes, unless urgent.

Q Will the gap analysis report by HAU be made available? **Ans** Yes, for feedback from the group before publication (Joe Martin will look into this), and after publication.

James Holmes Senior Scientist Crop Nutrition, Soil and Growing Media AHDB

A literature review will take place in 2018/19 on calcium for potatoes, to identify what is known and the key questions we don't yet know answers to. One aspect it will examine is comparative thresholds from NRM, Lancrop and other labs. **Q** Is extraction method the same across all labs for Ca? **Ans** Not known

Jon Knight Head of crop health and protection, AHDB

Jon has seen the Treater group terms of reference with the objectives:

- To improve standards of crop protection for the sustainable production of potatoes
- To consult on matters of crop protection through its members representing different sectors of the supply chain and other related industries
- To facilitate knowledge transfer through AHDB Potatoes and industry
- To develop guidelines for best practice.

With cross sectoral teams at AHDB there is a danger of drifting away if we lack the sectoral input. Jon wants to know if the Treater Group meets a need and should the terms of reference be changed, perhaps broadened? Is there satisfaction or does it continue to deliver?

David Turner filled in some history, saying that at the start the group just looked at tuber treatment and now has a wider remit, and is worthwhile. Jon asked if the group sees output and the chairman stated that he'd like to see output from the group put in front of growers.

Jon proposed putting information from the Treater group onto the AHDB web site. Dennis Walsh asked if presentations and minutes should go onto AHDB web site, and this was agreed by all.

David Turner said David Mossman from Potato Review is always looking for information, and the chairman agreed that this would be an avenue for the group to get its views known. Mark Taplin asked if SPot farm could demonstrate, or PIP.

Topics for future meetings

Nozzle technology was suggested as the topic for the next meeting, to include 90% drift nozzles and LERAPS. The chairman informed the group that it had last been discussed in late 2013. This topic was agreed. There is a link to new products for soil treatments, one of which has an application rate of only 0.8l/ha. The new fluopyram product rate will be 0.625l/ha. David Turner commented that Dosatrons can only go down to 1% and aren't reliable at that rate, so pre-dilution will be required.

Suggested speakers: Tom Robinson, (now independent, might be expensive), James Thomas, Claire Butler-Ellis at Silsoe (linked to Amber biopesticide).

James Holmes will bring the results of the literature review on calcium, and check the summary with the group.

Date for next meeting; **Nov 7th** selected following the meeting.

Venue. Suggestion to contact Danny Hubbard to ask if Team Sprayers might host.

AOB

A request from Graham Tomalin to join the Treater Group was accepted unanimously.