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| **Project title** | Blackcurrants: Evaluation of soil nitrogen assessments and the use of controlled release nitrogen fertilisers |
| **Project number:** | SF 12 (221) |
| **Project leader:** | John Atwood, ADAS UK Ltd |
| **Report:** | Final report, October 2009 |
| **Previous report** | None |
| **Key staff:** | John Atwood, Project leader |
| **Location of project:** | Kent, Norfolk & Herefordshire |
| **Project coordinator:** | Rob Saunders, GSK |
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| **Key words:** | Blackcurrants, Ribes nigra, nitrogen, fertiliser, nutrition |

## DISCLAIMER:



The results and conclusions in this report are based on an investigation conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

# AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

John Atwood
Senior Research Scientist
ADAS UK Ltd

Signature ............................................................ Date ............................................

**Report authorised by:**

Tim O'Neill
Horticultural Research Manager
ADAS UK Ltd

Signature ............................................................ Date ............................................

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# GROWER SUMMARY

## Headline

- A survey of 12 blackcurrant plantations showed that residual soil nitrogen levels were lower than in an earlier (1992) survey but could still contribute 20-50% of the estimated crop requirement.

### Background and expected deliverables

The current UK fertiliser recommendations for blackcurrants are largely based on the work of Bould and subsequently Bradfield (1969) at Long Ashton Research Station. Since that work was carried out cultivars and growing systems have changed. Whilst modern cultivars are high yielding, some can be excessively vigorous. There can be a conflict between achieving optimum growth, flower production, fruit set and quality.

In order to optimise applications of nitrogen, existing and potential soil nitrogen levels could be taken into account when making recommendations. Two methods of assessing soil nitrogen levels are available. Soil mineral nitrogen (SMN) is an estimate of the immediately available nitrogen in the soil profile. The anaerobic mineralisable nitrogen (AMN) (also referred to as potential mineralisable nitrogen) is a laboratory test that estimates the amount of nitrogen likely to become available to the crop during the season.

Earlier work by Marks (1995) showed that SMN levels could be quite high in UK blackcurrant plantations. More recently, New Zealand research (Craighead *et al* 2007) has shown that the use of soil anaerobic mineralisable nitrogen (AMN) tests gave a useful estimate of additional nitrogen likely to become available through mineralisation. The AMN level plus amount of fertiliser applied, gave the best correlation with yield when compared with other methods. The New Zealand researchers did not use SMN measurements in their study because previous experience there had shown nitrogen levels to be transient and the results somewhat variable (Craighead, pers. com.)

 

The main part of this study was a survey of soil N levels in a range of blackcurrant plantations and an assessment of the possible benefits in using soil mineral nitrogen (SMN) and/or anaerobic mineralisable nitrogen (AMN) tests to refine nitrogen recommendations for blackcurrants.

A further study within this project assessed the value of using a controlled release nitrogen fertiliser compared with straight nitrogen formulations. Environmental considerations require growers to match more closely the nitrogen applications to crop requirements and avoid excessive nutrient leaching. The use of controlled release fertilisers offers the possibility of matching release more closely with demand thereby improving the efficacy of nitrogen use, but this has not been evaluated on blackcurrants

## Summary of the project and main conclusions

Soil samples were taken from 12 blackcurrant plantations in Kent, Norfolk and Herefordshire in early March 2009 prior to the application of fertilisers. The soil was tested for SMN in two profiles 0-30 cm and 30-60 cm, and the 0-30 sample was also tested for AMN. Sampling was repeated immediately after harvest in 5 plantations.

Soil nitrogen measurements in most of the plantations tested were quite low, averaging 20 kg N/ha AMN and 27 kg N/ha SMN. AMN levels were on average about one third of those recorded in a survey of New Zealand plantations (Craighead *et al* 2007) where AMN is routinely used for assessing Nitrogen requirements. SMN levels were also much lower than in the 1992 survey of UK plantations by Marks (1995). Nitrogen applications by UK blackcurrant growers have been reduced over the last 15 years and this may have resulted in a reduction in the levels of SMN.

When exceptionally low yielding sites were excluded from the data there was a correlation between total N (AMN + SMN + applied N) and yield in this study. Both SMN and AMN data were necessary to achieve the correlation. Good (>11 t/ha crops) yields were achieved with total nitrogen supplies of between 92.7 and 130 kg N / ha which would appear to support results from New Zealand suggesting a normal crop requirement of around 110 kgN/ha (soil + applied N) extending to 150 kg N/ha for very high yielding crops.

 

Although soil N levels are relatively low in UK blackcurrant plantations they could be taken into account when deciding on nitrogen applications for blackcurrants because they may account for 20 to 50% of the crop requirement. Whilst the soil N levels are not generally high enough to justify the expense of routine annual testing, growers should be aware of typical levels in their plantations. To further refine the recommendations for UK blackcurrants it would be necessary to undertake some nitrogen response experiments on sites where SMN and AMN are monitored.

Measurement of a limited number of sites post-harvest indicated that in all cases there was a good reserve of soil nitrogen available. It is therefore unlikely that any of these sites would have benefited from additional nitrogen applied post-harvest.

A small additional study assessed the effect of applying the nitrogen fertiliser in controlled release (CRF) form compared with straight fertiliser. Three treatments were compared in an un-replicated observation applied to a mature plantation of Ben Hope at Gorgate Ltd, Hall Fm., Gressenhall, Dereham, Norfolk, (Table 1):

Due to a delay in the supply of the Agroblen CRF the fertilisers were applied later than planned on 1 May 2009. Soil conditions were very dry both before and after application. Yields from the straight fertiliser plots (treatments 2 & 3) were 7.2 t/ha, but yield from the Agroblen plot was 5.9 t/ha, a reduction of 1.3 t/ha.

It would appear that nitrogen supply in early May was limiting in the CRF plot and this resulted in a yield reduction. It is interesting that although there was apparently a reasonable level of soil N at this site (total 74 kgN/ha) when measured in March this was clearly insufficient to support the crop in May (growth stage F3 on 1May 2009) when there was a high requirement from developing leaf and setting fruit.

It is likely that if the fertilisers had been applied at the planned time April, the CRF might have performed better.

 

**Table 1.** Treatments for controlled release fertiliser trial

| Treatment No. | Fertiliser | Product rate (kg/ha) | Nutrients applied (kg/ha) | | | | Date applied |
|---|---|---|---|---|---|---|---|
| | | | N | $P_2O_5$ | $K_2O$ | Mg | |
| 1 | Agroblen (26:5:11) | 231 | 60 | 11 | 25 | | 1/5/09 |
| | Potassium Sulphate | 190 | | | 95 | | 1/5/09 |
| | Magnesium Sulphate | 185 | | | | 30 | 1/5/09 |
| 2 | Compound (9.8:19.5:4.8) | 612 | 60 | | 120 | 30 | 1/5/09 |
| | Ammonium nitrate | | 30 | | | | 27/5/09 |
| 3 | Compound (9.8:19.5:4.8) | 612 | 60 | | 120 | 30 | 1/5/09 |

## Financial benefits

Where growers are making post-harvest applications of nitrogen these could be eliminated with a saving of £20 /ha for a typical application of 40 kg/ha. The combined AMN + SMN analysis cost is quite high at £48 per sample plus the cost of sampling (which requires a specialist auger). Therefore financial benefits would only be possible if there was a saving of 96 kg N per site sampled.

There are however important environmental benefits in avoiding nitrogen applications in excess of the crops' requirements.

The study has not shown any financial benefit from the use of nitrogen in controlled release fertiliser form but it is possible an earlier timing would have given different results.

 

## Action points for growers

- Growers should consider taking soil samples for AMN and SMN analysis from representative fields on their farms.
- If soil analysis is not carried out allowance should be made for 20-40 kgN/ha to be available from soil reserves when estimating the crop requirements.
- Post harvest nitrogen applications are not recommended

 

# SCIENCE SECTION

## Introduction

The current UK fertiliser recommendations for blackcurrants are largely based on the work of Bould and subsequently Bradfield (1969) at Long Ashton Research Station. Since that work was carried out cultivars and growing systems have changed. Whilst modern cultivars are high yielding, some can be excessively vigorous. There can be a conflict between achieving optimum growth, flower production, fruit set and quality.

In order to optimise applications of nitrogen, existing and potential soil nitrogen levels should be taken into account when making recommendations. Research in the early 1990s (Chambers *et al*., 1991) showed that soil mineral nitrogen (SMN) measurements in the spring could be used to estimate soil nitrogen supply and to reduce spring nitrogen applications for arable crops in high nitrogen residue situations. The technique is currently recommended in situations when high N residues are thought to occur (Anon, 2009).

Earlier work by Marks (1995) also showed that soil mineral nitrogen levels could be excessively high in UK blackcurrant plantations. More recently New Zealand research (Craighead *et al.,* 2007) has shown that the use of soil anaerobic mineralisable nitrogen (AMN) tests (Keeney & Bremner, 1966) can also give a good guide to the level of residual nitrogen in the soil and an estimate of the additional nitrogen likely to become available through mineralisation. The AMN level + applied fertiliser gave the best correlation with yield when compared with other methods. The New Zealand researchers did not use SMN measurements in their study because previous experience there had shown nitrogen levels to be transient and the results somewhat variable (Craighead, pers. com.). A five year HGCA project is also underway investigating the value of AMN measurements + SMN measurements in calculating the soil nitrogen supply (SNS) for arable crops (Kindred, 2008).

In this project soil N levels were surveyed in a range of plantations as a preliminary investigation to see if there would be a value in using soil mineral nitrogen (SMN) and/or anaerobic mineralisable nitrogen (AMN) tests to refine nitrogen recommendations for blackcurrants.

 

A further study within this project investigated the value of using a controlled release nitrogen fertiliser compared with straight nitrogen formulations. Environmental considerations require growers to match more closely the nitrogen applications to crop requirements and avoid excessive nutrient leaching.  The use of controlled release fertilisers offers the possibility of matching release more closely with demand improving the efficacy of nitrogen use but has not been evaluated on blackcurrants

 

## Materials and methods

In early March 2009 soil samples were taken from 12 blackcurrant plantations. To achieve a geographical spread and a range of soil types, samples were taken from six farms, two from Kent, two from East Anglia and two from the West Midlands, sampling two plantations at each farm with either a soil type difference or a cultivar difference.

Samples were taken at each site taking at least 20 cores per field from within the herbicide strip of the crop row using a gouge core auger. Samples were taken at 0-30 cm and 30-60 cm depths. Samples were analysed for Soil Mineral Nitrogen (SMN) and Anaerobic Mineralisable Nitrogen (AMN) at NRM Laboratories, Bracknell.

Plantation details, soil type, N fertiliser applications (pre-harvest), crop yield and growers' comments about plantation vigour were recorded for each site (Table 2).

Five sites (no 8 (two samples), 10, 11 & 12) were re-sampled immediately after harvest in late July (Hereford) or early August (Norfolk) 2009.

In order to determine whether there were any significant relationships between yield and AMN, SMN, AMN + applied N, SMN + applied N or total N, the correlations were calculated and tested to see whether any were significant at P=0.05. Where the correlation indicated that there was a significant relationship the fitted line was calculated using regression analysis and the equation of the line and the R2 value produced.

 

**Table 2.** Details of blackcurrant plantations sampled in 2009

| Site No. | Location | Cultivar | Planted | Soil Type | Nitrogen Application (kg/ha) | Timing |
|---|---|---|---|---|---|---|
| 1 | Kent | Ben Tirran | 2004 | CL | 50 | Early April |
| | | | | | 25 | Early June |
| 2 | Kent | Ben Gairn | 1999 | MSL | 50 | Early April |
| | | | | | 25 | Mid May |
| 3 | Kent | B Lomond | 1999 | FSL | 23 | Mid May |
| 4 | Kent | Ben Hope | 2001 | FSL | Nil | |
| 5 | Norfolk | Ben Gairn | 2000 | MSL | 50 | End Mar |
| | | | | | 60 | Early May |
| 6 | Norfolk | Ben Hope | 2002 | SCL | 50 | End Mar |
| 7 | Norfolk | Ben Hope | 1999 | SCL | 60 | End Mar |
| 8 | Norfolk | Ben Hope | 1998 | MSL | a) 60 | Early May |
| | | | | | 30 | End May |
| | | | | | b) 60 crf* | Early May |
| 9 | Hereford | Ben Gairn | 1997 | ZCL | 60 | Mid Mar |
| | | | | | 24 | End Apr |
| | | | | | 03** | Apr-May |
| 10 | Hereford | Ben Hope | 1997 | ZCL | 60 | End Mar |
| | | | | | 24 | Early May |
| 11 | Hereford | Ben Hope | 2003 | MSL | 40 | Mid Mar |
| | | | | | 20 | Mid April |
| 12 | Hereford | Ben Gairn | 2000 | MSL | 36 | Mid Mar |
| | | | | | 36 | Mid April |
| | | | | | 18** | May-Jul |

* One row of site 8 (b) received N as a controlled release fertiliser, this area was sampled separately post-harvest

**Foliar applied

 

## Results & discussion

At the start of the season total SMN readings for the 12 sites surveyed ranged from 7.8 – 44.4 kg/ha with the average being 20 kg/ha (Table 3). All except one result fell within the "low" category (0-40 kg/ha N) of the ADAS classification for arable crops (Chambers, 1992). These levels were considerably lower than the average of 165 kg/ha N reported by Marks (1995) from a survey of 10 blackcurrant plantations in late winter 1992. Marks suggested that these high readings were the result of routine nitrogen applications in excess of crop requirements The average application rate for N in the 1992 survey was equivalent to 155 kg/ha in the crop row. In most cases growers' N applications were still within the published recommendations, leading Marks (1995) to suggest that the recommendations be reassessed. In practice the industry has reduced nitrogen application rates considerably since 1992. In the current survey the average N application rate was 67 kg/ha (Table 4) only 43% of the amount used in 1992.

**Table 3.** Soil nitrogen results for 12 blackcurrant sites, pre-season 2009

| **Site** | **AMN 0-30 cm** | **SMN 0-30 cm** | | | **SMN 30-60 cm** | | | **Total SMN Kg/ha** | **Total N kg/ha** |
|---|---|---|---|---|---|---|---|---|---|
| | N kg/ha | $NO_3$-N mg/kg | $NH_4$-N mg/kg | N kg/ha | $NO_3$-N mg/kg | $NH_4$-N mg/kg | N kg/ha | | |
| 1 | 20 | 1.02 | 0.96 | 7.9 | 0.85 | 0.73 | 6.3 | 14.2 | 34.2 |
| 2 | 20 | 2.41 | 1.14 | 14.2 | 1.72 | 0.69 | 9.6 | 23.8 | 43.8 |
| 3 | 20 | 1.3 | 1.4 | 12.1 | 0.86 | 0.92 | 7.1 | 19.2 | 39.2 |
| 4 | 50 | 0.89 | 0.76 | 6.6 | 0.49 | 0.64 | 4.5 | 11.1 | 61.1 |
| 5 | 40 | 2.13 | 0.94 | 12.5 | 1.47 | 0.37 | 9.4 | 21.9 | 61.9 |
| 6 | 20 | 2.69 | 1.06 | 15.1 | 1.34 | 0.56 | 7.6 | 22.7 | 42.7 |
| 7 | 30 | 3.53 | 1.84 | 21.5 | 1.41 | 0.81 | 8.9 | 30.4 | 60.4 |
| 8 | 30 | 5.11 | 1.19 | 25.2 | 3.26 | 1.54 | 19.2 | 44.4 | 74.4 |
| 9 | 20 | 0.61 | 0.76 | 5.5 | 0.05 | 0.53 | 2.3 | 7.8 | 27.8 |
| 10 | 20 | 0.97 | 0.60 | 6.3 | 0.05 | 0.51 | 2.3 | 8.6 | 28.6 |
| 11 | 30 | 1.23 | 0.93 | 8.6 | 0.57 | 1.01 | 6.3 | 14.9 | 44.9 |
| 12 | 20 | 1.45 | 1.55 | 12.0 | 1.28 | 0.72 | 8.0 | 20.0 | 40.0 |

 

Pre-season AMN readings ranged from 20-50 kg/ha N with an average of 27 kg/ha N (Table 3). From field studies in 2005-6, Craighead *et al* (2007) showed that AMN levels in New Zealand blackcurrant plantations were relatively high. Results ranged from <50 to 200 kgN/ha with most 70-110 kgN/ha. By comparison the UK survey results are relatively low.

For the sites where soil nitrogen was measured post-harvest, in all but one case higher levels of SMN and AMN were recorded compared with pre-season measurements (Table 4). Similarly, higher levels of SMN were recorded by Marks (1995) in the autumn compared with the late winter. In the current survey post harvest SMN results were more variable than pre-season, ranging from 17.8 to 240.4 kgN/ha. It is difficult to explain the exceptionally high level at site 12, however the crop was known to be poorly growing and may not have utilised all of the applied nitrogen. AMN levels were again slightly higher at most sites post-harvest compared with pre-season. In general it would appear that all of the sites were adequately supplied with available nitrogen and three out of five had excessive levels.

**Table 4.** Soil nitrogen results post-harvest at 12 blackcurrant sites, 2009

| **Site** | **AMN 0-30 cm** | **SMN 0-30 cm** | | | **SMN 30-60 cm** | | | **Total SMN kg/ha** | **Total N kg/ha** |
|---|---|---|---|---|---|---|---|---|---|
| | N kg/ha | $NO_3$-N mg/kg | $NH_4$-N mg/kg | N kg/ha | $NO_3$-N mg/kg | $NH_4$-N mg/kg | N kg/ha | | |
| 8a | 70 | 5.16 | 2.65 | 31.2 | 3.1 | 1.8 | 18.3 | 49.5 | 119.5 |
| 8b* | 60 | 6.86 | 3.78 | 42.6 | 4.26 | 1.89 | 24.6 | 67.2 | 127.2 |
| 10 | 30 | 0.91 | 3.10 | 16.0 | 0.08 | 0.38 | 1.8 | 17.8 | 47.8 |
| 11 | 30 | 2.46 | 1.83 | 17.2 | 0.91 | 0.49 | 5.6 | 22.8 | 52.8 |
| 12 | 10 | 31.59 | 8.59 | 160.7 | 14.18 | 3.25 | 69.7 | 230.4 | 240.4 |

* Site 8b received nitrogen as controlled release fertiliser.

When testing the entire data set there were no statistically significant ($p=<0.05$) positive correlations between yield and nitrogen supply in this survey, with good (>11 t/ha) yields being achieved with total nitrogen supplies ranging from 92.7 – 130 kgN/ha (Table 5).

**Table 5.** Nitrogen application, soil nitrogen pre-harvest and yield for 12 blackcurrant sites, 2009

| Site | AMN | SMN | Applied N | Total N | Yield (t/ha) |
|---|---|---|---|---|---|
| 1 | 20 | 14.2 | 75 | 109.2 | 14.0 |
| 2 | 20 | 23.8 | 75 | 118.8 | 9.0 |
| 3 | 20 | 19.2 | 23 | 62.2 | 9.9 |
| 4 | 50 | 11.1 | 0 | 61.1 | 7.4 |
| 5 | 40 | 21.9 | 110 | 171.9 | 8.9 |
| 6 | 20 | 22.7 | 50 | 92.7 | 12.1 |
| 7 | 30 | 30.4 | 60 | 150.4 | 7.4 |
| 8a | 30 | 44.4 | 90 | 164.4 | 7.2 |
| 9 | 20 | 7.8 | 87 | 114.8 | 11.2 |
| 10 | 20 | 8.6 | 84 | 112.6 | 14.0 |
| 11 | 30 | 14.9 | 60 | 104.9 | 11.1 |
| 12 | 20 | 20.0 | 90 | 130.0 | 15.4 |
| **Average** | **27** | **20** | **67** | **116** | **11** |

It is likely that at the lower end of the spectrum, yields were being limited by factors other than nitrogen supply (e.g. poor fruit set due to weather conditions) and consequently nitrogen supply was not a significant factor in those situations. It was therefore decided to study a selected data set where sites with low (<8 t/ha) yields (sites 4, 7 and 8a) and/or low efficiency of utilisation (<80 kg fruit per kg N) (sites 2 and 5) were excluded.

For the selected data set correlations between yield and AMN, SMN, AMN + applied N, or SMN + applied N were all tested for but none were statistically significant. It was only when both AMN and SMN and applied nitrogen were taken into account that a positive correlation between N supply and yield was found. The relationship between Total N (AMN + SMN + applied N) and yield was significant

 

(Correlation=0.7611; P=0.0469). The fitted equation was: Yield = 5.26+0.0701 Total N, with $R^2$=0.5793 and percentage variance accounting for 49.5 (Fig. 1).

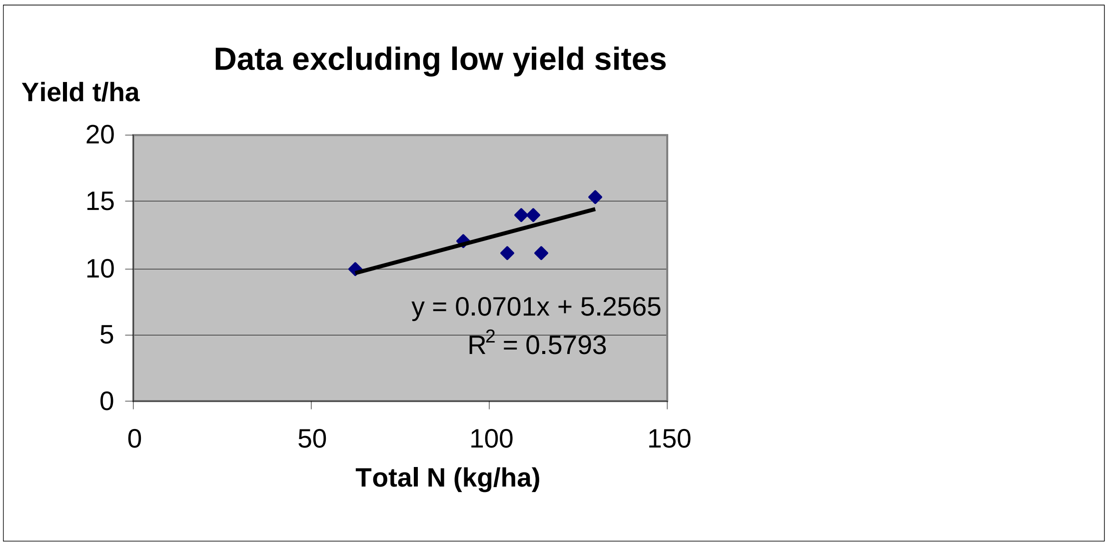


**Figure 1.** Relationship between yield and total N supply for x blackcurrant sites – excluding low-yield sites

## Conclusions

Soil nitrogen measurements in most of the plantations tested were relatively low, both for AMN and SMN. AMN levels were on average about one third of those recorded in a survey of New Zealand plantations (Craighead *et al*., 2007) where AMN is routinely used for assessing nitrogen requirements. SMN levels were also much lower than in the 1992 survey of UK plantations by Marks (1995). Nitrogen applications by UK blackcurrant growers have been reduced over the last 15 years and this may have resulted in a reduction in the levels of SMN.

The exact nitrogen requirement for blackcurrants is still subject to debate. The recommendations in the Defra Fertiliser Manual (formerly RB209) are still set at 160 kg/ha. However crops studies in New Zealand have indicated a normal requirement of 110 kg N / ha with only the highest yielding crops requiring 150 kg N / ha. In the more recent work sponsored by GlaxoSmithKline Nutritional Healthcare (Horticulture Link project MRS/003/02) the authors claimed a yield response up to 152 kg N / ha (for cv Baldwin), however this result was not consistent between the two years of the field trials and there was also evidence to suggest that a lower (76 kg N / ha) rate of applied nitrogen was sufficient for cv Ben Lomond. No soil nitrogen measurements were made prior to treatment but it is likely that further N would have been available from soil reserves.

When low yielding sites were excluded from the data in this study there was a correlation between total N (AMN + SMN + applied N) and yield. There was no correlation when soil N data was excluded. Good (>11 t/ha crops) yields were achieved with total nitrogen supplies of between 92.7 and 130 kg N / ha, which would appear to support the results from New Zealand.

Although soil N levels are relatively low in UK blackcurrant plantations they could be taken into account when deciding on nitrogen applications for blackcurrants because they may account for 20 to 50% of the crop requirement. Whilst the soil N levels are not generally high enough to justify the expense of routine annual testing, growers should be aware of typical levels in their plantations. To further refine the recommendations for UK blackcurrants it would be necessary to undertake more nitrogen response experiments on sites where SMN and AMN are monitored

Measurement of a limited number of sites post-harvest indicated that in all cases there was a sufficient reserve of soil nitrogen available. It is therefore unlikely that any of these sites would have benefited from additional nitrogen applied post-harvest.

*Controlled release fertiliser study*

## Materials and methods

A separate study was carried out to observe the effect of applying nitrogen in controlled release (CRF) form. The original intention was to use a sulphur coated urea. This is a straight nitrogen formulation that releases over 2-3 months according to moisture levels and is relatively cost effective. However it proved impossible to source the product at the time required so the closest available product – Agroblen Forestry (Scotts Co.) was used. Agroblen Forestry is a 26:5:11 containing both sulphur coated urea and organic resin coated compound fertiliser. The resin coating controls nutrient release and is more temperature dependant than moisture dependant. Unfortunately supply of this product from Scotts Co. was also delayed and application was made about one month later than planned. Agroblen was compared with industry standard non controlled release fertiliser (non-CRF) nitrogen formulated fertilisers.

This study was an un-replicated observation with the treatments listed in Table 6.

**Table 6.** Treatments for controlled release fertiliser trial in blackcurrants

| Treatment No. | Fertiliser | Product rate (kg/ha) | Nutrients applied (kg/ha) | | | | Date applied |
|---|---|---|---|---|---|---|---|
| | | | N | $P_2O_5$ | $K_2O$ | Mg | |
| 1 | Agroblen (26:5:11) | 231 | 60 | 11 | 25 | | 1/5/09 |
| | Potassium sulphate | 190 | | | 95 | | 1/5/09 |
| | Magnesium sulphate | 185 | | | | 30 | 1/5/09 |
| 2 | Compound (9.8:19.5:4.8) | 612 | 60 | | 120 | 30 | 1/5/09 |
| | Ammonium nitrate | | 30 | | | | 27/5/09 |
| 3 | Compound (9.8:19.5:4.8) | 612 | 60 | | 120 | 30 | 1/5/09 |

Crop and site details were as follows:

| | |
|---|---|
| Location | Hall Fm, Gressenhall, Norfolk |
| Cultivar | Ben Hope |
| Planted | 1998 |
| Cut down (for rejuvenation) | Winter 2006/07 |
| Row spacing | 3.0 m x 0.3 m |
| Soil type | Medium sandy loam |
| Soil indices | P (4), K(2), Mg(2) |
| Soil N | AMN (30 kg/ha), SMN (44 kg/ha) |
| Irrigation | Not used |
| Plot size | 1 row per treatment (840 $m^2$) |

 

Soil samples were taken in early March and again in early August for laboratory analysis for SMN and AMN (NRM, Bracknell).

Yields were calculated from bin weights following machine harvesting of each of the trial rows end July 2009.

Extension growth was recorded on 6 October 2009 by measuring 10 shoots randomly selected along each row of the trial.

## Results and discussion

The row receiving the Agroblen controlled release fertiliser yielded 1.3 t/ha lower than the other two treatments (Table 7). Although this was an un-replicated trial and it was therefore not possible to test for statistical significance care was taken to ensure the treated rows in the trial were as similar as possible in all other respects. Given the size of the yield difference it is worthy of note.

Soil conditions were dry both before and after applying the fertilisers. It is likely that the delay in applying the fertiliser was a significant factor in the poor performance of the Agroblen. In early May the crop was at 100% fruit set stage (F3) and with rapid growth the demand for nitrogen was likely to be relatively high. The nitrogen demand at this time appears to have been better met by a straight nitrogen fertiliser with immediate release than by a controlled release form.

Perhaps not surprisingly in view of the late application, there was no further yield benefit from applying a top dressing of 30 kgN/ha at the end of May.

**Table 7.** Effect of fertiliser treatments on blackcurrant yields, Hall Fm. Gressenhall, 2009

| Treatment No. | Fertiliser | N rate kg/ha | Timing | Yield (t/ha) |
|---|---|---|---|---|
| 1 | Agroben (CRF) | 60 | 1/5/09 | 5.9 |
| 2 | Compound | 60 | 1/5/09 | 7.2 |
| | Ammonium nitrate | 30 | 27/5/09 | |
| 3 | Compound | 60 | 1/5/09 | 7.2 |

 

Both treatments sampled for soil N left substantial nitrogen residues available in the soil post harvest (Table 8).

**Table 8.** Effect of fertiliser treatments on soil N measurements post blackcurrant harvest, Hall Fm. Gressenhall, 2009

| Treatment No. | Fertiliser | Soil N measurements post-harvest (kgN/ha) | | |
|---|---|---|---|---|
| | | **AMN** | **SMN** | **Total N** |
| 1 | Agroblen (CRF) | 70 | 49.5 | 119.5 |
| 2 | Compound<br>Ammonium nitrate | <br>60 | 67.2 | 127.2 |
| 3 | Compound | Not recorded | | |

There were some differences in extension growth between the treatment rows (Table 9). The CRF treatment had the most extension growth compared with the compound plus top dressing and the compound. However differences were small and should be treated with caution because it was not possible to statistically analyse the results.

**Table 9.** Effect of fertiliser treatments on blackcurrant extension growth, Hall Fm. Gressenhall, October 2009

| Treatment No. | Fertiliser | Extension growth (cm) |
|---|---|---|
| 1 | Agroben (CRF) | 16.7 |
| 2 | Compound<br>Ammonium nitrate | 11.6 |
| 3 | Compound | 14.9 |

## Conclusions

The fertilisers were applied too late to give a fair assessment of the possible benefit from a controlled release formulation. It is clear that nitrogen supply in early May was limiting in the CRF plots and this resulted in a yield reduction of 1.3 t/ha.

 

## Technology transfer

No technology transfer activities took place during this project.

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