Grower Summary

SF 012 (GSK221)

Blackcurrants: Evaluation of soil nitrogen assessments and the use of controlled release nitrogen fertilisers

Final 2009

Disclaimer

The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

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Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

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Further information

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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