Grower Summary

FV 380

Identification of critical soil P in vining pea crops

Final 2014

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Further information

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Project Number:	FV 380
Project Title:	Identification of critical soil P in vining pea crops
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GROWER SUMMARY

Headline

Results from this project suggest that vining peas should be grown at phosphate (P) Index of 3. On average, across sites the mean yield response of vining peas grown on soils at a P Index 3 compared to an Index 2 was 0.8 t/ha.

Background

The recent increasing costs of Phosphate (P) fertiliser and concerns from the risk of diffuse pollution have re-opened the debate on the need to apply P, and whether or not a target P Index of 2 (Olsen P 16-25 mg/l) is appropriate for all soil types and crop conditions. This project delivers improved guidance to growers on target soil P indices suitable, in terms of plant nutrition, for both yield and quality for vining pea crops on a range of soil types, and new information on crop response to fresh P fertiliser.

Guidance to growers following results from this project will allow the use of P fertiliser to improve the economic efficiency in vining pea production. Specific targeted doses of P fertiliser should reduce the risk of undesirable P losses to water courses resulting in eutrophication and potentially help to meet future requirements of the Water Framework Directive.

Summary

Many vining pea growers are questioning whether or not a target soil Phosphate (P) Index of 2 (Olsen P range of 16-25 mg/l) is appropriate for all soil types and crop conditions. This target Index, based on critical soil P levels to achieve 95% of maximum crop yield, was established to achieve economic yields for all crops grown in any rotation and was based on the results of a limited number of field experiments.

Critical P values can vary between soils, depending upon soil physical conditions (e.g. soil structure, moisture, bulk density, stone content and soil porosity) and between crops, depending on root growth and architecture and P uptake rate needed to achieve maximum yield. To date, however, sufficient data for making a scientifically robust change to the recommendations have not been available.

This project aimed to identify the levels of Phosphate required in vining pea production to help growers maximise yield and quality.

Results over three cropping years from six sites on contrasting soils suggest that Olsen P should be maintained at P Index 3 for vining pea crops. Critical P values to achieve 98% of maximum yield were around 27 - 41 mg/l (or at P Index of 3) and this was economically justified. The mean yield response of vining peas grown on soils at a P Index 3 compared to an Index 2 was 0.8 t/ha. A small or large dose of fresh P fertiliser did raise vining pea yields to above that achieved at Index 2. Therefore, growers could maintain an Olsen P at Index 2 for combinable crops (across the wider farm rotation) and apply a fresh P fertiliser dose ahead of the vining pea crop. Applying either a small or large fresh P fertiliser dose ahead of vining peas resulted in a mean yield response of 0.2 t/ha or 0.5 t/ha respectively over and above Index 2 Maintaining higher soil Olsen P indices increased crop vigour and, in some instances, improved seed size and root nodulation.

Financial Benefits

For all sites, to raise Olsen P from Index 2 to Index 3, before the additional crop value exceeds the cost of achieving and then maintaining an increase in P Index, would take 1 to 4 cropping cycles to see economic returns; which ranged from £125 to £580/ha. The number of cropping cycles would be dependent upon the length of farm rotation and the frequency of inclusion of vining pea crops within the rotation. However, maintaining an Olsen P at Index 2 for combinable crops (across the wider farm rotation) could potentially allow growers to apply a low fresh P dose and gain a net return of £44 to £393/ha above that at Index 2.

Action Points

- Maintain soil Olsen P at Index 3 for optimum yield in vining peas.
- Ensure soil is regularly tested (every 3 to 4 years) for Olsen P to maintain Indices.
- Ensure soil structure is maintained to allow for improved crop rooting that will maximise P uptake and efficiency by the vining pea crop.