Project Title: Vining peas: Control of volunteer potatoes

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## GROWER SUMMARY

### Headline

- The treatments examined in this work did not control volunteer potatoes in vining peas or the formation of the toxic berries which some varieties produce.
- Making use of existing web based tools could minimise the chances of crop rejection if potatoes and vining peas are in the same rotation (£240/tonne). See: (http://www.potato.org.uk/department/export_and_seed/seed_variety_database/index.html)

### Background and expected deliverables

The contamination of vining pea produce (worth approximately £240/tonne) with toxic potato berries can cause crop rejection. The control of the berry formation is possible using a Fortrol (cyanazine) and Trifol-Xtra (MCPB+MCPA) mix but this is not 100% reliable and timing of application is very important.

As part of European Council Directive 91/414/EEC cyanazine will be unavailable for use after the 2007. Past work by PGRO has noted that treatments containing MCPA+MCPB alone are not effective at preventing berry formation the cyanazine appears to have an unexplainable but crucial part to play in preventing formation.

Many vining pea crops are in a rotation with potatoes and an alternative control method is required for the 2008 season.

The expected deliverables from this project are:

• An evaluation of a range of materials (bifenox, boron, and various adjuvants) used along with MCPA + MCPB to mimic the “cyanazine effect” and prevent potato berry formation.

### Summary of the project and main conclusions

• Control of potato berry formation within the commercial crops appeared to be successful this season compared to the four trials. The cyanazine component of the mix caused more physical damage to the potato plant than the treatments tested but the chemical was still tolerated well by the crop. This damage could well influence chemical uptake and maximise the chance of potato berry control.

• None of the treatments tested in the trials had any statistically significant effect on numbers of potato flowers or berries developing at any of the 4 sites.

• At the Thornhaugh and Gosberton Cheal sites varying degrees of crop twisting were noted within 7 days of spray applications containing the hormones MCPA and MCPB.

• At Thornhaugh treatments containing hormone delayed flowering.

• No treatment significantly influenced yield or maturity at the harvested Church End Drove site.

Hormones are suspected to play a major role in the prevention of flower/berry formation. The treatments chosen had little effect with or without the various adjuvants which, it was hoped, would facilitate hormone uptake. Fox (bifenox) treatments had no effect and if boron is useful the permitted amounts present in the 3.0 kg/ha rates of Mycrobor used are, unfortunately, ineffective.

On a positive note, use of the British Potato Council web site proved invaluable for determining the potato varieties which posed the greatest contamination threat to a vining pea crop and hence the better sites for this work. If potato berry formation cannot be controlled then the website could be used 'the other way round' to identify those varieties which rarely produce berries and so pose a lesser threat.
Http://www.potato.org.uk/department/export_and_seed/seed_variety_database/index.html

**Financial benefits**

• There are no financial benefits to be gained from the treatments examined in this a work.

• Making use of available web based tools could minimise the chances of crop rejection if potatoes and vining peas are in the same rotation (£240/tonne).

**Action points for growers**

• Increased attention to cultural techniques to minimise the possibility of volunteer potato development in following vining pea crops.

• Be aware of the likelihood of berry formation being a problem from knowing past grown potato varieties. If vining peas are to be grown in the same rotation the opportunity to avoid high risk fields would be useful.

## SCIENCE SECTION

### Introduction

Many vining pea crops are grown in potato production areas and volunteers can develop from seeds and tubers which are left behind after harvest. Generally unharvested tubers are left on or near the soil surface and hard winter frosts can effectively reduce numbers as can animal feeding but milder winters in recent years have meant a less effective winter kill and an increased problem in vining peas. The potatoes not only compete directly with the vining pea crop but as they develop many varieties produce toxic berries. The berries are very similar to peas in shape, size and colour and are difficult to sort out of a contaminated crop. A contaminated crop can lead to crop rejection.

Currently there are no effective means of volunteer potato control with any pre-emergence herbicide used in vining peas. Control of the plant is not possible post-emergence either but the use of Fortrol (cyanazine) + Trifol-Xtra (MCPB+MCPA) applied as late as possible i.e just before flowers can be found in the enclosed buds, has been effective in preventing berry formation and thus at least minimising contamination problems. Cyanazine is a material which will no longer be available after 2007 and past experience has suggested that the use of hormones alone has little effect upon berry formation.

An effective alternative is required to at least prevent the formation of the potato berries and ideally a treatment may emerge which controls the whole plant effectively.

### Materials and Methods

A trial area of the vining pea variety Bikini was drilled at the PGRO trial ground Thornhaugh. Five seed tubers of variety Desiree, a variety which produces "very many" berries, were planted in each plot.

Additional trials were laid out at Gosberton Cheal, Gosberton Risegate and Church End Drove within commercial crops of vining peas. Plots were 2m x 5m and there were four replications.

The site details were as follows:

Site 1: PGRO, Thornhaugh, Cambs OS Ref: TF 076 015. Sowing date: 3rd April 2006. Site rolled after drilling.
Soil type: Silt loam
Sprays applied: Post-emergence 5$^{th}$ June 2006. Crop growth stage 106-201 (6 nodes to enclosed bud).

Site 2: Gosberton Cheal OS Ref: TF 226 292. Sowing date: 10$^{th}$ April 2006. Site rolled after drilling.
Soil type: Silt
Sprays applied: Post-emergence 14th June 2006. Crop growth stage 107-201 (7 nodes to enclosed bud).

Site 3: Gosberton Risegate OS Ref: TF 166 312. Sowing date: 12th April 2006. Site rolled after drilling.
Soil type: Silt
Sprays applied: Post-emergence 14th June 2006. Crop growth stage 107-201 (7 nodes to enclosed bud).

Site 4: Church End Drove, Quadring OS Ref: TF 215 338. Sowing date: 19th April 2006. Site rolled after drilling.
Soil type: Silt
Sprays applied: Post-emergence 20th June 2006. Crop growth stage 201 (enclosed bud).

At each site, fifteen post-emergence sprays were examined. The products and treatments were as follows:-

| | Trade Name | Application Rate (l/ha) | Timing |
|---|---|---|---|
| 1 | Untreated | - | - |
| 2 | Impetus + Guard | 2.0 + 0.1% | Post-emergence |
| 3 | Impetus + Rhino | 2.0 + 0.15% | Post-emergence |
| 4 | Impetus + Fortune | 2.0 + 0.5% | Post-emergence |
| 5 | Impetus + Silwet-77 | 2.0 + 0.15% | Post-emergence |
| 6 | Mycrobor | 3.0kg | Post-emergence |
| 7 | Mycrobor DF + Impetus | 3.0kg + 2.0 | Post-emergence |
| 8 | Mycrobor DF + Impetus + Guard | 3.0kg+ 2.0 +0.1% | Post-emergence |
| 9 | Mycrobor DF + Impetus + Rhino | 3.0kg + 2.0 +0.15% | Post-emergence |
| 10 | Mycrobor DF + Impetus + Fortune | 3.0kg + 2.0 +0.5% | Post-emergence |
| 11 | Mycrobor DF + Impetus + Silwet-77 | 3.0kg + 2.0 +0.15% | Post-emergence |
| 12 | Mycrobor DF + Guard | 3.0kg + 0.1% | Post-emergence |
| 13 | Mycrobor DF + Rhino | 3.0kg + 0.15% | Post-emergence |
| 14 | Mycrobor DF + Fortune | 3.0kg + 0.5% | Post-emergence |
| 15 | Mycrobor DF + Silwet-77 | 3.0kg + 0.15% | Post-emergence |
| 16 | Fox + Impetus | 0.5 + 2.0 | Post-emergence |

| Trade Name | Active Ingredient | Amount of Active Ingredient |
|---|---|---|
| Impetus | MCPA + MCPB | 25:275 g/l |
| Fox | bifenox | 480 g/l |
| Mycrobor DF | Sodium pentaborate decahydrate | 18% w/w boron |
| Guard | Synthetic latex | 52% |
| Rhino | Polyether-polymethyl | |
| Fortune | siloxane | 75% |

| | | |
|---|---|---|
| Silwet-77 | Seed oil fatty acid esters<br>Polyalkylene oxide | 80% |

Crop husbandry followed standard practice.

After spray treatments were applied the vining peas were assessed for crop damage using % phytotoxicity where100% = complete crop kill, >25% = probable yield reduction and 0% = no damage. Where appropriate % flowering scores were recorded i.e. visual assessment of the proportion of plants present at any one time, with at least one open flower. Again, if appropriate a score reflecting the relative severity of any crop twisting caused by treatments was recorded, higher score = greater degree of twisting (epinasty). At all sites numbers of flowers and berries present on plots were recorded and the results statistically analysed using GENSTAT. All yield data from the Church End Drove site were recorded and the results statistically analysed using GENSTAT.

**Results and Discussion**

Applications made at Thornhaugh (Table 1), Gosberton Cheal (Table 3) and Gosberton Risegate (Table 3), at the enclosed bud growth stage indicated that the adjuvant + hormone combinations chosen were having an epinastic effect on the crop but not, on the potato target. The presence of all adjuvants except Guard increased the severity of the epinasty (twisting) from unnoticeable levels to up to scores of 16 (0-no twisting, 10-medium, 15-20- strong symptoms seen). The twisting effect itself was short lived and had disappeared 5-7 days later at both sites (See figure1).

**Figure 1**

Crop flowering at Thornhaugh (Table 1) was significantly affected. All treatments of MCPA + MCPB alone and with Mycrobor DF with all adjuvants except Guard 2000 caused delayed flowering on the variety Bikini. (See figure 2). The hand planted Desiree potatoes had emerged well at Thornhaugh but the hot weather and very dry soil conditions seemed to promote flower abscission and therefore very little of the expected berry formation. Rabbit grazing on both crop and potatoes eventually meant no further meaningful data could be gathered from the Thornhaugh site.

**Figure 2**

PGRO, Thornhaugh: Sprays applied 5th June 2006

Table 1: Thornhaugh – Crop epinasty (0 - no crop effect, 15-20- strong effect). 9th June 2006. 4 DAT.
Crop growth stage 201.
% Crop flowering. 13th June. 8 DAT. Crop growth stage 201-203

| | | 4 DAT | 8 DAT |
|---|---|---|---|
| | Treatment | Epinasty Score | % Crop flowering |
| 1 | UNTREATED | 0 | 33.75 |
| 2 | MCPA + MCPB (2.0l/ha) + Guard 2000 | 3.75 | 46.25 |
| 3 | MCPA + MCPB (2.0l/ha) + Rhino | 13.75 | 10.5 |
| 4 | MCPA + MCPB (2.0l/ha) + Fortune | 10 | 0.5 |
| 5 | MCPA + MCPB (2.0l/ha) + Silwett-77 | 12.5 | 1.25 |
| 6 | Mycrobor DF | 0 | 37.5 |
| 7 | Mycrobor DF + MCPB (2.0l/ha) | 0 | 37.5 |
| 8 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Guard 2000 | 0 | 32.5 |
| 9 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Rhino | 8.75 | 0 |
| 10 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Fortune | 8.75 | 0 |
| 11 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Silwett-77 | 11.25 | 0 |
| 12 | Mycrobor DF + Guard 2000 | 0 | 50 |
| 13 | Mycrobor DF + Rhino | 0 | 50 |

| | | | |
|---|---|---|---|
| 14 | Mycrobor DF + Fortune | 0 | 45 |
| 15 | Mycrobor DF + Silwett-77 | 0 | 42.5 |
| 16 | Fox + MCPA + MCPB | 0 | 40 |
| | **Fprob** | <0.001 | <0.001 |
| | **LSD** | 2.27 | 17.1 |
| | **CV%** | 37.1 | 45.6 |

Table 2: Gosberton Cheal - Crop epinasty (0-no crop effect, 15-20-strong effect). 20th June 2006. 6 DAT.
Crop growth stage 201.
Average numbers of purple (Maris Piper). and white (Cara) potato flowers 7th July 2006. 23 DAT. Crop growth stage 204 (pod set)
Average numbers of flowers and berries. 17 July 2006, 33 DAT. Crop growth stage 205-206 (flat pod/pod swell)

| | Treatment | 6 DAT Epinasty | 23 DAT No. purple flowers | 23 DAT No. white flowers | 33 DAT No. of flowers | 33 DAT No. of berries |
|---|---|---|---|---|---|---|
| 1 | UNTREATED | 0 | 10.75 | 1.25 | 1 | 8.75 |
| 2 | MCPA + MCPB (2.0l/ha) + Guard 2000 | 1.25 | 4.75 | 5.25 | 8 | 2.5 |
| 3 | MCPA + MCPB (2.0l/ha) + Rhino | 8.75 | 6.5 | 1 | 2.25 | 5.75 |
| 4 | MCPA + MCPB (2.0l/ha) + Fortune | 10.5 | 4.25 | 3 | 0 | 2.25 |
| 5 | MCPA + MCPB (2.0l/ha) + Silwett-77 | 12.5 | 6.75 | 4.75 | 6 | 7.5 |
| 6 | Mycrobor DF | 0 | 3.25 | 2 | 2.75 | 1.5 |
| 7 | Mycrobor DF + MCPB (2.0l/ha) | 2.5 | 10.5 | 7.5 | 6 | 4.5 |
| 8 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Guard 2000 | 0 | 8.5 | 4.75 | 4.75 | 4 |
| 9 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Rhino | 8.75 | 13.5 | 11 | 7.75 | 8.75 |
| 10 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Fortune | 7.5 | 2.5 | 4.25 | 3.5 | 1.25 |
| 11 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Silwett-77 | 8.75 | 4.25 | 6.5 | 8 | 3.25 |
| 12 | Mycrobor DF + Guard 2000 | 0.5 | 7 | 1.5 | 4.5 | 3 |
| 13 | Mycrobor DF + Rhino | 0 | 9 | 6.5 | 2.5 | 11 |
| 14 | Mycrobor DF + Fortune | 0 | 2.25 | 5 | 0 | 4.5 |
| 15 | Mycrobor DF + Silwett-77 | 0 | 11.25 | 10 | 7.75 | 12 |
| 16 | Fox + MCPA + MCPB | 0 | 10.5 | 7.25 | 9.75 | 9 |
| | **Fprob** | <0.001 | 0.452 | 0.873 | 0.667 | 0.205 |
| | **LSD** | 3.5 | 9.8 | 11.106 | 9.8 | 8.4 |
| | **CV%** | 63.1 | 95.4 | 153.1 | 148.0 | 105.6 |

At Gosberton Cheal potato volunteers of two varieties were present, Maris Piper and Cara. This was confirmed by white and purple flowers appearing. Separate counts of the different coloured flowers (Tables 2) showed that no treatment had a statistically significant effect on flower numbers with either variety. Thirty three days after treatment total flower and berry numbers were recorded (Table 2). No treatment had any significant effect.

Table 3: Gosberton Risegate - Crop epinasty (0-no crop effect, 15-20- strong effect). 20th June 2006. 6 DAT. Crop growth stage 201
% Crop flowering. 28th June. 14 DAT. Crop growth stage 202-203.
Average number of flowers and berries. 7th July 2006. 38 DAT. Crop growth stage 205 (flat pod)
Average number of flowers. 17th July 2006. 48 DAT. Crop growth stage 207 (pod fill)
Average number of potato berries. 27th July 2006 58 DAT. Crop growth stage 207-208

| | Treatment | 6 DAT Epinasty | 14 DAT % crop flowering | 38 DAT No. of flowers | 38 DAT No. of berries | 48 DAT No. of flowers | 58 DAT No. of Potato berries |
|---|---|---|---|---|---|---|---|
| 1 | UNTREATED | 0 | 8.5 | 11.75 | 0.25 | 11 | 1.75 |
| 2 | MCPA + MCPB (2.0l/ha) + Guard 2000 | 3.75 | 6.75 | 10 | 0 | 7.5 | 1.75 |
| 3 | MCPA + MCPB (2.0l/ha) + Rhino | 11.25 | 2.5 | 8.5 | 0 | 6 | 0.25 |
| 4 | MCPA + MCPB (2.0l/ha) + Fortune | 13.75 | 2.25 | 20.75 | 0 | 11.75 | 2.25 |
| 5 | MCPA + MCPB (2.0l/ha) + Silwett-77 | 11.25 | 1.75 | 20.5 | 0 | 14 | 2.5 |
| 6 | Mycrobor DF | 0 | 10.5 | 11.25 | 0 | 11.5 | 4.25 |
| 7 | Mycrobor DF + MCPB (2.0l/ha) | 0 | 9 | 10 | 0 | 7.75 | 3.25 |
| 8 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Guard 2000 | 0 | 6.25 | 10.75 | 0 | 4.75 | 3.75 |
| 9 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Rhino | 12.50 | 2.25 | 23 | 0 | 14.67 | 4 |
| 10 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Fortune | 16.25 | 1.75 | 17.75 | 0 | 14.5 | 4.25 |
| 11 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Silwett-77 | 13.75 | 3.25 | 16.75 | 0 | 3 | 1.25 |
| 12 | Mycrobor DF + Guard 2000 | 0 | 11.75 | 6.75 | 0.25 | 4.75 | 0.25 |
| 13 | Mycrobor DF + Rhino | 0 | 5.5 | 10.5 | 0 | 2.75 | 1.5 |
| 14 | Mycrobor DF + Fortune | 0 | 9.5 | 13.33 | 0 | 5.75 | 2.5 |
| 15 | Mycrobor DF + Silwett-77 | 0 | 13.25 | 15.25 | 0 | 6.25 | 3.5 |
| 16 | Fox + MCPA + MCPB | 0 | 7.5 | 13.25 | 0 | 12 | 4.25 |
| | **Fprob** | <0.001 | <0.001 | 0.502 | | 0.352 | 0.315 |
| | **LSD** | 3.12 | 5.24 | 12.5 | | 10.27 | 3.5 |
| | **CV%** | 42.9 | 57.6 | 66.3 | | 86.0 | 98.2 |

Crop flowering at Gosberton Risegate (Table 3) was significantly affected. Generally all treatments of MCPA + MCPB alone and with Mycrobor DF plus all adjuvants except Guard 2000 caused delayed flowering when compared to the untreated. Flower counts (Table 3) at this site were relatively high but there was no statistical significance. The number of berries formed at this time was disappointingly low. Ten days later (Table 3) another flower count still revealed no differences between treatments. The extremely hot weather conditions appeared to encourage the flowers to dry up and drop off rather than develop to form an equivalent number of berries. A berry count on the 27th July (Table 3) indicated no treatment was influencing berry formation.

No crop twisting or effect on flowering was seen at the Church End Drove site after application. The commercial crop variety Arnesa did show some low levels of phytotoxicity to the treatments Mycrobor DF with MCPA + MCPB combined with adjuvants Rhino, Fortune and Silwet-77 (Table 4). The phytotoxicity took the form increased levels of lower leaf chlorosis compared to the untreated. Fox (bifenox) with MCPA + MCPB caused increased levels of phytotoxicity with lower leaves showing light brown spotting (See figure 3). The symptoms were outgrown in 10-14 days with no further adverse effect on the crop.

**Figure 3**

A flower count on July 7th showed that no treatment was having a significant effect at this time (Table 4). Ten days later (Table 4) when berries had formed counts of these and flower numbers still showed that no treatment was having a significant effect. The trial was harvested 24th July with no treatment affecting the yield or tenderometer reading.

Table 4: Church End Drove. % Phytotoxicity. 28th June 2006. 8 DAT. Crop growth stage 201
Average number of flowers. 7th July 2006. 17 DAT. Crop growth stage 204
Average numbers of flower and berries. 17th July 2006, 27 DAT. Crop growth stage 205-206

| | Treatment | 8 DAT % Phyto | 17 DAT No. of flowers | 27 DAT No. of flowers | 27 DAT No.of berries |
|---|---|---|---|---|---|
| 1 | UNTREATED | 0 | 10.75 | 1.75 | 1.5 |
| 2 | MCPA + MCPB (2.0l/ha) + Guard 2000 | 0 | 4.25 | 0.5 | 1.0 |
| 3 | MCPA + MCPB (2.0l/ha) + Rhino | 0 | 5.25 | 2.5 | 0.25 |
| 4 | MCPA + MCPB (2.0l/ha) + Fortune | 0 | 3.75 | 0.75 | 0.25 |
| 5 | MCPA + MCPB (2.0l/ha) + Silwett-77 | 0 | 4.75 | 0.75 | 1.5 |
| 6 | Mycrobor DF | 0 | 10.75 | 1 | 0.5 |
| 7 | Mycrobor DF + MCPB (2.0l/ha) | 0 | 3.25 | 0.5 | 0.75 |
| 8 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Guard 2000 | 0 | 5.75 | 0.5 | 1.0 |
| 9 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Rhino | 1.5 | 1.25 | 0.75 | 0.0 |
| 10 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Fortune | 5 | 8.75 | 1.5 | 0.5 |
| 11 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Silwett-77 | 2.75 | 3.75 | 2 | 1.25 |
| 12 | Mycrobor DF + Guard 2000 | 0 | 6.25 | 1 | 1.75 |
| 13 | Mycrobor DF + Rhino | 0 | 5.75 | 2.25 | 1.75 |
| 14 | Mycrobor DF + Fortune | 0 | 7.5 | 2.5 | 0.75 |
| 15 | Mycrobor DF + Silwett-77 | 0 | 8.25 | 4.75 | 2.25 |
| 16 | Fox + MCPA + MCPB | 10 | 6.75 | 3.75 | 2.75 |
| | **Fprob** | | 0.432 | 0.522 | 0.634 |
| | **LSD** | | 7.648 | 0.364 | 2.394 |
| | **CV%** | | 86.1 | 152.9 | 151.6 |

Table 5: Church End Drove - Harvest data. 24th July 2006, 34 DAT

| | Treatment | Bag wt (Kg) | Fresh wt (Kg) | TR |
|---|---|---|---|---|
| 1 | UNTREATED | 33.4 | 4.64 | 82 |
| 2 | MCPA + MCPB (2.0l/ha) + Guard 2000 | 36.6 | 5.41 | 85 |
| 3 | MCPA + MCPB (2.0l/ha) + Rhino | 37.3 | 4.86 | 82 |
| 4 | MCPA + MCPB (2.0l/ha) + Fortune | 37.4 | 5.19 | 85 |
| 5 | MCPA + MCPB (2.0l/ha) + Silwett-77 | 37.7 | 5.49 | 83 |
| 6 | Mycrobor DF | 38.2 | 5.58 | 86 |
| 7 | Mycrobor DF + MCPB (2.0l/ha) | 35.7 | 5.43 | 85 |
| 8 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Guard 2000 | 36.7 | 5.69 | 87 |
| 9 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Rhino | 34.9 | 4.8 | 84 |
| 10 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Fortune | 32.4 | 4.15 | 84 |
| 11 | Mycrobor DF + MCPA + MCPB (2.0l/ha) + Silwett-77 | 33.7 | 4.8 | 83 |
| 12 | Mycrobor DF + Guard 2000 | 35.2 | 5.54 | 84 |
| 13 | Mycrobor DF + Rhino | 38.2 | 5.81 | 87 |
| 14 | Mycrobor DF + Fortune | 37.9 | 5.77 | 85 |
| 15 | Mycrobor DF + Silwett-77 | 37.7 | 5.58 | 84 |
| 16 | Fox + MCPA + MCPB | 32.1 | 4.99 | 84 |
| | **Fprob** | 0.3 | 0.084 | 0.95 |
| | **LSD** | 5.3 | 1.0 | 6.5 |

| | | | |
|---|---|---|---|
| **CV%** | 8.9 | 11.8 | 4.6 |

## Conclusions

• None of the treatments tested had any effect on potato flower or berry formation so the problem of the berries as a potential toxic contaminant in vining peas remains.

• At three of the four sites applications with MCPA + MCPB and adjuvants caused crop twisting to varying degrees whereas generally those with no adjuvant appeared to be tolerated well. Indicating increased uptake of the hormones by the crop if not the potato, in the presence of adjuvants.

• Examination of the volunteer potatoes in the commercial vining pea crops after treatment with Fortrol + Trifol-Xtra showed high levels of physical damage compared to any treatment tested. This damage may allow enhanced chemical entry into the plant and influence the desired effect (See figure 4).

**Figure 4**

• A means of controlling the berry formation looks unlikely for 2008.

• The British Potato Council web site is a useful tool and could be used as an aid in the decision making process when deciding on the location of vining pea crops in potato vulnerable areas. Its variety search facility advises you as to the likelihood of berry formation. Http://www.potato.org.uk/department/export_and_seed/seed_variety_database/index.html

• Boron applications at higher rates may be useful and worth further examination but with no approvals for the use of high rates of boron in peas (presuming berry formation can be controlled and it is crop safe) there is little chance that it would available for 2008. Investigating alternative post-emergence partners for MCPA + MCPB would be useful but again the availability of a successful treatment for 2008 would be unlikely if looking at products not approved in UK crops.