

Project title:	Establishment of best agronomic practice towards minimizing pesticide residues on herbs and speciality produce
Project number:	FV 371
Project leader:	Stewart Reynolds, Fera
Report:	Final report, July 2010
Previous report:	Not applicable
Key staff:	Miles Thomas, Fera, Database developer Tom Davies, Malvern View Herbs, Grower Liaison
Location of project:	Fera, Sand Hutton, York
Project coordinator:	
Date project commenced:	1 January 2010
Date project completed (or expected completion date):	31 July 2010
Key words:	herbs, lettuce, pesticide residues, minimisation

Whilst reports issued under the auspices of the HDC are prepared from the best available information, neither the authors nor the HDC can accept any responsibility for inaccuracy or liability for loss, damage or injury from the application of any concept or procedure discussed.

The contents of this publication are strictly private to HDC members. No part of this publication may be presented, copied or reproduced in any form or by any means without prior written permission of the Horticultural Development Company.

The results and conclusions in this report are based on a desk study conducted over a six-month period. As the number of full data sets obtained from growers were limited in number 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 report represents a true and accurate record of the results obtained.

Stewart Reynolds
Senior Science Specialist
Fera

Signature S. Reynolds Date 30/07/10

Report authorised by:

Shaun White
Head of Chemical Safety Programme
Fera

Signature [Signature] Date 30/07/10

GROWER SUMMARY

Headline

Usage and residue data have been collected from key UK herb and lettuce growers and fed into a database. The outputs from the database have been presented in this report to see which products/actives have given rise to the highest residue levels in crops of herbs and lettuce.

Expected deliverables

The specific objectives of the project were:

1. To contact a number of key herb and lettuce growers and ask them to provide information on their usage of pesticides in 2009 (i.e. effectively since Regulation (EC) No 396/2005 came into force) and the results of residue tests performed on the crops at harvest.
2. A suitable database to be designed and the growers' information to be entered. The database could then be interrogated to identify the most problematic pesticides in terms of the frequency and levels of residues that remained in the crop at harvest.
3. Once the most problematic crop/pesticide combinations had been identified, suggestions for reducing residue levels could be formulated.

Summary of the project and main conclusions

The paucity of information, based on only one growing season since the implementation of Regulation (EC) No 396/2005, particularly regarding pesticide usage on both herbs and lettuce makes it difficult to draw many hard and fast conclusions. Indeed now that an Excel template, it would merit collecting further data from selected growers for the 2010 season in order to strengthen the database.

The outputs from the database do confirm what might be expected: that residue levels are generally dependent on treatment rates, numbers of applications and harvest intervals.

For crops where usage information was available, all residues were below MRLs and in most cases $< \frac{1}{2}$ the MRL, or even lower.

It would appear that if GAP is observed then none of the products being currently used on herbs, wild rocket or lettuce are likely to lead to any MRL exceedance. Of course there are other approved pesticides, such as clomazone and lenacil, but as

no data were submitted, or were available from other sources then their potential to produce measurable residues remains unverified.

The results are encouraging from a grower's perspective as they do not indicate that any particular product or active is problematic in terms of producing residues close to an MRL.

If growers are under pressure to further reduce residues in their crops then this may be possible by alternating treatments between different products containing actives of the same chemical class. However, from the approved lists available to both sets of growers only the strobilurin & pyrethroid classes contain more than one active.

Herb & Wild Rocket Growers

With the exception of a single crop of coriander (0.12 mg/kg of pendimethalin, which has an 'LOD MRL' of 0.05 mg/kg for herbs), none of the actives, where usage data had been supplied, gave rise to residues above the MRL. Indeed, in the vast majority of cases, the residues were < ½ MRL and often just above the limit of quantification of 0.01 mg/kg.

Fungicides

- Quite a narrow range of products and actives were used to control fungal diseases on herbs and wild rocket.
- The most popular fungicide products used to control fungal diseases during the 2009 growing season were: Amistar (azoxystrobin), Fubol Gold (mancozeb/metalaxyl-M), Aliette / Standon Fullstop / Previcur Energy (fosetyl-aluminium), Invader (dimethomorph/mancozeb) and Signum (boscalid/pyraclostrobin).
- Only very low residue levels, just above the limits of quantification, of azoxystrobin and boscalid were found in a few samples of wild rocket. The MRLs for these actives are quite high at 70 mg/kg and 10 mg/kg, respectively.
- Two residues of dithiocarbamates (from mancozeb usage) and three residues of metalaxyl-M were found but at levels well below the MRL. Although these two actives are co-formulated in Fubol Gold, the residues appeared in five different crops.
- Fosetyl-aluminium is not amenable to multi-residue analysis and therefore none of the crops were analysed for this compound.

- With the exception of pyraclostrobin (always co-formulated with boscalid), all other actives showed incidences of measurable residues.
- If residues need to be minimised further and more than one treatment is necessary, alternating treatments of azoxystrobin and pyraclostrobin could be made. If within 21 days of harvest then a tank-mix of azoxystrobin and pyraclostrobin at 1/2 rate each could be used to perhaps 14 days before harvest. The efficacy of either of these approaches would need to be tested, and tank-mix compatibility of the products checked with the relevant agrochemical companies.

Herbicides

- A much broader range of herbicide products, compared with the fungicides, was used. The most popular products were Alpha Linuron (linuron), Stomp (pendimethalin) and Kerb (propyzamide). All three products showed incidences of residues of 0.01 mg/kg, or above.
- Pendimethalin has a very low 'LOD MRL' of 0.05 mg/kg and all five crops of coriander that were treated with pendimethalin contained measurable residues. One was at the MRL and one at 0.12 mg/kg exceeded the MRL (see figure 11 in Appendix 2).
- The numbers of crops treated with other products were too few to be able to draw any conclusions regarding residue levels.

Insecticides

- By far the most popular insecticides in 2009 were products containing pyrethroids.
- These were Decis & Decis Protech (delatmethrin), Contest (alpha-cypermethrin – not approved for use on herbs or wild rocket¹) and Hallmark (lambda-cyhalothrin). Perhaps surprisingly, Toppel 100 (cypermethrin - approved for use on herbs and wild rocket) was not used by any of the growers that submitted both usage and residue data. Hence Toppel 100 does not appear in the table at Appendix 1a. About 20% of crops treated with pyrethroids contained measurable residue levels.

¹ SOLA 1221/01 for Contest covers use on Brassica vegetables grown for baby leaf production, however CRD have confirmed that rocket is not considered a Brassica (family Brassicaceae, Genus Eruca)

- Crops treated with Tracer (spinosad) and Plenum (pymetrozine) did not give rise to any measurable residues, although crop numbers were few.
- If residues need to be minimised further and more than one treatment is necessary alternating treatments of deltamethrin, cypermethrin and lambda-cyhalothrin could be made. If within 10 days of harvest then a tank-mix of deltamethrin + cypermethrin + lambda-cyhalothrin at $\frac{1}{4}$ rate each could be used to perhaps 3 days before harvest. The efficacy of both these approaches would need to be tested and the compatibility of the tank-mix products checked with the relevant agrochemical companies.

Lettuce Growers

Fungicides

- The most popular fungicides used were the strobilurins and dithiocarbamates.
- Nearly all products gave rise to measurable residues, but none approached the MRLs.
- The use of Signum (boscalid/pyraclostrobin) gave rise to residues of boscalid in about 50% of treated crops and pyraclostrobin in around 5%.
- Just under 30% of crops treated with Amistar (azoxystrobin) gave rise to measurable residues.
- Fubol Gold was commonly used and contains metalaxyl-M as a co-formulant with mancozeb. Residues of mancozeb (measured as dithiocarbamates) were found in around 30% of treated crops, but a metalaxyl-M residue was only found in a single crop.
- The use of Teldor (fenhexamid) gave rise to residues in several crops.
- Aliette, which contains the active fosetyl-aluminium, was also used but it is not possible to see if measurable residues resulted as fosetyl-aluminium is not amenable to multi-residue analysis and therefore none of the crops were analysed for this compound.

Herbicides

- A much broader range of herbicide products, compared with the fungicides, were used. The most popular products were Kerb (propyzamide), Alpha

Propachlor/Ramrod (propachlor – approvals for which expired on 18 March 2010), and Stomp (pendimethalin).

- Measurable residues of propyzamide were found in 5 out of 32 crops that had been treated. All residues were <0.1 mg/kg (MRL = 1 mg/kg) and generally had the shortest harvest intervals around the 42-day minimum harvest interval. See Figure 12 in Appendix 2).
- *The numbers of crops treated with other products were too few to be able to draw any conclusions regarding residue levels.*

Insecticides

- The most commonly used products contained the pyrethroids.
- By far the most commonly used product was Decis, which contains the active deltamethrin and gave rise to measurable residues in just over 10% of treated crops.
- Cypermethrin (from the use of Toppel 100 EC) were found in nearly all treated crops.
- Hallmark (lambda-cyhalothrin) and Dovetail (lambda-cyhalothrin/pirimicarb) gave rise to measurable residues of lambda-cyhalothrin in less than 10% of treated crops. However, measurable residues of pirimicarb were found in just over 50% of treated crops.
- If residues need to be minimised further and more than one treatment is necessary alternating treatments of deltamethrin, cypermethrin and lambda-cyhalothrin could be made. If within 10 days of harvest then a tank-mix of deltamethrin + cypermethrin + lambda-cyhalothrin at ¼ rate each. The efficacy of both these approaches would need to be tested and the compatibility of any tank-mix products checked with the relevant agrochemical companies.