

Protected salads

Dithiocarbamate contamination of salad produce and the use of rubber gloves

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Tests have shown that handling salad produce with gloves containing natural latex rubber compounds can result in the deposition of reportable levels of dithiocarbamates. This factsheet reports on the results of dithiocarbamate tests from four different glove types and recommends the most appropriate glove types for handling fresh produce.

Summary

Dithiocarbamates are a class of chemical compounds used in a number of fungicides. They are also used as accelerators in the manufacture of natural latex rubber products. Handling salad produce with gloves containing natural latex rubber products can result in the deposition of reportable levels of dithiocarbamates

which are highest when 'worn' gloves are used.

In a short study, four different glove types were tested including rubber and non-rubber types. Residues on cucumber fruit handled with gloves containing natural latex rubber compounds reached the reportable levels (0.05mg/kg and above) in a small number of cases but all were below the Maximum Residue Level

allowed for these substances on foodstuffs.

However, to eliminate any possibility of contamination through handling, it is recommended that gloves containing natural latex rubber compounds are not used at any time in the production and distribution chain when handling salad produce.



Use clear or blue vinyl (plastic) gloves (left), clean cotton gloves (right) or the naked hand to handle salad crops

MRLs and reporting limits

The Maximum Residue Level (MRL) on food products for dithiocarbamates and other compounds is set by the Pesticide Safety Directorate (PSD) in the UK. PSD undertake monitoring of pesticide residues in a range of food-stuffs annually, testing UK produce

as well as imported products. The UK MRLs for dithiocarbamates on a range of salad crops are presented in Table 1 below.

The laboratories undertaking MRL tests set a 'reporting limit' for each pesticide compound, which is an indicator of the sensitivity of the test method used. The reporting limit on most occasions will be well below the MRL. All pesticide residues detected

above the reporting limit will be formally reported in the PSD pesticide residue monitoring programme.

The reporting limits for dithiocarbamates can vary with the laboratory undertaking the analysis and with the commodity and hence, from year to year. The reporting limits for dithiocarbamates in 2003 and 2004 for the relevant salad crops are shown in Table 1.

Table 1
The UK MRLs and reporting limits for dithiocarbamates on a range of salad crops

Crop	MRL (mg/kg)	Reporting limit for dithiocarbamate (mg/kg)	
		Year 2003	Year 2004
Aubergine	2.0	0.1	n/a
Cucumber	0.5	0.1	n/a
Pepper	2.0	0.05	0.05
Tomato	3.0	n/a	0.05

n/a – Not applicable due to no testing being undertaken and hence no reporting limits set

The extent of the problem

PSD sampled cucumbers, peppers and aubergines in 2003 as part of the pesticide residue monitoring programme and, via its Pesticides Residue Committee (PRC), reported a number of incidences of dithiocarbamate residues in UK grown crops. In the case of aubergines, 12 positive samples of dithiocarbamates were found out of 33 tested and for

cucumbers, 3 positive samples were found out of 31 tested in 2003. None of the residues measured were above the MRL.

Cucumbers and aubergines were not included in the PSD pesticide residue monitoring programme in 2004 but cucumbers will be included again in 2005. Tomatoes and peppers were included in the 2004 monitoring programme and the results from Quarters 1, 2 and 3 are available on the PSD website (www.pesticides.gov.uk). Tests specifically for dithiocarbamates

were undertaken in Quarter 2 2004, with one positive sample reported for pepper out of a total of 14 UK pepper samples. The sample was below the MRL. None of the UK tomato samples tested positive for dithiocarbamates.

Further tests for dithiocarbamates on tomatoes and peppers were undertaken in Quarter 4 2004 and these results should be available on the PSD website in summer 2005.

Sources of contamination

Since dithiocarbamates are not approved as a fungicide for use on aubergines in the UK, and the approval on cucumbers is restricted to thiram seed dressings, it appeared unlikely that contamination in UK crops during 2003 could have come from this source. In fact, following a thorough independent audit of one of the nurseries which showed some contamination, there were no indications of

any possible use of the chemical for some years.

Possible explanations for the measured dithiocarbamate contamination in UK grown cucumbers and aubergines in 2003 were therefore:

- Analysis error giving false 'positive' results
- Errors in indication of country of origin on the produce
- Contamination from another source – most likely rubber as this contains dithiocarbamates

The PRC is aware of the latter issue and now recommends the use of cotton gloves or washed hands when handling the samples in the laboratory.

For one of the nurseries involved in the pesticide residues monitoring programme in 2003, all materials coming into contact with the cucumbers were checked for sources of contamination. The only obvious candidates were rubber gloves used in handling.

Glove testing

To test the likelihood of gloves being the source of contamination of salad produce, tests were carried out using cucumbers that were being grown as part of the AYR cucumber production trial at Stockbridge Technology Centre (HDC project PC 201). The cucumbers used had received no chemical treatment – other than seed dressing with thiram – prior to handling. Two common latex rubber glove types were used in the tests, in addition to a nitrile glove and a glove type that is commonly used in food preparation. The four types were:

Type 1:

Disposable latex rubber gloves

'Bodyguards 4' lightly powdered latex disposable gloves ('standard' disposable gloves)

Type 2:

Hard wearing rubber gloves

'Marigold' (G43Y) latex gloves ('standard' hard wearing gloves)

Type 3:

Disposable gloves with no rubber

'Semperguard nitril' powder free disposable gloves (possible non-rubber replacement for 1 above)

Type 4:

Hard wearing gloves for food use

'Pro Food' (possible reduced rubber replacement for 2 above)

When new gloves of both Type 1 and 2 above were used in the tests, there were a few instances of trace levels of contamination but nothing that could be reported with accuracy and all were below the reporting limit.

For the tests on glove Type 3 and 4, and the control, no residues were

detected whatsoever in any of the replicates.

Further tests were carried out with used gloves of Type 1 and Type 2. 14 of the 24 samples showed measureable but still very low amounts of contamination. However, in two instances, the levels of dithiocarbamates on the fruit were above the reporting limit of 0.05mg/kg.



Disposable latex rubber gloves (left) and Hard wearing rubber gloves (right). To avoid any possibility of contaminating salad crops, these should not be used for handling

Conclusion

Gloves containing natural latex rubber compounds, when used in handling salad crops, have the potential to contaminate salad produce with residues that may be mistakenly identified as dithiocarbamates arising from fungicide applications. The level of contamination is likely to be low

but occasionally at or slightly above the reporting limit. It is unlikely to reach the MRL. Worn gloves are more likely to lead to greater contamination than new gloves.

To avoid any possibility of contamination of salad crops, it is recommended that gloves containing any rubber ie Types 1, 2 and 4 are not used for handling produce at any

stage during the harvesting, grading or distribution phases of production. Whilst no residues were detected when using Type 3, they are currently the most expensive option. It is therefore recommended in order to avoid the problem of contamination, that only plastic gloves (blue or clear vinyl), clean cotton gloves or the naked hand are used.

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