Results of routine testing of organic food for agro-chemical residues

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ABSTRACT

Consumers expect organic foods to be free of agro-chemical residues. Organix Brands plc. routinely test organic food ingredients for agro-chemical residues using independent test laboratories. In the past year 243 batches of ingredients were tested and low levels of agro-chemical residues were found in 21% of samples. These residues can arise in organic food through environmental contamination, processing contamination or even the fraudulent use of agro-chemicals on organic food. Food containing agro-chemical residues can enter the organic system because of limitations in the organic rules.

Keywords: organic ingredients; agro-chemical residues

INTRODUCTION

Consumers of organic food have clear expectations of organic food. In a postal survey carried out by Organix Brands plc. in May 2001, 97% of consumers who indicated that organic foods were healthier also believed that organic food was less likely to contain pesticide residues than non-organic foods.

Organix Brands plc makes organic food in several factories across the UK and Europe. We test every batch of raw food ingredients that we use in our food for the presence of agro-chemical residues so that we can reject ingredients that contain measurable levels. Each ingredient is tested for a range of residues determined by consulting with independent experts. Test laboratories are selected based on their testing methodologies and sensitivity limits. Our testing programme is continuously updated to incorporate improvements in methodology or testing regimes.

This paper records the results of our agro-chemical residues testing programme for the past year. We want to share our results so that we can work together to further improve the quality of organic food and better meet consumer expectations.

RESULTS

Batches of all of the ingredients used by Organix Brands plc. were tested (Table 1). In the 243 batches of ingredients tested, 17 different agro-chemical residues were found. These were - captan, carbaryl, carbendazim, chlormequat, chlorpyrifos-methyl, chlorpyrifos-ethyl, cypermethrin, diphenylamine, iprodione, malathion, parathion methyl, permethrin, phosphine, pirimiphos methyl, procymidone and tetradifon (Table 2). With the exception of diphenylamine found

in yoghurt, all of the agro-chemical residues found in the ingredients were of the type that would normally be associated with the same crop produced under non-organic agriculture.

Table 1. Summary of ingredients tested.

Ingredient	No. Batches	With Residues	Percentage
Rice & Cereal	43	17	39.53
Oils	4	1	25.00
Fruit	124	24	19.35
Dairy	7	1	14.29
Vegetables	58	8	13.79
Meat	2	0	0.00
Herbs & Spices	5	0	0.00
Total	243	51	20.99 %

The average amount of agro-chemical residues found was 0.05 $mg.kg^{-1}$ (range 0.01 to 0.3 $mg.kg^{-1}$), excluding one batch of pear flakes and one batch of oat flakes, which had significantly higher levels of residues than in the rest of the ingredients (0.7 and 0.9 $mg.kg^{-1}$). In most cases it was noted that the levels of residue found were significantly lower than the maximum residue level (MRL).

Of the 51 batches of ingredients containing agro-chemical residues 42 of them had been processed in a way that concentrated the ingredient (and hence the residues). For instance, grapes were dried to make sultanas, fresh apricots were dried, pears were dehydrated to make pear flakes, oils were extracted from the seed and raw oats were dried into flakes. Using the residues in the concentrated ingredient to calculate the equivalent residue level for the un-processed form leads to residue levels on the un-processed food that in most cases are lower than the limit of detection for that agro-chemical. Therefore, they would not have shown up in the analysis of the food in its natural state.

Table 2. Summary of the agro-chemical residues found in organic ingredients

Agro-chemical Residue (*)	Occur-ances	Average quantity ($mg.kg^{-1}$)	Range ($mg.kg^{-1}$)	Maximum Residue Level (MRL) ($mg.kg^{-1}$)	Found In
breakdown products of captan (f)	3	0.2	0.2	2.0 (stone fruit)	dried apricots x3
carbaryl (I, r)	2	0.1	0.1	5.0 (grape)	sultana x2
carbendazim (f)	13	0.04	0.01 - 0.08	2.0 (apple)	apple juice conc. x2
				2.0 (grape)	sultana x2
				1.0 (apricot)	dried apricot x4
				0.1 (cherries)	cherry concentrate x3
				0.1 (mango)	mango puree x2
chlormequat (r)	26	0.1	0.01 - 0.9	5.0 (oat)	oats x15, pear x 2
				0.5 (pear)	pear flake x3, puree x2
				0.05 (tomato)	tomato conc. x4
chlorpyrifos-methyl (i, a)	2	0.03	0.02 - 0.04	0.5 (pear)	orange oil
				0.3 (orange)	pear flakes
chlorpyrifos-ethyl (i, a)	4	0.05	0.03 - 0.08	0.5 (grape)	sultana
				0.3 (orange)	orange oil x3
cypermethrin (i)	3	0.03	0.02 - 0.04	2.0 (apricot)	dried apricot x2
				0.5 (grape)	sultana
diphenylamine (f)	6	0.026	0.015 - 0.04	5.0 (apple)	apple flakes x3, apple puree, sweetcorn flakes, yoghurt
				0.05 (sweetcorn)	
iprodione (f)	2	0.025	0.02 - 0.03	10 (apple)	apple flakes
				10 (grape)	sultanas
malathion (i, a)	1	0.02	0.02	2.0 (orange)	orange flakes
methamidophos (i, a)	1	0.01	0.01	0.01 (pepper)	red pepper
parathion methyl (i)	2	0.04	0.04	1.0 (orange)	orange oil x2
Permethrin (i)	2	0.029	0.26 - 0.32	2.0 (rice)	rice flour x2
phosphine (u)	1	0.01	0.01	0.1 (rice)	rice flour
pirimiphos methyl (i)	3	0.02	0.01 - 0.03	5.0 (rice)	rice flour
				1.0 (orange)	orange flakes
				0.05 (sunflower seed)	sunflower oil
procymidone (f)	3	0.037	0.03 - 0.04	5.0 (grape)	sultana x2
				2.0 tomato)	tomato concentrated
tetradifon (a)	1	0.01	0.01	Not given	tomato concentrate

* *a=acaricide, f=fungicide, g=plant growth regulator, i=insecticide, u=fumigant*

DISCUSSION

These results show that about 20% of organic food currently fails to match the high expectations of consumers with regard to agro-chemical residues. The presence of any level of agro-chemical residue in organic food challenges the integrity of the food chain. There are at least four potential sources for these residues in organic food:

- Environmental contamination (e.g. from, rain, spray drift, or in the case of tree fruit, residues if the tree was grown non-organically)
- Processing contamination (e.g. during harvest, storage, transport, processing)
- Mixing of organic and non-organic ingredients (e.g. through the use of non-dedicated transport)
- The fraudulent use of agro-chemicals on organic food

These have most probably arisen as a result of the following:

- EC organic legislation (Council Regulation (EEC) No 2092/91) was created when organic production was mainly limited to local productions and local trade. In recent years, however, organic production has developed significantly. It now typically involves a much longer supply chain with several operators and operations, such as import, transport, storage, processing and packing. A recent amendment to the legislation in force on the 20 February 2002 (European Commission Regulation (EC) No 2491/2001) has addressed these highlighted areas.

- Variations in organic inspection and certification procedures between certifiers (some certifiers were conducting less 'policing' of the organic rules than others).

- Lack of knowledge of the organic rules and the way they are controlled by regulators in the UK such as the Food Standards Agency, Pesticides Safety Directorate, and Trading Standards

CONCLUSION

Organix Brands plc. has responded to these findings by working closely with farmers, suppliers and certifiers to develop supply chains that are as short as possible and handled by only one party. However there is a need for wider discussion on the development of organic standards so that consumer expectations continue to be satisfied by the organic system.

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