

Keeping residues well within the limits



Today's consumers are questioning the role of pesticides and the implications of any residues in the food they eat. Their perception is that all pesticides are undesirable and most consumers would like no residues at all. At the same time, however, most of us still want year-round supply of high quality produce at good value for money.

In practice the availability of high quality, affordable fresh produce and the use of pesticides are inextricably linked. The food industry always faces the challenge of balancing consumers' demands with the reliable supply of fresh produce. In reality, whilst pesticide residues can be further reduced – continuing the decline over recent years – it is likely to prove impractical to achieve 'zero' levels in all produce.



Food producers, food companies and retailers have to question whether "zero" pesticide residues or residues below the Limit Of Determination (LOD) in all food are:

- (a) necessary
- (b) practical
- (c) economic

It is possible to achieve residues on some produce which are at the Limit Of Determination (the smallest level which can be measured with confidence). Growers manage this in produce destined for the limited baby food market by, for example, using no pesticides in their production or strictly adhering to lower rates of use or leaving longer periods between spraying and harvesting. For larger fresh produce markets, however, such measures cannot always ensure the economic yield, quality or physical appearance of crops demanded by consumers.

By law, all food producers, processors and retailers must demonstrate 'due diligence' in supplying consumers with produce that is safe and free of disease, pest, weed and mycotoxin contamination. While imperfections in skin quality and physical appearance are of less importance in processed foods, such as baby foods or potato waffles, the demand for visually attractive material on fresh produce shelves remains an imperative for retailers and consumers. The price penalty for growers who fail to achieve these visual standards can prove disastrous. (See Table 1.)

Furthermore, modern analytical equipment is capable of detecting residues at parts per billion that would never have been identified in

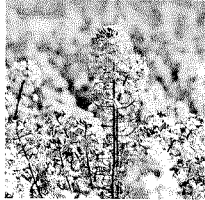
the past. It is this type of sensitive equipment that the government uses to undertake 90,000 tests on 3,000 samples of fresh produce annually in the UK at a cost of £1.6m as part of its monitoring programme.

The government publishes the results of these tests regularly, including brand names and retailer information, and highlights those samples in which residues exceed the legal trading standard (the Maximum Residue Level or MRL). MRLs are not safety standards; they are the legal maximum residues allowed in food if growers have used the chemicals properly. With very rare exceptions, residues higher than the MRL are perfectly safe for consumers.

Table 1

	Skin quality	Physical appearance	Free from pests and diseases	Price sensitivity
Fresh, loose & pre-pack produce	*****	*****	*****	*****
Chilled, fresh prepared meals	***	***	*****	**
Frozen vegetables	***	****	*****	****
Food processor	**	***	*****	**

The entire food industry must balance the role of pesticide in assuring quality and consistency at an affordable price against the impractical 'no residue' demands of consumers.



The latest results from the UK Working Party on Pesticide Residues (WPPR), published in autumn 2000, show **75% of food samples tested are free from detectable levels of residues.**

A further 23% showed some residue from a pesticide's use during the crop's production, but the levels were well within the Maximum Residue Limit (MRL). Only 1.6% contained residues above the MRL trading standard.

However, it is still important to remember that MRLs are not health standards and that, even where the level may be exceeded, residues are still likely to be well within any safety limits.

The consumer pressure to reduce residue levels towards the Limit of Determination will not necessarily make the food safer, since the present low levels of residue are safe anyway. The likely consequence is to reduce crop yields and quality, whilst pushing up production costs, shortening storage and shelf life and increasing food wastage for retailers and consumers.

The food production industry has already concentrated on reducing overall pesticide use, a major aim being that no produce should contain residues above the MRL. It is now also aiming to reduce the residue levels in the 23% of food samples that presently contain some residue.

Consumers can be confident that, where residues may be present at low levels below the MRL, they have been thoroughly assessed for safety. Modern pesticides are rigorously tested to ensure their safety to consumers long before they are used commercially by growers; the official health standards dictated by the government are akin to – and often exceed – those for medicines. The standards and the decisions which flow from them are based on 'worst-case scenarios' and the precautionary approach.

Residue reduction in the field

It has to be recognised that, for any field crop, the level of pesticide use will vary from season to season as growers combat the threat to crop yield and quality from pests, diseases and weeds in the face of widely differing seasonal weather conditions and levels of attack.

Pesticides are expensive and it makes sense to use them sparingly and wisely. Today's growers always aim to use the minimum pesticide they deem necessary to reduce the risk of loss and damage to an acceptable level. It is driven principally by economics; indeed current economic pressures on growers have hastened the move towards even lower pesticide use.



To minimise the likelihood of residues occurring on crops, growers can adopt a range of agronomic techniques in an Integrated Crop Management (ICM) approach, including:

- Growing pest and disease resistant varieties;
- Exploiting the natural disease and pest breaks offered by crop rotation;
- Monitoring pest numbers and treating only when economic thresholds are breached;
- Matching the dose of chemical precisely to the pest or disease level;

- Encouraging natural insect predators to control pest populations.

It depends very much on the crop, the variety and the seasonal weather patterns as to which of these measures can be practically used in the field. In one year, for example, natural predators may contain aphid pest populations at an economically acceptable level but in another season an insecticide may be required to keep the pest in check. These differences will be reflected in variations in pesticide residues between years.

Growers are targeting the use of pesticides more effectively to the disease or pest risk through better decision-making and information technology. Additionally, new application technology, such as air-assisted and drop-leg sprayers, provides more accurate targeting of pesticides where they will have greatest effect. This enables growers to reduce pesticide rates yet achieve the same control levels.

Residue reduction in the store

Post-harvest treatments to prevent spoilage in store and enable out-of-season supply of fresh produce have the potential to affect residue levels. Residues can be higher because the period from application to consumption is less than in field treatments, plus the chemical is often applied directly to the produce.

Consumers are particularly concerned about these residues. In a review of food labelling by the Board of the Food Standards Agency, the food industry has been encouraged to provide more information to consumers at the point of sale about the use of post-harvest treatments. The industry is in discussion with the Agency on the best way of taking this advice forward.

Dependence on post-harvest treatments can be reduced through:-

- Better harvesting to reduce skin damage and disease risk;
- Specialist storage, using environmental control or other techniques;
- Sourcing of in-season fresh produce from around the world.



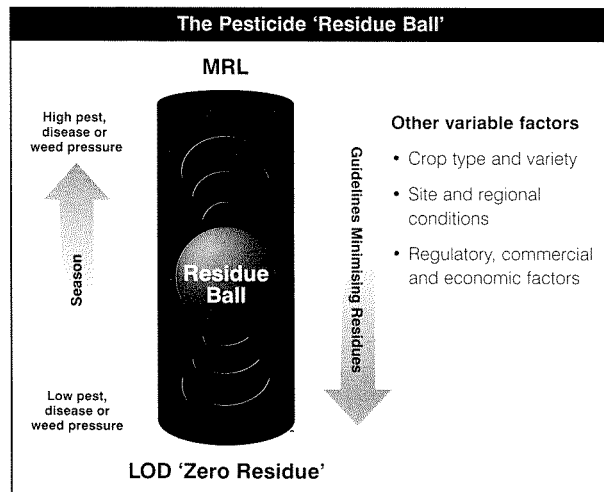
In recent years the majority of food samples containing higher residue levels were on produce imported to the UK. In general, the further south and the warmer the climate, the greater will be the need for disease and pest control. Consequently more pesticide is likely to be used and the potential for residues on produce is greater.

A residue in excess of the MRL indicates that a pesticide has not been used according to international Codes of Good Agricultural Practice. Such incidences are low and will continue to be reduced by further education of growers and by enforcement of national and international standards. Adoption of the new standards laid down by the Euro-Retailer Produce Working Group (EUREP) will widen globally the ability of growers and produce suppliers to minimise pesticide residues world-wide.

Residues in Reality

All these practical and realistic measures in field and store are helping growers to both reduce their reliance on pesticides and to use them more effectively. The consequence will be to reduce residues in food and, at the same time, ensure high quality produce remains widely available at economic prices.

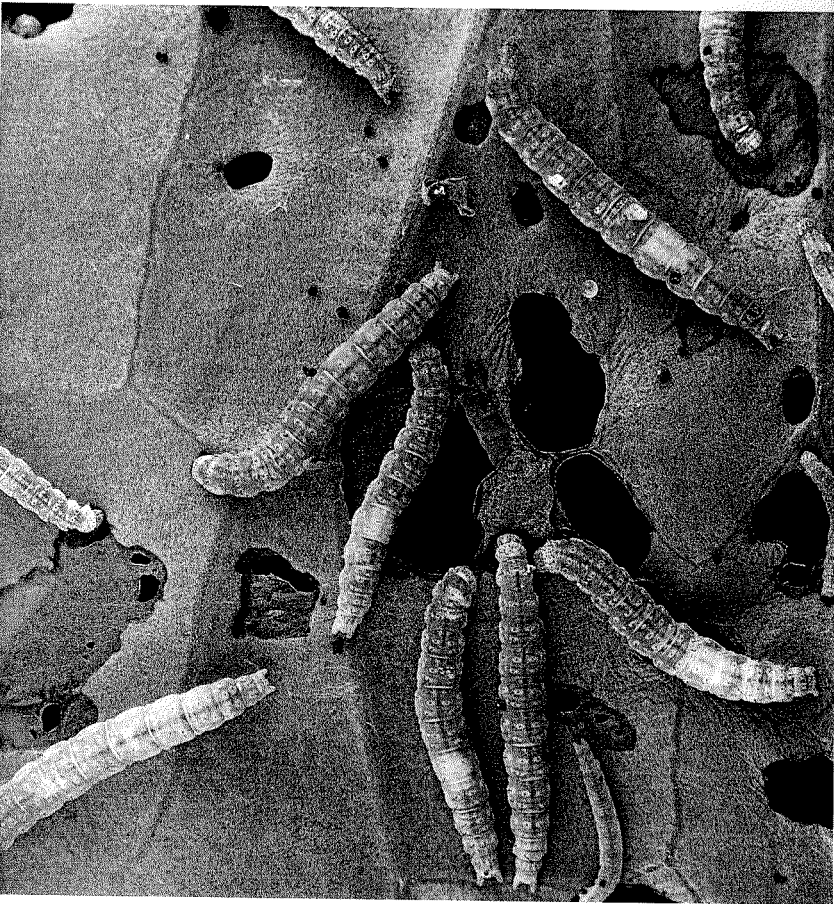
The inescapable fact remains, however, that crop protection practices must cope with great seasonal weather variations and weed, pest and disease pressure. Pesticide usage and any resulting residue levels are bound to vary between seasons.



The 'residue ball' illustrates this very clearly. The 'ball' moves up and down the vertical tube between the MRL and zero residues in response to the range and impact of the factors highlighted. In a season of low pressure, the use – and therefore residues from – crop protection products will be reduced and the 'ball' will hover above the LOD. In years of high pressure where a

programme of treatments will be needed to safeguard quality and yield, then the residue 'ball' will move nearer to the MRL.

This model helps to explain the flexibility of safe pesticide use needed by growers, their agronomy advisers and suppliers to enable the food industry to continue to deliver the high quality, choice and fair price demanded by consumers.



Actions to Reduce Pesticide Residues

The techniques listed below can all help to reduce levels of pesticide residues, but most could also have an impact on crop quality and yield.

In practice growers, their advisers and the customers for their produce have to use the best combination of techniques to balance the in-field and/or in-store risks with consumer demands. The balance will vary between regions, sites, crops, seasons as well as pest, weed and disease pressures.

To get the right balance between crop yield, quality and buyers' residue expectations, growers should consider:

- Adoption of ICM techniques referred to above;
- Longer pre-harvest intervals;
- Fewer applications;
- Lower application rates within the bounds of resistance management;
- Use of different pesticides through the season;
- Use of lower rates nearer harvest;
- Reduce reliance on post-harvest treatments by better harvesting and specialist storage;
- Use of pesticides which leave lower residues;
- Use of modern, accurate application equipment;
- Ensuring all spray and application equipment is working efficiently.