Provision of information on tree canopy size in efficacy and residue trials in apple orchards

Introduction

There is considerable variation in the foliar canopy density between trees of different sizes and different growth stages. When spraying with axial fan equipment, the average deposit achieved has been found to increase markedly with decreasing canopy density and tree size.

CRD has been funding work towards the development of a method to enable those applying pesticides in orchards to achieve an approximately constant deposit on trees of different size and canopy density. Thus where trees are small and less dense it is possible to determine a reduced dose that will maintain biological efficacy. The scheme provides a series of pictographs of typical apple trees of different canopy density to aid assessment of the ‘Crop Adjustment Factor’ (CAF) which is then used to calculate the applied pesticide dose for a given orchard. Underpinning the scheme is the assumption that the label recommended dose is efficacious in trees with a large canopy density, and these have been given a CAF value of 1 (one). Currently the scheme and pictographs relate to orchards where trees are in single rows and where row spacing is up to 5.5m. Work is ongoing to develop pictographs for a wider range of orchards and to determine CAF values for them.

In developing recommendations for product labels, efficacy and residue trials are likely to be conducted in a number of orchards that vary in their canopy size and density. Interpretation of results from such trials is difficult but can be enhanced if information on the canopy size and structure is presented in the trials reports and regulatory submissions/biological assessment dossier.

Estimation of canopy size by assessment of the ‘Crop Adjustment Factor’

There are a number of estimates of canopy size that can be made, and CRD has previously requested information such as tree height and width, growth stage and row spacing, as detailed in Efficacy guideline 401. However the pictographs developed for the scheme also provide a means by which the canopy density of trees used in experimental trials can be ‘quantified’ by an assessment of the ‘crop adjustment factor’ or CAF value.
Pictographs for a range of trees in orchards (of row spacing up to 5.5m and with trees in single rows) are presented below. They detail a CAF value, as would be used by the scheme to adjust pesticide dose, for a series of trees of different sizes either early season (i.e. pre–blossom) or mid season (fruit maturity at maximum leaf). Also shown in white on the pictograph is the actual CAF value (not rounded) which has been determined by opto-electronic or LIDAR measurement.

When trials are being conducted on apple orchards, experimenters are asked to make an assessment of the CAF value of the trees in the experimental area by reference to the pictographs. Assessment of CAF value should be made by comparing the trees in the orchard to those in the pictograph and selecting the CAF value (¼, ½, ¾ or 1) of the closest match. Assessment of CAF value should be made at the time of application and where possible prior to blossom (using the ‘early season’ pictographs) and in mid season towards fruit maturity (using the ‘mid season’ pictographs). This information, along with other information on variety, growth stage, and row spacing should be included when the data are submitted for evaluation.

**Further information.**

The scheme, known as the PACE scheme (Pesticide dose Adjustment to the Crop Environment) is being developed jointly by Silsoe Research Institute and Horticultural Research International. Further information on the application of the scheme which is aimed to assist growers in determining the dose that should be applied in specific orchards is now available. The method has now been developed and the scheme was launched to apple growers in November 2005 and an accompanying fact sheet providing information on the scheme, and the opportunities for reducing doses by making adjustments for canopy density, was made available to all top fruit growers. This fact sheet, which has been published by HDC, is also available on CRD’s website to enable those who are developing plant protection products for use in orchard situations to be aware of the progress with and practical application of the PACE dose adjustment scheme.

Benefits of adjusting the dose to suit the crop canopy include avoiding applying too much pesticide and associated risks of high pesticide residues on fruits at harvest. It will also reduce the risks of operator and environmental contamination. Reductions in the pesticide dose can be taken into account as a factor in the Broadcast Air–assisted LERAP.