

## MODELLING THE EXPOSURE OF WATER BODIES TO SPRAY DRIFT FOR FRUIT GROWING IN THE NETHERLANDS

*H.J. Holterman, J.C. van de Zande, H.T.L. Massop, J.J.T.I. Boesten, J.F.M. Huijsmans, M. Wenneker*  
*Wageningen UR, P.O. Box 16, 6700 AA, Wageningen, THE NETHERLANDS*

**Corresponding author:** *Henk Jan Holterman; henkjan.holterman@wur.nl*

### Abstract

Downwind off-target deposits of spray drift have been investigated for many years. For spray applications in fruit crops, such deposits are significantly higher than those for field crops, mainly due to different application techniques for these crop types. For field crops, various spray drift models have been described in literature. For fruit crops no models are available to assess the exposure of surface waters to spray drift. The current study describes the development of a generic spray drift model for pesticide applications in fruit crops based on a large set of experimental data. The model is implemented in an exposure assessment model to estimate pesticide concentrations in edge-of-field water bodies next to fruit orchards in the Netherlands. The features of the exposure model express a high level of realism.

After 20 years of field experiments, a considerable amount of experimental data on spray drift in fruit crops is available. These data form the basis of the generic model for spray drift in fruit crops (typically, apple tree orchards). Regression analysis yielded the relevant input parameters describing downwind deposits of spray drift. A multi-parameter empirical model was fitted to these data, accounting for both crop related parameters and local meteorological conditions. A special feature of the model is the seamless dependence on growth stage (through BBCH code). The model fits experimental data relatively well (correlation coefficient 85%).

The model is implemented in an assessment model for the exposure of aquatic organisms to pesticides reaching the surface of all water bodies next to fruit orchards in the Netherlands. The exposure assessment model takes into account one or more spray applications during the growing season, local weather conditions, growth stage of the fruit trees, localization and orientation of the fruit orchards, various types of edge-of-field water bodies. These parameters may vary spatially (depending on the regions where the orchards are located) and temporally (depending on the dates of the spraying events).

In an extensive simulation study the predicted environmental concentrations (PECs) were computed for all possible spatial settings (defined by the characteristics of orchards and adjacent water bodies). A spatial setting corresponding to a 90% exposure risk was selected as a reference. This reference will be used in an assessment model (being developed) for the authorization of plant protection products.

**KEY WORDS:** *Pesticides, fruit crops, spray drift, exposure assessment, multiple treatments, surface water*