

Spray drift, bystander, resident and worker exposure

- This lecture considers the movement of pesticides from treated crops and the extent to which bystanders and people living near agricultural areas are exposed to spray drift. The exposure of those working in crops that have been sprayed, namely farm workers, who come into contact with pesticide deposits is also considered.
- Following the ban on organochlorine insecticides due to their persistence in the environment, there has continued to be considerable criticism about the use of pesticides in general adversely affecting our environment.
- The concern has focussed on the movement of pesticides out of the agricultural fields treated to protect crops by 'spray drift' and contamination of water

- The downwind movement of spray droplets by the wind at the time of a spray application to areas, which are outside the treated fields, can cause unacceptable effects depending on the type of pesticide.
- Insecticides may adversely affect bees and other beneficial or non-target insects, while herbicides can affect vegetation, which can in turn cause a reduction in non-target species by the effects on habitats and food sources.
- The general public have also felt that airborne spray is the cause of many illnesses

What is drift?

- Himel (1974) defined spray drift into two categories, namely exo- and endo-drift

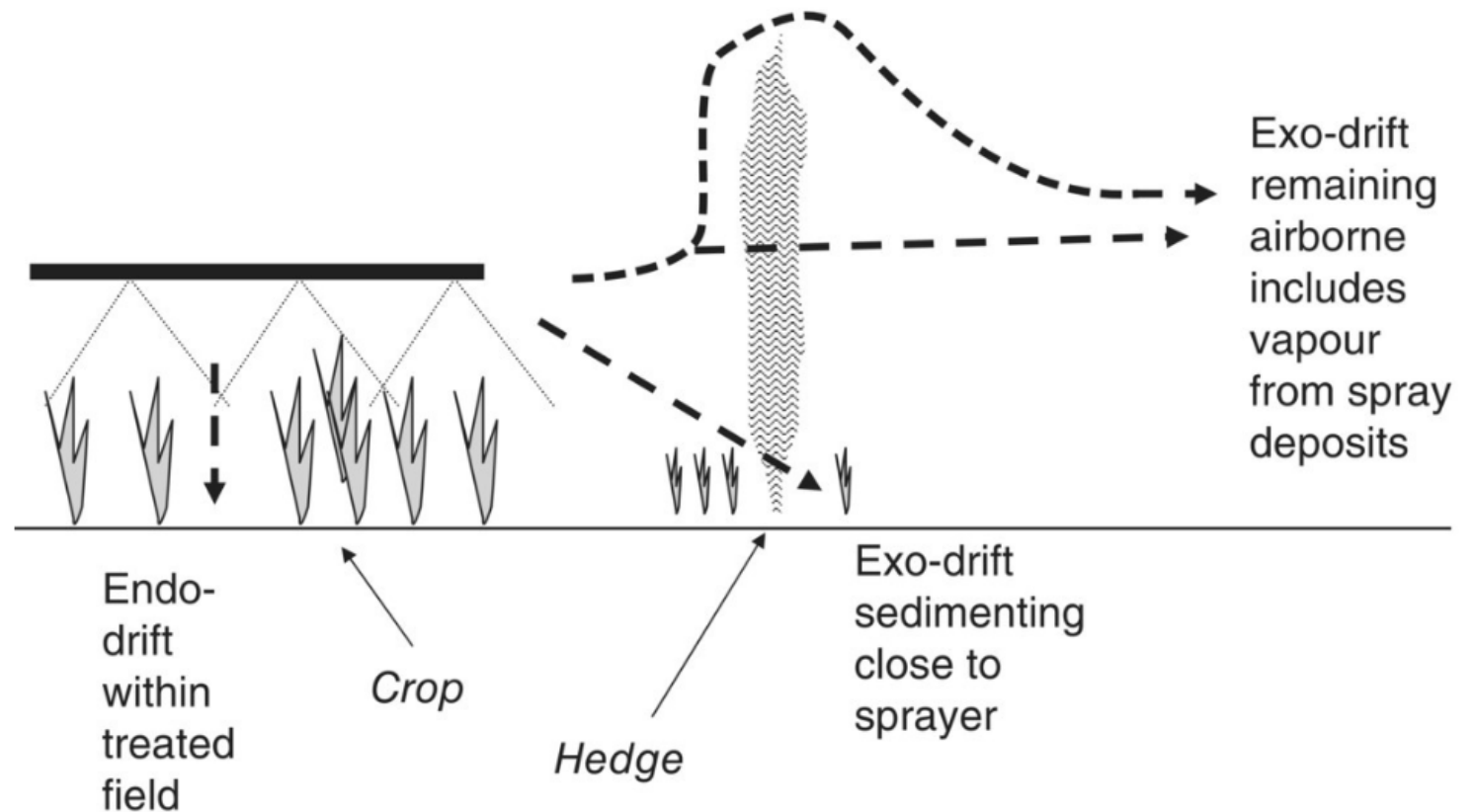


Fig. 5.1 Exo- and endo-drift.

Exo-drift

- This is the movement of spray droplets beyond the edge of a treated field.
- Depending on the movement of air, droplets can travel over very long distances, especially if the meteorological conditions including pockets of air favour their movement upwards, before they ultimately sediment on vegetation or on the ground

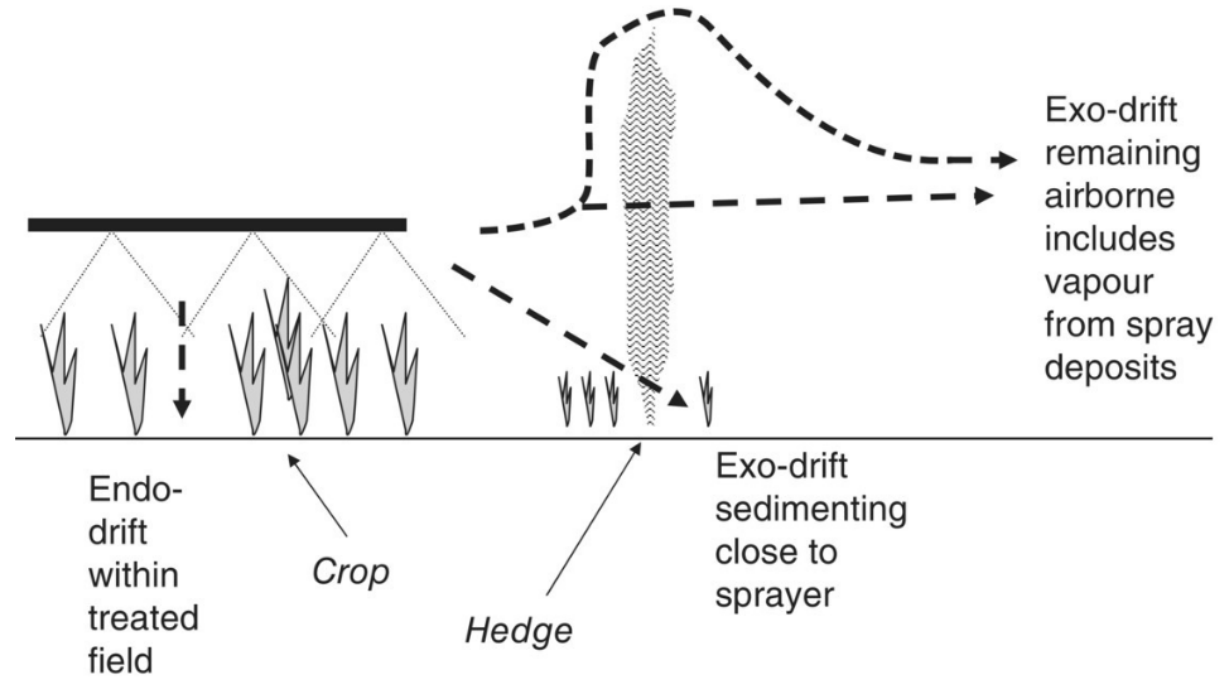


Fig. 5.1 Exo- and endo-drift.

Endo-drift

- This is the distribution of a pesticide within a field, but not on the intended target.
- Thus some of a foliar spray may fail to be deposited on leaves and sediment on the ground.
- Rain soon after a spray application may also wash deposits off foliage on to the ground.

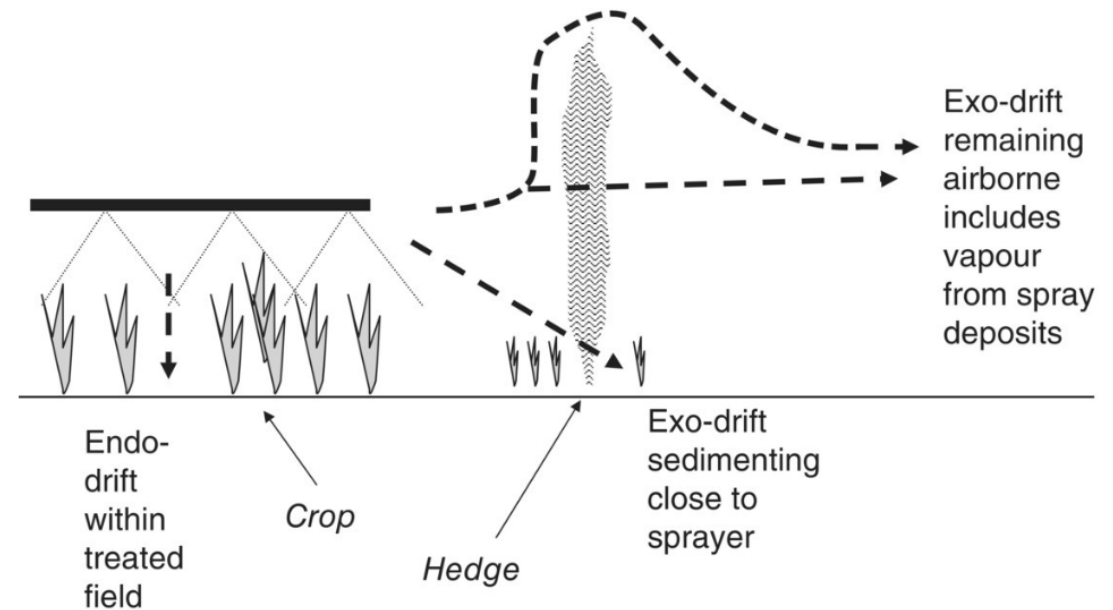


Fig. 5.1 Exo- and endo-drift.

Endo-drift

- Subsequent movement of this pesticide deposit by leaching through the soil profile can lead to contamination of ground water, if the pesticide molecule is sufficiently mobile in soil and not adsorbed on soil particles.
- This endo-drift could also become exo-drift, if heavy rain or irrigation washed the soil surface deposit into the nearest ditch or waterway.

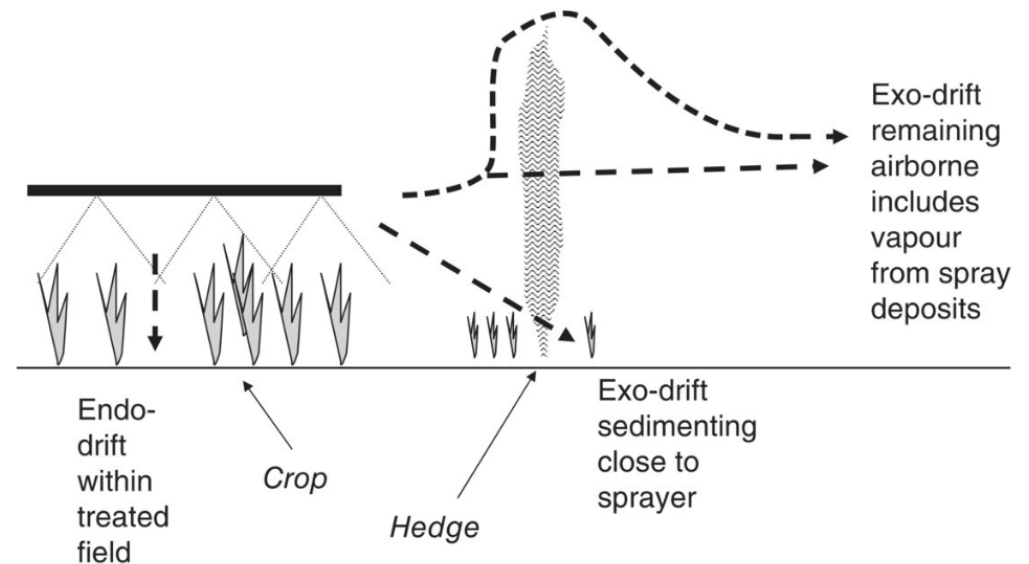


Fig. 5.1 Exo- and endo-drift.

How is drift measured?

- An international standard for measurement of drift (ISO 22866) is designed to cover both short-range down wind sedimentation of spray and longer range airborne drift of the smaller spray droplets.

Airborne droplets

- The droplets that remain airborne are generally smaller than 100 μm and unless the liquid is involatile, the droplets will become smaller in flight. Efficient sampling of these small droplets is more difficult as they can bypass a solid object in their path, when carried in the airflow

Bystander exposure

- A bystander is a person who is located within or adjacent to an area where pesticides are being applied or has just been applied, but whose presence is quite incidental and unrelated to the application of the pesticide.
- There is a risk that some of the spray drifting downwind could be deposited on their body, especially if no action is taken to avoid exposure
- A bystander, who happens to be walking near a field while it is being sprayed, would not be wearing any personal protective clothing (PPE).

Bystander exposure

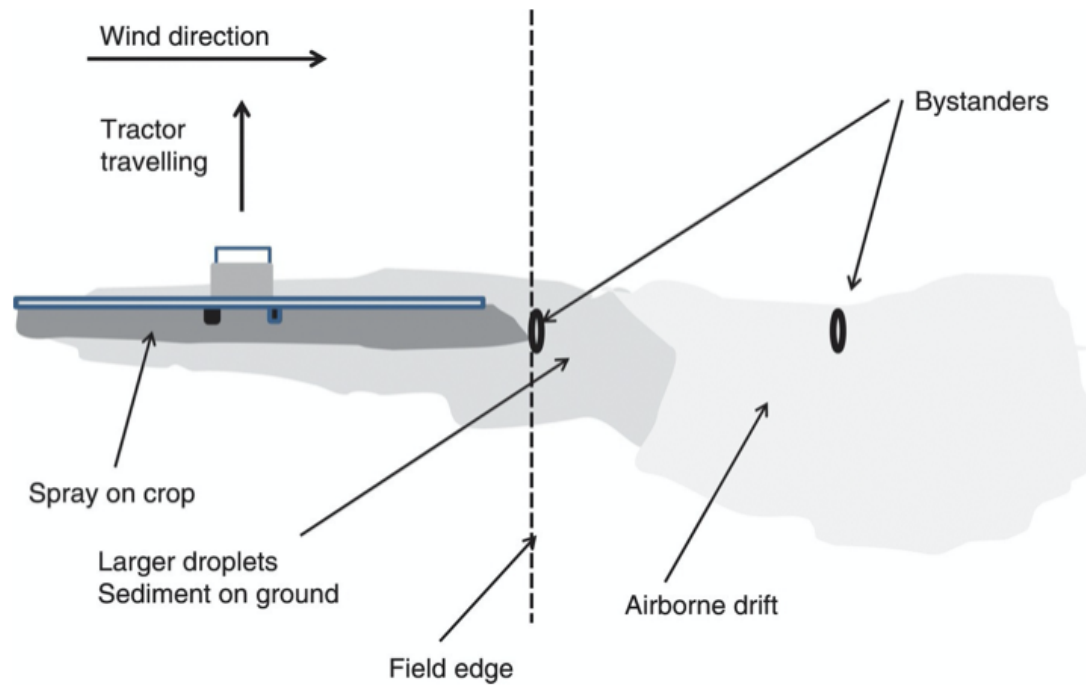


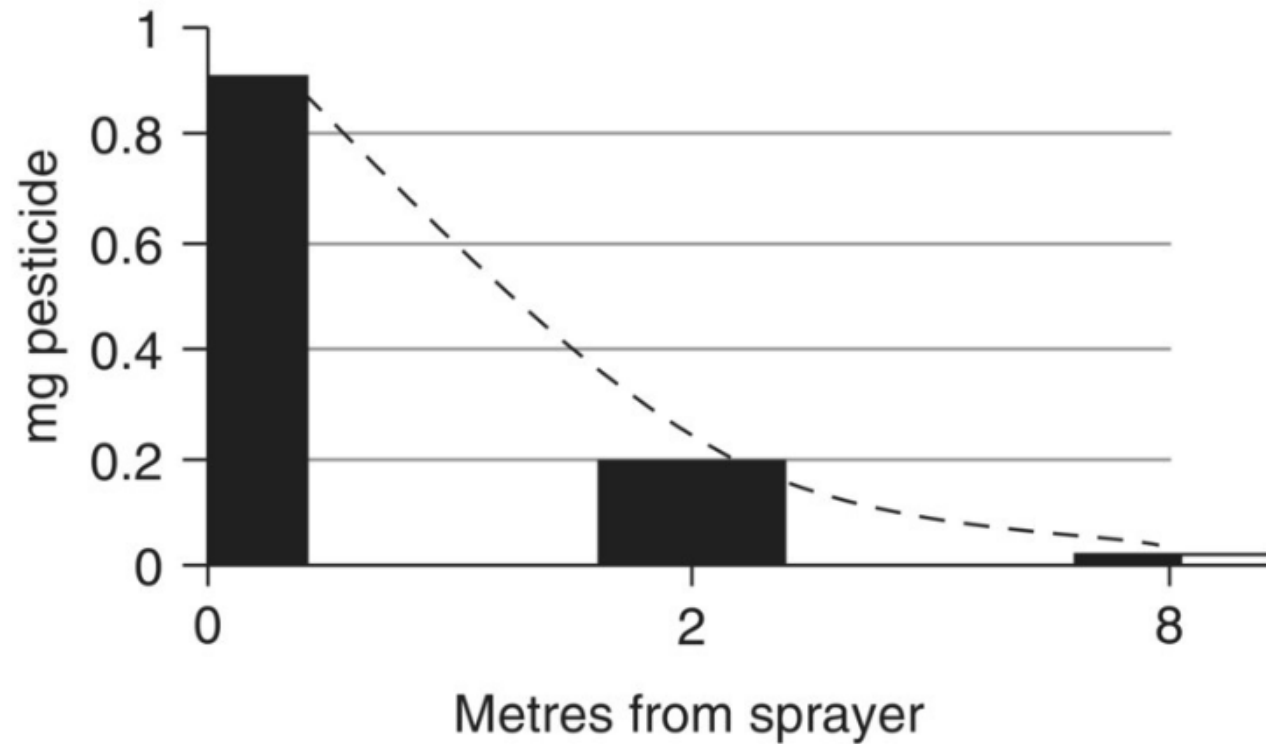
Fig. 5.5 Differences in sensitivity of individuals in relation to distribution of bystander exposure.

Adapted from a diagram by Professor Brian Hoskins, Royal Commission on Environmental Pollution).

Bystander exposure

- Addition to people walking near fields being sprayed, concern has been expressed about spray drifting across field boundaries into adjacent gardens and houses, occupied by 'residential neighbours'.
- In the regulatory risk assessment of exposure to bystanders, it is now considered that the distance of a sprayer from the field boundary and the position of the bystander or resident should be 2 m distance rather than the 8 m previously used

Bystander exposure



[Fig. 5.8](#) Decrease in exposure at different distances downwind of the boom.