ENGLISH NATURE

Research information note

English Nature Research Reports, No 614

The impacts of pesticide spray drift and fertiliser over-spread on the ground flora of ancient woodland

Report Authors: Benedict Gove, Jaboury Ghazoul, Sally Power and Peter Buckley

Keywords: Woodland, pesticide, spray drift, fertilizer, ground flora, edge effects

Introduction

Drift or overspray from pesticides applied to farmland may affect the flora of adjacent woodland. However there are few data to indicate which species might be most sensitive, how far such effects may spread into the wood, or any consequent effects on ground flora richness at the edges of woods. These issues were studied as part of a Ph.D project at Imperial College by Benedict Gove (funded by the John Stanley Foundation, with additional inputs from the Woodland Trust and English Nature).

What was done

Levels of spray drift from adjacent land into woodland were assessed by controlled experiments at Imperial College London's Silwood Park (Berks) and Wye (Kent) campuses. In addition the woodland margin ground flora was surveyed in 90 woodlands adjacent to three different agricultural land uses. Thirty margins were surveyed beside each of the following land-use types: unimproved grassland, improved grassland and arable fields, assumed to represent low, medium and high agri-chemical input regimes respectively.

Results and conclusions

The highest concentrations of spray drift were generally confined to within 5 metres of the spray boom, except in conditions with open margins and higher wind speeds, where drift may be detectable (although not necessarily in damaging concentrations) at least up to 10 metres. Drift within the first 4 metres of the woodland margin was measured at concentrations shown to have impacts on some woodland plants in separate greenhouse/ field trials. At low wind speeds the physical structure of the woodland margin had little effect on depth of penetration of drift. At higher wind speeds (but within recommended limits) the attenuation produced by dense marginal vegetation increased.

Differences in the ground flora of woodland margins adjacent to different land uses were significant in terms of overall species richness, diversity and abundance only in the outer two metres of the margin. Abundance, species richness and diversity were all highest in woodland margins adjacent to unimproved grassland, and lowest next to arable fields.

continued >>>

Analyses of the abundance of individual species and groups of species showed significant differences related to adjacent land use up to 12 m into woodland margins. Those species identified as highly sensitive to herbicide damage in the plant screens were found to occur significantly more frequently in woodland margins alongside unimproved grassland, with their lowest frequency being alongside arable fields.

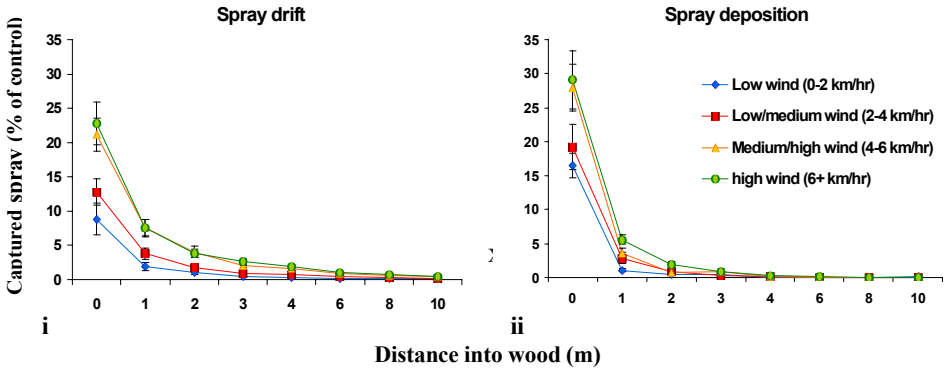

Figure 1. Influence of wind speed on the movement of i. spray drift and ii. spray deposition into woodland margins in the drift trials at Silwood Park campus.

The use of Ellenberg values for nitrogen suggest that fertiliser over-spread may have impacts on ground flora up to at least 4 m into the margin. The impacts were associated with both improved grassland and arable fields, with higher frequency of nitrophilous species and lower abundance of species associated with low nutrient sites.

English Nature's viewpoint

The new agri-environment schemes can provide incentives to land owners to create unsprayed zones around fields. From this study a buffer of 10-15 m would appear to be needed to eliminate most of the risk of herbicide sprays affecting the woodland flora, but even a narrow strip of 2-5 m could be of some use. In addition restoring hedges round the edges of woods or the development of a dense scrubby thorn or bramble belt between the wood and the field would further help to reduce the potential impact on the woodland flora.

Selected references

GOVE, B., GHAZOUL, J., POWER, S.A. & BUCKLEY, G.P. 2004. Does pesticide spray drift and fertiliser overspread have impacts on the ground flora of ancient woodland margins? *In:* R SMITHERS (ed) *Landscape ecology of trees and forests*, 27-34. Cirencester: IALE(UK).

KLEIJN, D., & SNOEIJING, G.I.J. 1997. Field boundary vegetation and the effects of agrochemical drift: botanical changes caused by low levels of herbicide and fertilizer. *Journal of Applied Ecology*, 34, 1413-1425.

TSIOURIS, S., & MARSHALL, E.J.P. 1998. Observations on patterns of granular fertiliser deposition beside hedges and its likely effects on the botanical composition of field margins. *Annals of Applied Biology*, 132, 115-127.

Further information

For the full report or other publications on this subject, please contact the Enquiry Service on 01733 455100/101/102 or email enquiries@english-nature.org.uk

For further information about the work of English Nature, please visit our website at: www.english-nature.org.uk