HERBICIDES in Forestry

Ian Willoughby, Forestry Commission, Forest Research, Alice Holt Lodge, looks at the ways in which forestry herbicides are used and approved.

'You can drink glyphosate, it's so safe'

'There's more pesticide used to grow that apple you're eating than we use in this wood in a 100 years'.

'You probably use more in your rose garden every year than we do in this wood'.

Tempting remarks, perhaps, to an enquiry from the public about weeding operations going on in your wood? But just how much truth do they have - what is the regulatory environment ensuring pesticide safety, and how much is actually used in forestry?

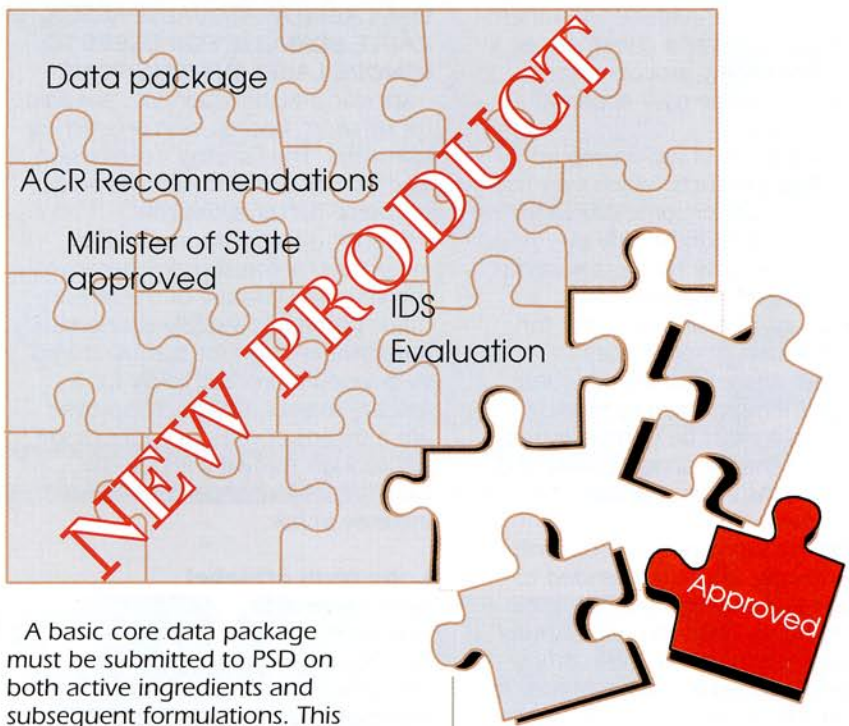
PESTICIDE CONTROL AND REGULATION

The Pesticides Safety Directorate (PSD) and the Health and Safety Executive (HSE) are the government agencies responsible for assessing data on the safety of pesticides in respect to users, general public, consumers, plants, animals and the wider environment. Five government departments are responsible for the approval of pesticide products - these are the Department of Health, Department of the Environment Transport and the Regions, Ministry of Agriculture Fisheries and Food, and the Scottish and Welsh Offices. For forestry situations, we are normally concerned only with the Pesticides Safety Directorate.

Approvals

When you pick up a bottle of herbicide the first thing to look at is the statutory conditions box on the label. This tells you where you can use the herbicide, how much you can use and when, and measures you need to take to protect operators and the environment. The rest of the label gives essential further details on how to use the product. This is what we refer to as a full label approval.

Before any product containing a new active ingredient can be approved for use in the UK, it must go through the following process.



A basic core data package must be submitted to PSD on both active ingredients and subsequent formulations. This includes data on physio chemical properties, mammalian toxicology, environmental fate and behaviour and ecotoxicology, plant metabolism and residue chemistry, information on potential user and consumer exposure, and data on efficacy. Detailed reports and evaluation are presented to the Interdepartmental Secretariat (IDS) by PSD.

Membership of the IDS is drawn from all the government departments responsible for the approval of pesticides as well as PSD, HSE and independent scientific experts. The IDS reaches a consensus on the likely risks to people, animals and the environment - if risks fall within acceptable limits, it recommends the approval to the Advisory Committee on Pesticides (ACP).

The ACP is made up of independent experts and lay members and is free of government or agrochemical industry representation. The ACP makes a recommendation to the Ministers of State responsible for pesticides, all of

whom must agree to the recommendation before a product can be approved.

The work of the ACP is supported by several other committees, such as the Environment Panel, Working Party on Pesticide Residues and Working Party on Pesticide Residues in Water. These all have both government and independent representatives.

A summary of the procedure is as follows:

Core data package to PSD
Evaluation by PSD
Consideration by IDS
Scrutiny and recommendation by ACP
Recommendation confirmed by Ministers of State.

All evaluation documents produced by the ACP are published.

Notwithstanding the approval, any evidence of adverse effects on the environment or human health must be submitted immediately to PSD, and may lead to amendment or immediate revocation of the approval.

Reviews

Reviews of existing products follow a similar procedure to that of approvals. A major pan-European review process is under way to harmonise national approval systems. All products approved before July 1993 will be reviewed. Only those that are proven to be without danger to humans or the wider environment will be approved and given 'Annex 1' listing. The review process takes a similar form to the new approval system.

This new process will sweep up those older products which may have been approved for some time and, although proven to be safe in practice, may have had less rigorous data packages submitted (for example, glyphosate). In order for older products to retain their approvals, there must be adequate data on them assessed to modern standards. It must be demonstrated that they pose no unacceptable risks to users, consumers and the environment.

Eighty-six substances are currently under review, and it is intended to complete all reviews by 2003. After this time, only products with 'Annex 1' listing may be used. Evaluations will be published in the same way as for new products.

Information on older products

It is intended that full independent evaluations on all older products will be made available by 2003, due to the EU wide review process. In the meantime, any interested party can make a specific request for information on products to the Pesticide Safety Directorate. Some information is commercially sensitive, but PSD will always aim to be as open as possible, and at the very least provide information on the extent of the data they hold.

APPROVAL TYPES

Products approved under the systems described earlier are granted full or provisional approval for certain fields of use and situations. Provisional approvals require extra data to be submitted within a set timescale, for the approvals to continue. Labels on pesticide products detail conditions and instructions for use, based upon the evaluation and approval. These full approvals are paid for and owned by the manufacturers of the products.

Other types of approval also exist.

Specific off-label approval

Specific off-label approvals are granted by PSD take the form of a 2-3 page guidance note allowing products with full/provisional approval in certain crops or situations to be used in others. For example, a product approved for use in agriculture might have a specific off-label approval granted for use in forestry. Specific off-label approvals are only granted by PSD, and only after careful evaluation of any increased risks that may result from such an extension of use.

OFF-LABEL APPROVAL IS NOT A CARTE BLANCHE FOR USERS TO IGNORE LABEL INSTRUCTIONS.

Specific off-label approvals are paid for by users, based upon research or user trials. The Forestry Commission and Timber Growers Association act on users' behalf in this role.

Specific off-label approvals are important for forest users, because the very small nature of the forestry market means it is rarely economically attractive enough for manufacturers to develop a product solely for a forestry market. Off-label approvals are a means of using a wider range of products to deal with specific problem weeds or pests, with no increase in risk.

Long-term off-label arrangements

Long-term off-label arrangements also exist to allow certain approved products to be used in other crops/situations. Subject to certain restrictions, the following are allowed: (1) pesticides approved for use on any growing crop may be used in forest nurseries; (2) herbicides approved for use on cereals may be used in the first five years of establishment in farm forestry on land previously under arable cultivation or improved grassland, as defined under the Forestry Commission Woodland Grant Scheme. In addition, herbicides approved for use on cereals, oil-seed rape, sugar beet, potatoes, peas and beans may be used in the first year of regrowth after cutting in short rotation coppice.

FIELDS OF USE/SITUATIONS

Pesticides have an approved field of use which gives the broad area of use of the products and indicates what level of certification is required - we are concerned here with forestry fields of use. They also have an approved situation, which defines more clearly where products can be used. We are particularly concerned here with three areas.

1. *In or near water* - covers use within water bodies and on banks and land immediately adjacent. It is Forestry Commission policy to normally avoid spraying within 20m of lakes or reservoirs, or 10 m of watercourses. Within these riparian zones, alternative methods of weed control should be considered. If herbicide use is absolutely necessary, only products approved for use in or near water should be used, and only then if there is no risk of contamination of water courses.
2. *Forest* - all woodlands grown for whatever objective.
3. *Farm forestry* - groups of trees established on arable or improved grassland (new planting) as defined by the Woodland Grant Scheme.

The distinction between *forests* and *farm forestry* is important. New planting on improved grassland or arable land is often faced with distinctive weed problems. Agricultural products are required to control profuse growth of annual arable weeds. In some situations, new woodland creation on fertile lowland sites would be prohibitively expensive without the use of *farm forestry* approved products. The crucial point here is that planting trees in an agricultural field does not immediately change the area into a forest ecosystem.

Users should be able to have access to the 300+ agriculturally-approved products, rather than the 16 *forest* approved products, as they are essentially faced with an agricultural problem and ecosystem, albeit with a few trees planted. It is not anticipated that users would be using *farm forestry* herbicides outside the establishment period, i.e. 3-5 years after planting. After this time, *forest* products could be used if necessary. *Forest products* can be used in *farm forestry* situations, but not *vice versa.*

HERBICIDE USE IN FORESTRY

Weeds compete for moisture and nutrients with newly planted/regenerated trees. This can result in seriously suppressed tree growth and death. Competing vegetation must be controlled to create new woodlands or regenerate old ones. Several methods exist for managing weeds. The use of herbicides is currently the most economically viable method in most situations. The table shows an estimate of the amount of pesticide used in forestry compared with other crops. Despite forestry making up around 11% of the land-use of Great Britain, it only amounts for 1.2% of all pesticide use. If figures for stump treatment using the commodity substance urea (fertiliser) are excluded, forestry accounts for less than 0.1% of all usage.

PESTICIDE USAGE 1994

Crop	Total area crop (ha)	% Land area	Area treated (ha)	% Area of each crop treated	Tonnes active ingredient used	% Total AI used
Forestry pesticides	2,406,000	11	34,000*2	1.4	30	0.1
Forestry urea	2,406,000	11	16,400*1	0.7	420*4	1.2
Total Forestry	**2,406,000**	**11**	**50,400**	**2.1**	**450*3**	**1.3**
Arable	4,563,920	20	42,444,236	930*5,6	28,746	84
Glasshouse	4,050	0.01	58,657	1,448*5,6	148	0.4
Grassland	10,490,279	47	2,275,359	21*5,6	1,744	5.1
Nurseries	8,172	0.04	62,827	768*5,6	108	0.3
Fruit	4,044	0.18	832,012	2,000*5,6	691	2
Vegetables	15,256	0.7	1,053,705	690*5,6	903	2.7
Other agricultural	9,831	0.04	178,094	1,800*5,6	721	2.1
Industrial & non-crop	4,598,000	20.6	N/A	N/A	633	2

*1 *Restock area treated with urea and pesticides after planting*
*2 *Estimate based on total annual new planting/restocking area. Part will be untreated, but part will be treated more than once*
*3 *Estimated total forestry usage, based on FC as 40% of total*
*4 *Urea is a commodity substance – fertiliser used as a cut stump treatment*
*5 *Some areas treated more than once*
*6 *Agricultural and industrial figures produced by Central Science Laboratory Pesticide Usage Survey*

AI – *Active ingredient*
N/A – *Data not available*

Despite forestry making up around 11% of the land-use of Great Britain, it only accounts for 1.2% of all pesticide use. If figures for stump treatment using the commodity subsance urea (fertiliser) are excluded, forestry accounts for less than 0.1% of all usage.

Recent agreement between UK forestry industry and environmental organisations has paved the way for an independent certification scheme - The UK Woodland Assurance Scheme - to be set up. One element of this scheme will be an audit protocol to allow independent assessment of woodlands against agreed environmental and sustainability criteria. It is likely that a commitment to a reduction in the amount of pesticides used on a per hectare basis will be included as a long term objective in woodlands managed under the UK Woodland Assurance Scheme.

The Forestry Commission Research Agency has been investigating methods of reducing herbicide inputs in forestry for many years, and a new series of experimental work started in 1994. This work has been recently reported (Willoughby 1998) and showed the clear potential for using closer spacing of trees to reduce inputs. This can be achieved through planting or in the case of certain tree species, through direct seeding. In addition, there appears to be some potential for using cover crops such as clover to reduce herbicide use.

The next step will be a review of the alternatives and concrete proposals for future research aimed at giving further practical alternatives for users. This will be produced by the middle of 1999.

Other options that are available now to managers to reduce herbicide inputs include:

- ***the use of highly active herbicide products*** - 750 g active ingredient per hectare (15 l/ha product) of imazapyr may give up to 3 years of weed control, compared with perhaps a few weeks or months of weed control from 720g active ingredient per hectare (2 l/ha product) of glyphosate. However, bear in mind that the more persistent the product, the higher the potential for environmental impact;
- ***cultivation to suppress weeds*** – but remember that this may actively encourage weed growth on more fertile sites;
- ***use of the minimal necessary rates,*** with adjuvants if required, to control the weed problem;
- ***use of spots/bands instead of complete weed control*** – a 1m wide weed free band is the MINIMUM, not the optimum, level of weed control that should be aimed for. In many cases 1m² is specified, but a considerably smaller area is actually achieved;
- ***use of larger (balanced) transplants*** – planted at the optimum time of year for the species;
- ***'hot planting'*** – restocking quickly after felling, to take advantage of the weed-free condition that often exists post harvest in conifer forests;
- ***alternatives such as mulches and hand-weeding*** – sometimes effective, but can be very expensive.

The Forestry Commission will be producing guidance for managers on minimising pesticide inputs based upon existing knowledge, in 1999.

CONCLUSION

An effective regulatory regime exists to ensure products are environmentally safe, if used correctly. Herbicide use in forestry is relatively low compared with other fields of use. Those woods subject to the new audit protocol will need to show explicitly the appropriate choice of the minimal amount of pesticide necessary, as well as a long-term commitment to reduce inputs. Forestry Commission work will aim to support users in carrying out these practices.

REFERENCES

Willoughby, I. (1998). *Future alternatives to the use of herbicides in UK forestry.* In Wagner, R.G. and Thompson, D.G. (Comp.) (1998). Third International Conference on Forest Vegetation Management: Popular summaries. Ontario Ministry of Natural resources, Ontario Forest Research Institute, Forest Research Information Paper No.141.