KNAPSACK SPRAYERS
AND WATER PROTECTION

Do’s and Don’ts
Keep all pesticides in a dedicated secure bunded labelled store (see HSE “Guidance on storing pesticides for farmers and other professional users” AIS 16).

Check with your pesticide supplier or a BASIS registered agronomist that the product you are planning to use is
- approved for the planned situation or crop
- will control the target weed, pest or disease
- suitable for hand held use and will control the target weed or pest.

Check the sprayer is clean, in good condition and safe to use.

Use stored water or a double check valve on mains water supplies for making spray solutions.

Use clean water to check the sprayer for leaks, and that the lance cut off valve is working properly.

Check the correct nozzle is fitted and spares are available.

In general use
- a flood jet for herbicide spraying
- a hollow cone nozzle for insecticide/ fungicide spraying
- consider using an air induction nozzle or a controlled droplet applicator (cda) to reduce the risk of drift

Check battery status of electrically dependant sprayers eg cda sprayers.

Check the spray pattern is correct, and the nozzle flow rate is within 5% of manufacturers stated output.

Do Read the label before use and follow instructions
Do check pesticide dose rates and any supportive guidance

- Double check dose rates and mixing quantities using the product label and the tables in this leaflet, web sites and other information sources.
- Fill up in an appropriate pesticide handling area.
- Have a spill kit ready for use.
- Position sprayer, pesticide container and measuring jugs within a spill tray or within a bunded area.
- Only take the amount of pesticide you are likely to use for the planned spraying activity out of the store.
- Follow correct mixing sequences; usually some water is added to spray tank before adding product.
- Take care to avoid splashing any pesticide concentrate or spray solution when filling.
- Rinse empty containers and measuring jugs at least three times and until visibly clean.
- Add any washings to spray solution in the knapsack sprayer.
Do use safe, effective spraying methods

- Check the site for hazards that may impede good spraying practices.
- Measure your spraying speed in the intended treatment area.
- Check wind direction is away from – or will not cause spray to drift to any environmentally sensitive areas.
- Project the spray downwards with the nozzle at its optimal distance from target vegetation.
- Consider using a shroud to target applications and minimise drift.
- Apply the correct dose at all times.
- Return to mixing area and work in the spill tray or bunded area to rectify sprayer faults.
- Carefully note exact location where spray solution has run out, so that the subsequent load starts in the right place.

Use a spill tray to capture any drips and splashes. Keep sprayer well away from drains when filling and cleaning.
**Do clean sprayer thoroughly after spraying**

- Triple rinse the inside of the spray tank.
- Remove tank lid, direct nozzle to within tank and flush the lance with clean water.
- Remove nozzle and filters to enable thorough cleaning.
- Spray out all washings over a small unsprayed area within the overall treatment zone.
- Dispose of visibly clean waste packaging through a waste/recycling contractor.

**Controlled droplet applicators (cda)** are a useful alternative to a knapsack. They usually come with a closed transfer system which means there is no mixing and minimal cleaning.
Don’t risk pesticides reaching water

- Never take water directly from a water course, borehole or without use of double check valves from a domestic supply.
- Never prepare any spray solutions near a water course or drain and keep at least 50m away from any borehole, spring or well.
- Avoid preparing spray solutions over hard core or unbunded concrete.
- Never wash splashes or spills into drains.
- Avoid use of adjustable nozzles.
- Never be tempted to overdose by either adding more pesticide than is needed when preparing the spray solution or during the application.
- Do not apply pesticides if heavy rain is expected within 48 hours of application.
- Never over-spray buffer zones, drains or water courses.
- Avoid spray drift at all times.
- Avoid use of fine sprays which are more prone to drift.
- Do not spray upwards and avoid spraying laterally as spray drift may move for very long – and uncontrolled – distances.
- Do not apply so much spray that it runs off the target.
- Do not try and rectify sprayer faults within the treatment area.
### Usefull tables for knapsack spraying

#### Spraying speed:

<table>
<thead>
<tr>
<th>Seconds taken to spray 50 metres:</th>
<th>40</th>
<th>50</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>metres/second</td>
<td>1.25</td>
<td>1.00</td>
<td>0.83</td>
</tr>
<tr>
<td>Kilometres/hour</td>
<td>4.5</td>
<td>3.6</td>
<td>3.0</td>
</tr>
</tbody>
</table>

#### Area treated with 20 litres of spray solution:

<table>
<thead>
<tr>
<th>Spray volume rate; litres/hectare</th>
<th>150</th>
<th>200</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treated area; square metres</td>
<td>1333</td>
<td>1000</td>
<td>800</td>
</tr>
</tbody>
</table>

#### Amount of product used to make 20 litres of spray solution; mls of product

<table>
<thead>
<tr>
<th>Label dose rates; litres/hectare of product</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>5</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spray volume rate; litres/hectare</td>
<td>150</td>
<td>133</td>
<td>266</td>
<td>333</td>
<td>667</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>80</td>
<td>160</td>
<td>240</td>
<td>400</td>
</tr>
</tbody>
</table>

#### Amount of product used to make 20 litres of spray solution at a label specified spray concentration/dilution ratio

<table>
<thead>
<tr>
<th>Spray concentration; %</th>
<th>0.5</th>
<th>0.75</th>
<th>1.00</th>
<th>1.25</th>
<th>1.50</th>
<th>2.00</th>
<th>2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dilution ratio</td>
<td>1:200</td>
<td>1:150</td>
<td>1:100</td>
<td>1:80</td>
<td>1:67</td>
<td>1:50</td>
<td>1:40</td>
</tr>
<tr>
<td>Product; mls</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>250</td>
<td>300</td>
<td>400</td>
<td>500</td>
</tr>
</tbody>
</table>
FURTHER INFORMATION

In the first instance, talk to your pesticide supplier or consult a BASIS registered agronomist

Websites offering more information:

The Voluntary Initiative  
www.voluntaryinitiative.org.uk

Environment Agency  
www.environment-agency.gov.uk

Catchment Sensitive Farming  
www.naturalengland.org.uk/csf

Health and Safety Executive  
www.hse.gov.uk

Scottish Environment Protection Agency  
www.sepa.org.uk

National Association of Agricultural Contractors  
www.naac.org.uk

Crop Protection Association  
www.cropprotection.org.uk

Chemicals Regulation Directorate  
www.pesticides.gov.uk

National Sprayer Testing Scheme (NSTS)  
www.nsts.org.uk

National Register of Sprayer Operators (NRoSO)  
www.nroso.org.uk