Importance and limitations of pellets in slug control

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Why pellets?

- Slug body is covered in layer of watery mucus, so molluscicides need to be highly water-soluble to enter body
- Slugs are most active in wet weather
- Water-soluble molluscicides are rapidly washed away in wet weather

Active substances in Slug Pellets

- Metaldehyde – Selective: kills slugs but no effects on beneficial insects and earthworms. Relatively low cost. Good choice for integrated control programmes, BUT residues in water supplies

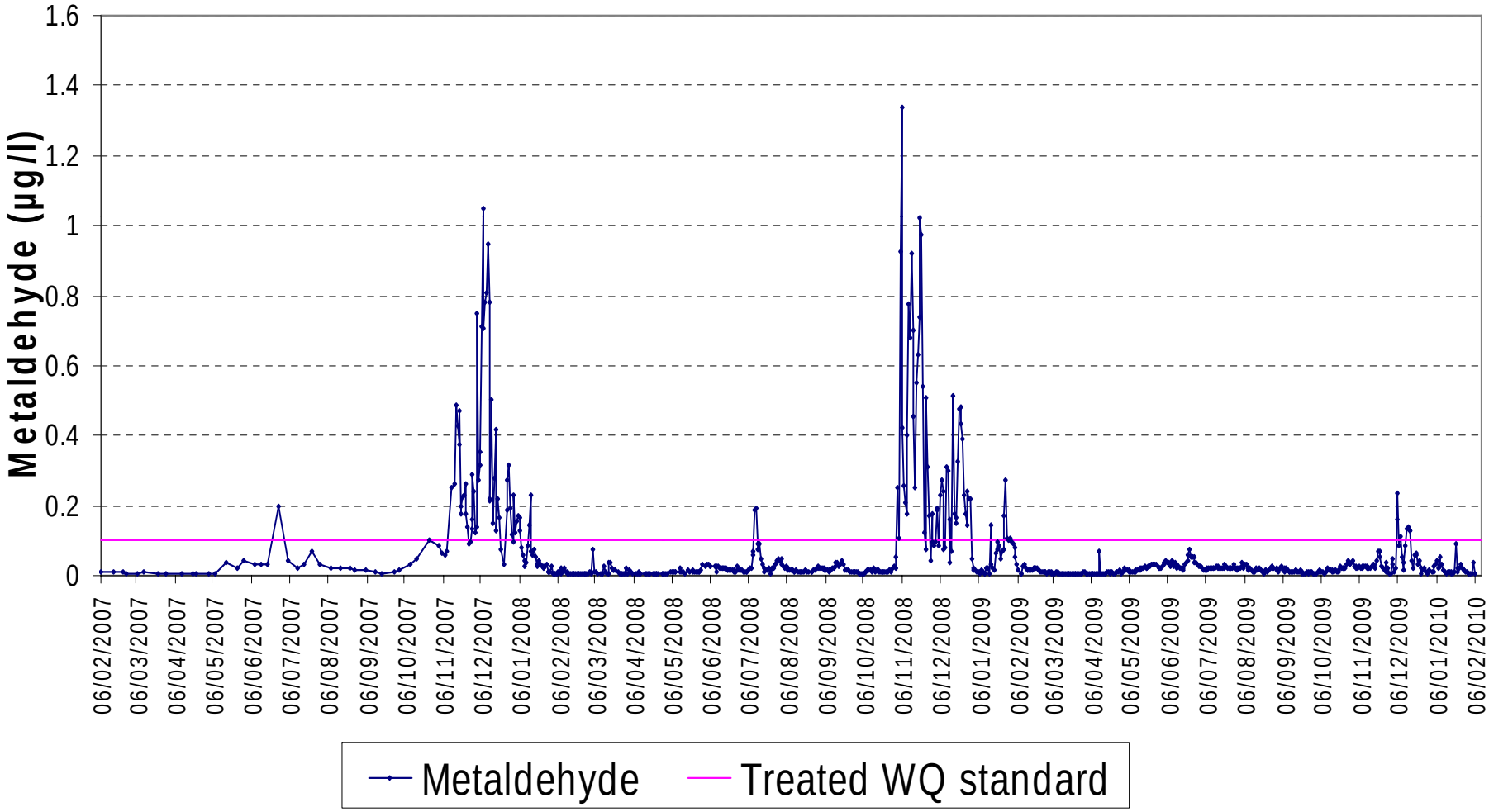
- Methiocarb – kills slugs but also kills ground beetles and some earthworms

- Iron phosphate pellets (3% formulation) are recent introductions. Selective: kill slugs, no effects on beneficial insects but may affect earthworms. The only product that can be used at field edges

Metaldehyde in drinking water

- Metaldehyde is the active substance most commonly used in slug pellets
- In 2007 and 2008, metaldehyde residues were detected in “raw” drinking water at >10 times the permitted level of 0.1 µg/litre
- Metaldehyde residues in water are the result of slug pellet applications by arable farmers
- Once metaldehyde gets into water supplies, it is very difficult to remove it
- If metaldehyde residues in water are not reduced to acceptable levels, **we risk losing this valuable active ingredient**

Raw water metaldehyde content (µg/l)



Industry Response

- The main manufacturer of metaldehyde has combined with the pellet producers to form the **Metaldehyde Stewardship Group (MSG)**
- MSG aim to promote and encourage best practice use of metaldehyde slug pellets, minimise environmental impact and, in particular, protect water
- MSG Get Pelletwise Campaign
- MSG Program of R&D
- New pellet formulations
- Lower metaldehyde concn. in pellets

MSG Research

Cherwell monitoring study results

7 kg/ha of 4% wet process 280g a.s/ha

- Direct 0.2%
- Equipment contamination 1.1%
- Drainage losses **98.7**%
  = 5g/ha up to 20µg/l

MSG Modelling

Metaldehyde levels in drainage water

- Worse on heavy clays
- Less of problem with early autumn application
- Split applications can be beneficial

Strategies for slug control

- Factors influencing slug damage risk
- Integrated control
  - Assessment of slug damage risk
  - Role of cultivation in slug control
  - Chemical control
    - Seed treatment
    - Slug pellets

Factors favouring slugs

- Moisture
- Moderate temperatures (optimum 17^{o}C)
- Heavy clay or silt soils
- Dense leafy crops, especially oilseed rape
- Crop residues
- Weeds and volunteers
- Lack of soil disturbance

Slug damage to wheat

Seed hollowing - is most severe damage

Leaf grazing -
is usually less important

Slug damage to oilseed rape

Newly germinated seedlings are most vulnerable

Slug damage patterns within field

- Normally there is much less slug damage around field margins than in the middle of fields. Compaction at field edge restricts slug movement, especially for slugs damaging wheat seeds
- However, Oilseed rape may suffer damage at the field edge

  - Large *Arion* spp. in field margins are adults at the time of rape establishment and move at night to feed in the crop edge
- Do not use metaldehyde pellets within 6m of watercourse or ditch
- Do not use methiocarb pellets within 6m of field margin
- If necessary, treat field edges with pellets based on iron phosphate

Risk assessment – Step 1

- Assess slug activity using 9 traps per field baited with non-toxic bait (e.g. chicken layers' mash) left for **one** night in stubble before cultivation, **when soil surface is moist**
- For wheat, 4 slugs/trap in stubble = possible risk
- For oilseed rape:
  - 1 slug/trap in stubble =possible risk
  - 4 slugs/trap in standing cereals = possible risk

Risk assessment – Next steps

If slug trap catch is above threshold

- Was the field drilled during wet weather?
- Has wet weather delayed drilling?
- Is the seedbed coarse & cloddy and rolling not possible?

! Slug pellet application is justified soon after drilling

Trap again if wet weather continues after drilling

Monitor crop throughout establishment

- For wheat, especially to start of tillering
- For oilseed rape, especially to 4-true-leaves

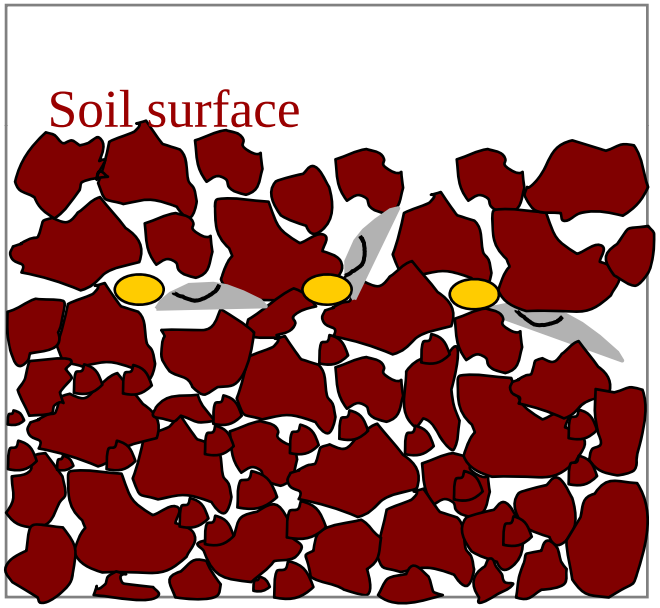
! Repeat treatment in response to damage

Use cultivation to reduce slug damage

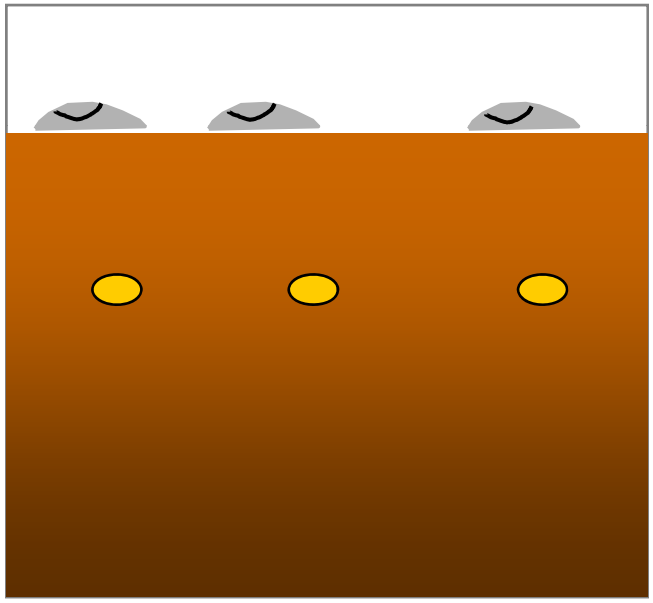
- Even minimum tillage gives considerable reduction in slug damage compared to direct-drilling
- Production of fine firm seedbeds is most important
- Drill a little deeper than normal if seedbed is cloddy
- In cloddy seedbeds with large slug population, effective slug control is difficult

Slug damage to wheat seeds

Cloddy seedbed



Fine seedbed



Seed treatment with neonicotinoids (clothianidin & imidacloprid) can help to reduce seed kill (but NOT later seedling damage)

Slug pellet application

- Application of slug pellets should be integrated with cultural control measures
- Broadcasting on the soil surface soon after drilling (after rolling if done) is normally the best method and timing of application, adding to the control achieved by cultural measures
- Spread pellets evenly to provide enough bait points for control

  (MSG recommends spread width of 12 m with quad bikes)
- Pellets drilled with the seeds are likely to be totally ineffective if cultural control measures are followed

Slug pellet application – continued

- Have appropriate Certification of Competence
  - See MSG Advice Document produced 22/10/10
- Wear protective equipment and follow precautions on label
- Avoid spillages – can result in run-off and pellets in concentrated amounts can kill wildlife and pets

Choice of slug pellets

- Metaldehyde pellets are good first choice for pellet application, provided that MSG Best Practice Guidelines can be met:
  - Selective – do not harm predatory ground beetles, which can help to restrict slug populations
  - Relatively low cost
  - Wide range of options

Metaldehyde bait types currently available

- **Dry-pressed pellets**
  - Size can be quite variable
  - Tend to be dusty – especially as result of breakdown during application
  - Some break down relatively quickly in the field in wet weather
- **Wet-pressed pellets**
  - More uniform in size
  - Less dust
  - If pellets too hard, water uptake is delayed, initially less attractive to slugs
  - Better persistence in wet weather
- **Wet-extruded products**
  - Precision size
  - Different shapes can be produced
  - Least dust
  - Also better persistence in wet weather

Metaldehyde amount is being reduced

- 5% or 6% metaldehyde pellets were standard
  Recommended rate was up to 15kg/ha
  (750g - 900 a.s./ha)

- Most pellets now contain 3% metaldehyde

- Some pellets contain only 1.5% metaldehyde
  Recommended rates are considerably less
  All have been tested for efficacy

Metaldehyde stewardship best pract. 2010

- No pellets within six metres of watercourse/ditch
- Maximum single application: 210g a.s./ha (= 7kg 3% a.s./ha)
  Advise - individual application 160g a.s./ha (= 5.3kg 3% a.s./ha)
  (=10.6kg 1.5% a.s./ha)
- Maximum total dose from 1 August to 31 December:
  210 g a.s./ha
  Advise - 160 g a.s./ha
- Maximum total dose rate: 700 g a.s./ha/calendar year

- Do not apply when heavy rain is forecast

- Do not apply if drains are flowing

Choice of slug pellets – Other actives

- Methiocarb pellets are well proven alternatives:
  - Where metaldehyde has been applied up to the max. limit/ha
  - In situations where drains are flowing or likely to flow (more likely later in autumn)
  - Best applied later in autumn when ground beetles are less active

- Ferric phosphate pellets are an option in early autumn when carabid beetles are active. They are the only type of pellets that can be applied within 6m of field margin with ditch or watercourse

Thank you

Follow best practice use of metaldehyde slug pellets to minimise environmental impact and protect water