PINPOINT
Rivers Trusts and Farmers tackling water pollution

Best Practice Information Sheet

A clear solution for farmers
CATCHMENT SENSITIVE FARMING

A joint project between the Environment Agency and Natural England, funded by Defra and the Rural Development Programme for England, working in priority catchments within England.

Cultivation techniques to protect soils Sheet 24.0a

Direct drilling

Why change?

Direct drilling offers many benefits over traditional plough-based systems of crop establishment which include:

- lower costs and energy inputs
- less wear and tear on machinery
- improved soil structure and less risk of damage from machinery
- reduced soil erosion and runoff
- increased beneficial invertebrates and earthworms
- decreased mineralisation of nitrogen and reduced leaching risk.

Direct drilling can help reduce cultivation costs

Steps to success

1. **Review the current situation** by considering whether economic and other benefits can be gained from a change to your system of crop establishment. Look at factors such as climate, soil type, residue management, farm size, cultivation system, cropping, machinery, management capability and personal business objectives.

2. **Identify potential opportunities** for reduced cultivation using direct drilling on your farm. If your soil structure is good and you do not have a heavy infestation of black grass then direct drilling is an option. Avoid direct drilling on poorly drained or wet soils.

3. **Calculate the cost-benefit of these opportunities** by comparing the cost of factors such as time, machinery, energy and agrochemical losses for both systems. Remember that direct drilling also offers savings associated with improved soil workability, structure and reduced soil erosion, runoff and pollution risk. Be aware that research has shown that direct drilling can reduce yields and increase herbicide use but enable significant savings on cost of cultivations.

4. **Develop an action plan** to adopt a system of reduced cultivation using direct drilling on your farm:

   - know the soils on your farm and consider whether reduced cultivation is an option. Consider partial adoption of direct drilling as a first step. Use the **Cross Compliance Soil Protection Review (SPR)** as guidance for soil management, and review annually.
   - plough only when necessary, such as when the soil is deeply compacted or to meet the needs of specific crops, e.g. potatoes
   - timeliness is the key to successful crop establishment using direct drilling. Avoid drilling when soils are wet to minimise the risk of smearing and compaction, both of which can reduce crop productivity and increase soil erosion and runoff
   - plan your weed control. Develop a stale seedbed by discing or tined cultivation. Allow weeds and volunteers to germinate and then control them on subsequent cultivations, or by using a broad-spectrum herbicide sparingly
   - drill the crop into the seedbed using a specialist drill
   - use crop rotations to improve soil structure and fertility, and to aid weed control
   - consider the use of machinery rings or contractors to increase work rates, save investment in machinery costs and ensure timeliness of operations.

5. **Check** your fields regularly for pests and plan pest management suitable for a direct drilling situation to minimise the cost of control.

PINPOINT
Rivers Trusts and Farmers tackling water pollution

Best Practice
Information Sheet

Cultivation techniques to protect soils **Sheet 24.0b**

Direct drilling **- Practical examples**

Direct drilling versus ploughing

Direct drilling is a system of seed placement where soil is left undisturbed with crop residues on the surface from harvest until sowing. Seeds are delivered in a narrow slot created by discs, coulters or chisels.

Direct drilling offers the potential for savings over traditional plough-based crop establishment systems due to lower costs associated with machinery, energy, soil damage, soil erosion, nitrogen leaching and agrochemical losses.

Direct drilling also offers substantial environmental benefits such as increased soil fauna and habitats for birds, as well as a reduced risk of watercourse pollution.

Case studies in a Soil Management Initiative (SMI) booklet 'A guide to managing crop establishment' e.g. pages 26-27 show ***"a dramatic reduction in establishment costs and an increase in work rate – improved control of black grass and reduced slug activity"*** Source Cranfield University

Comparison of direct drilling versus ploughing

System	Depth cm	Cost £/ha	Time min./ha	Cereal yield%
Plough	15-35	100-135	150-220	100
Direct drilling	0	30-45	25-40	99.2*

*Average yield relative to ploughing for a medium loam soil
Source Defra

When is direct drilling an option?

Improved soil management benefits all cropping situations. Direct drilling promotes soil stability, fertility and porosity, and can help to control weeds in some situations. In many circumstances direct drilling is preferable to ploughing.

Direct drilling is best suited to any stable soil that maintains its structure throughout the growing season. Clays, silty clay loams and clay loams are particularly suitable.

Avoid adopting direct drilling on sands, compacted soils, fields with serious weed problems, and crops that require specific tilth conditions such as potatoes.
Always avoid wet soils.

Be aware that timeliness is the key to successful direct drilling.

Direct drilling is best suited to any stable soil.

Remember

- Optimising crop establishment by reducing cultivations can save you money and protect the environment.
- Take advice before changing practices.
- Timeliness is key. Avoid operations in wet conditions to reduce the risk of soil damage, erosion and runoff.

For further information: Defra (www.defra.gov.uk), CSF (www.gov.uk/catchment-sensitive-farming), Natural England (www.naturalengland.org.uk/csf), Environment Agency (www.environment-agency.gov.uk), Cross Compliance Helpline 0845 345 1302 (www.crosscompliance.org.uk) and The Rivers Trust (www.theriverstrust.org)

THE RIVERS TRUST

A clear solution for farmers
CATCHMENT SENSITIVE FARMING

This information sheet is part of a series providing farmers with advice on land management practices to protect water bodies, produced by The Rivers Trust with support from Catchment Sensitive Farming. The advice will also enable farmers to use farm resources more efficiently and help meet Nitrate Vulnerable Zone and Soil Protection Review requirements under Cross Compliance and environmental regulation.

Based on Information Sheets originally created by the Westcountry Rivers Trust (www.wrt.org.uk) and developed with EAGGF objective one funding and published under permission by DEFRA and RT