

## Potato Haulm Destruction in Conventional and Organic Crops

ISSN 0142 7695

ISBN 1 85482 702 2

T491

- The destruction of potato haulm is necessary to reduce late blight and virus spread, to reduce interference at harvest, to improve skin-set and to control tuber size.
- Early and thorough haulm destruction is an essential part of good seed production.
- Potato haulm may be destroyed by physical or mechanical means or by chemical means, or a combination of both.

### Reasons for haulm destruction

The destruction of potato haulm is a well established practice which is necessary for:

- Preventing late virus spread* - late summer weather favourable to aphid migration may allow virus to be introduced to green foliage and be transmitted to the tuber.
- Reducing tuber blight* - the risk of tuber infection from blight on the haulm is greatest when the tubers are immature. Early removal of the haulm allows the tuber to mature and stops production of the inoculum. This is particularly important in tuber blight - susceptible varieties such as King Edward.
- Controlling tuber size*. Tuber number and the proportion in the seed category is determined largely by rate of planting of seed tubers, dependant on variety, and by when growth is terminated by destruction of the haulm.
- Improving and speeding skin-set*.
- Reducing interference at harvest*. The main problems caused by fresh haulm are blockage at the lifting share by gathering around the discs, impaired separation of tubers, crop losses over the haulm elevator, obstruction on picking tables. Destruction of the haulm can also reduce late weed growth which causes further interference with harvesting.

### EARLY DESTRUCTION

Early and thorough haulm destruction is an essential part of good seed production.

#### Early destruction

- *reduces blight and virus disease*.
- *prevents decline of seed yield*. From the beginning of August seed yield declines as tubers pass into ware categories.
- *allows early lifting*. This usually means lifting in drier and warmer conditions with a subsequent reduction in the risk of gangrene and skinspot. Lifting before tubers become contaminated by the breakdown of the mother tube prevents the spread of blackleg bacteria (*Erwinia*).

### Thorough Destruction

Haulm destruction must be thorough as partially destroyed haulm and haulm regrowth can cause similar problems to untreated haulm. Thorough destruction also hastens tuber maturation and skin set.

Haulm regrowth is greatest in crops in which haulm is destroyed early at a time when foliage is growing strongly. This is encouraged by warm weather, and where drought is followed by rain. The young leaves of the regrowth are more susceptible to disease than mature haulm.



Root cutting trial

Where regrowth has occurred or haulm is only partially destroyed, retreat the haulm as soon as possible if you cannot lift early to prevent disease reaching the tubers.

## Interval to lifting

Except where there are particular problems with haulm regrowth which require early lifting, tubers should be allowed to mature and set skin for some time before lifting. Otherwise they will be more susceptible to damage and subsequent infection.

Crops destroyed early require longer for tubers to mature than crops destroyed later; they are also more susceptible to dry rot in warm weather. A minimum interval of 3 weeks between complete haulm destruction and harvesting is recommended.

Crops destroyed later generally require less time for tubers to mature, but as lifting is delayed these crops are more prone to gangrene and skin spot. These crops are best lifted about 14 days after the haulm is completely destroyed, and should not be left for more than 3 weeks, if possible.

Blighted crops should not be lifted earlier than 14 days after haulm destruction to prevent contamination of the tubers.

## Crops for processing

Where crops are destined for processing, the processor may have their own protocol for haulm destruction based on their requirements for tuber size, maturity and quality and other marketing factors. You should discuss this with the customer before growing the crop.

## Physical and mechanical destruction

Physical methods of haulm destruction are essential in organic potato production, and can play an important part in conventional production systems with or without combination with chemical methods (*see below*). Physical methods must be designed so as not to damage tubers, but must allow separation of the tubers from remaining haulm. It should be noted that there is evidence that the spray aerosols produced by mechanical destruction of fresh haulm by flailing, particularly in moist conditions, can spread bacteria which cause blackleg within the crop and between neighbouring crops, and such treatments should only be undertaken in dry conditions.

Physical and mechanical destruction of haulm can be undertaken by:

flailing	haulm pulling
haulm burning	root cutting

### Flailing

Cuts the haulm using rotating knives or flails. Most designs are able to lift the haulm and are profiled to fit row widths. They can be front or rear mounted, front is better as the haulm is not run down by the wheels. Some machines can have side discharge of chopped material which dispenses the material in the wheelings.

Flailing does not always give total kill of haulm and additional treatments are often required, such as haulm pulling or burning or root cutting. There is also increase risk of disease spread (should it be present) by contact and air borne spores. Furthermore, in a wet season trafficking and compaction from wheels can create problems.

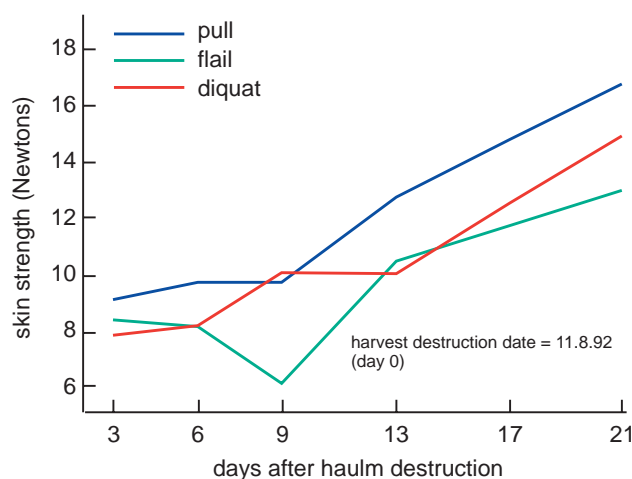
### Haulm pulling

Haulm is pulled by the lower stem after flailing with the intention of removing the haulm and roots. Very variety dependent, and drills need to be set up at planting time for pulling depending on the puller to be used.

The main problem with the technique is that poor pulling can cause breakage of stems or tubers to be pulled out and exposed to the light. The approach can work very well with care but in most cases losses are high.

Good control of bulking and skin set is achieved by haulm pulling (*Figure 1*). Tuber skin diseases can also be controlled if they are associated with the root system, but not if soil borne.

Figure 1



### Haulm Burning

Application of a flame or intense heat to kill the haulm. This is usually done after flailing, but in some crops can be done without flailing, but requiring two passes. Gas is the normal fuel used although some attempts have been made using diesel oil.

It can be more effective than flailing on its own but will not stop vigorously growing crops. Disease implications have still to be assessed but the approach should help kill some but not all spores. It is more costly than flailing alone and has similar draw backs.

### Root Cutting

Not really haulm destruction but is classed as such as it has the same desired effect of stopping the crop and achieving rapid skin set. It is usually performed after flailing, by dragging a blade under the crop to cut the roots. It is essential that the crop is planted at even depth and tubers are borne within a defined depth. Its use on stone separation ground also present problems with depth control.

Early tests indicate that it is effective, but if the depth setting is wrong excessive amount of tubers are sliced and lost. Requires very careful attention when operated.

## Chemical destruction

There are three chemical desiccants in common use, sulphuric acid, diquat and glufosinate-ammonium. Carfentrazone is a novel active ingredient currently in development, but does not have MAFF approval for use at the time of publication.

**Sulphuric acid**- applied in a concentrated 77% form at 168-337 litres/ha, and should be used when haulm or weed is dense. **It is particularly useful for seed crops** because of its very quick and reliable desiccation, and is less damaging to tubers in dry conditions than diquat (see page 3). Apply when the tubers are at the desired size. Where haulm, or weed, cover is very dense, two half-doses can be applied with an interval of 7 days between applications. Acid is very dangerous and corrosive, so avoid drift onto neighbouring properties, and acid on foliage can be corrosive for up to 7 days.



*Sulphuric acid used after flailing*

**Diquat** - sold as 20% liquid formulation, Reglone, by Zeneca Crop Protection. Reglone is applied at 4 litres/ha in 200-500 litres water/ha, using the higher volumes

when the haulm is dense. Do not add an adjuvant. Only one treatment is allowed per season for haulm destruction, but it can be applied with conventional farm sprayers. Apply when tubers reach the desired size in bright light and low humidity conditions. Regrowth may occur if potato seed crops are treated very early, or if haulm is very dense. Another product, such as half-dose sulphuric acid (see above) or physical control has to be used as a follow-up.



*Sulphuric acid used on dense haulm, leaving a tangle*

It should be noted that care should be taken in using diquat in dry conditions. Diquat may damage tubers if applied in periods of soil moisture stress, and the chance of damage is increased when mist, light rain or heavy dew are present or imminent.

Moisture deficit for safe spraying is as follows:

	CROP TYPE		
	Ware	Early or Seed	Canning
Sands, very light, light soils and all stony soils	50 mm	33 mm	Do not use
Medium and heavy soils	66 mm	50 mm	Do not use
Organic soils (over 10% OM)	83 mm	66 mm	50 mm

On medium, heavy and organic soils, crops may be sprayed if 13 mm of rain has fallen or the equivalent amount of irrigation has been applied in the previous 5 days, and the soil is moist around the tubers. On sands, light and stony soils, crops may be sprayed if 13 mm of rain has fallen or the equivalent amount of irrigation has been applied in the previous 2 days, and the soil is moist around the tubers.

**Glufosinate-ammonia** - available as a 150 g/l aqueous solution, Harvest or Challenge, manufactured by Aventis. It is applied at 3 litres/ha in 200-400 litres/ha volume, using the higher volume in dense haulm, and can be used in conventional spray equipment. Apply after the start of senescence, 14-21 days before harvest. With late maturing crops with dense haulm, a second application may be required. The second application should be made about 7 days after the first, once the foliage desiccation from the first treatment has allowed the canopy to open up to improve spray penetration. As this product is slower acting than sulphuric acid or diquat, maintain a full fungicide programme until desiccation is complete, to prevent tuber blight.

**DO NOT** use in crops intended for seed, and do not use in the variety Kerr's Pink. Ensure dry, well ventilated conditions in ware stores.

The activity of Harvest/Challenge is quickest under warm, moist conditions, but do not use on moist foliage. Harvest/Challenge can be used when soils are dry, but do not use when soils are saturated or there has been more than 40 mm of rain in the previous 5 days.

## Combination of physical and chemical control

Flailing is often combined with chemical control where crop canopy is dense and poor penetration of the desiccant is expected, then flailing can be carried out to improve penetration. Depending on the crop, lower dose rates of the desiccant may be able to be used.

Flailing immediately prior to harvesting can be carried out to allow easier lifting where desiccant by chemicals has been inadequate to reduce interference by the haulm.

## Haulm destruction and tuber damage

Haulm destruction is sometimes associated with heel-end discoloration of tubers. This is evident when the heel-end is cut across as a brown staining within the vascular ring. The problem is most common if the haulm is destroyed:

- i. When very immature - irrespective of the method of destruction used.
- ii. When the soil is very dry, particularly when diquat is used. Under severe conditions, blackening and rotting of tubers can occur.
- iii. There have been problems in the variety Kerr's Pink in Ireland, linked possibly with glufosinate-ammonium use as a desiccant, with rotting in store. Its use in this variety is not recommended.
- iv. Mechanical methods of control can damage tubers near the surface by cutting, scuffing and bruising. Root undercutting may cause the same problems if cutting is too shallow.

## Warnings

- Spray drift of pesticides can seriously damage other crops and the surrounding environment. Do not spray in windy conditions, and wait until any air movement is away from sensitive crops and surrounding vegetation or water. Currently there are no specific LERAPS requirements for the desiccants listed in this note; however, this may change and you should check the product label regarding no-spray buffer zone requirements related to use of herbicides near water.

- Clean out sprayers immediately after use. This is especially important when moving from one crop to another. Follow the manufacturer's label instructions fully regarding tank and line washing procedures.
- **USE PESTICIDE SAFELY: READ THE LABEL**  
Read and follow all label instructions regarding the approved method of use of all pesticides. Comply with the conditions of approval relating to the Control of Pesticides Regulations 1986 (COPR) or the Plant Protection Products Regulations 1988 (PPPR). Risks associated with the use of any substance hazardous to health must be assessed before use and appropriate measures taken to control the risk, under The Control of Substances Hazardous to Health Regulations (COSHH). The Food and Environment Protection Act 1985 places an obligation on users of pesticides to safeguard the environment, and in particular avoid pollution of water. Under the Water Resources Act 1991 it is an offence for any person to cause or knowingly permit any poisonous, noxious or polluting matter to any controlled water. These include all rivers, lakes, canals, estuaries, coastal water and underground waters. The UK has also introduced The Groundwater Regulations to implement the EU directive. From April 1999 anyone who disposes of dilute spray mix or tank washings onto uncropped land or an area of the farmyard must have a licence from the appropriate Environmental Agency (SEPA in Scotland). Useful publications include MAFF Publication PB3528 'Pesticides: Code of Practice for the safe use of pesticides on farms and holdings.', The use of pesticides by water is covered in MAFF PSD booklet 'Local Environment Risk Assessment for Pesticides: A Practical Guide.'

**Ken Davies, Fraser Milne**