

## The Role of Soil Aerators in Organic Grassland

OFTS48

The primary sources of nitrogen (N) in organic grassland are

- N-fixation by legumes such as clover
- Mineralised N from organic matter in the soil
- N contained in farmyard manure or slurry.

N fixation, and especially N mineralisation, are very dependent on a well aerated soil. However, grassland can become compacted as a result of:

- grazing with livestock and
- regular vehicular traffic (silage machinery, slurry and FYM spreaders, etc).

Compaction can reduce yield dramatically, particularly in dry seasons (since root growth is restricted). It can also restrict the accessibility of fields for grazing (because of increased susceptibility to poaching) and cause rapid surface run-off of slurry or rainwater.

It is much preferable to minimise compaction in the first place than to try to ameliorate the compaction once created. It is difficult to restore the condition of the soil without resorting to tillage and reseedling. However, machines are available which will ameliorate soil compaction to some extent. They fall into two categories:

- a) **soil aerators** or pasture slitters, which are tractor-mounted, ground-driven machines with sets of blades fitted concentrically on a horizontal shaft. They typically create slits in the turf approximately 15cm deep.
- b) **sub-soilers**, which are tractor-mounted, tined implements operating at depths of up to 40-45cm with winged, angled or vibrating tines.



Before undertaking soil aeration work, a number of soil pits should be dug to determine whether the compaction problem is limited to the surface layer or extends throughout the whole topsoil layer.

Compaction caused by <b>livestock</b> grazing and poaching ↓	Compaction caused by <b>tractors and machinery</b> ↓
Limited to the <b>surface layer</b> (0-10cm) ↓	Throughout the <b>topsoil</b> (0-50cm) ↓
<b>Soil aerators</b> shown to be effective	Soil aerators <b>not</b> effective. <b>Subsoiling required</b>

For effective operation of the aerator:

- ◆ **Wide working widths** treat a larger area relative to the tracking caused by the tractor wheels.
- ◆ **Long, sharp and narrow blades** give greatest penetration and volume of the slot.
- ◆ **Adjust depth** of penetration if aerator tears or lifts soil surface.
- ◆ **Adjust the weight** by adding or removing weights to ensure effective penetration.
- ◆ Forward speed must be **low enough** (1-2km/h) to allow adequate penetration.

David Younie and Jim Douglas

August 2004