

However, the money spent on drainage can never be regained if the outlets of drains emptying into ditches or streams are immersed in water when conditions are wet. It is therefore recommended that not a penny be spent on drainage while such conditions exist. Drain outlets must always be free, as the water flows out of them by gravity, not by pressure.

Type of Mole Plough

The general construction of mole ploughs is similar. As long as any adjustment for depth, the throwing of the plough out of the ground, and letting it in are easily accomplished, and the draught is not so excessive as to require unusually powerful tractors, the three points that matter in its construction are the thickness of the blade, the size of the plug, and the method of attaching the plug to the torpedo. It is not recommended that a blade greater than $\frac{1}{2}$ in. in thickness be used, as tests have shown that earlier breakdown occurs with the larger blade, because its use weakens the top of the channel at the junction of the slit and the channel and causes it to fall in.

A 3 in. channel will carry all the water which will collect in it when the total length of the mole channels is not greater than 25 chains. A 3 in. channel is also stronger than a 4 in. channel and therefore is less likely to break down. With the larger-diameter plugs there is also more chance of the channel running out of the clay into the topsoil. Plugs should not be attached to the torpedo with a nut and bolt, which will score the sides of the channel.

Power Required

For ease of operation a tracklaying tractor of the 30 to 40 h.p. class is required and is absolutely necessary on rolling country. On flat country the 30 to 40 h.p. class of wheeled tractors fitted with steel grippers have done a lot of work with 2½ in. plugs.

Time of Year for Draining

The channel which a mole plough leaves in the soil only carries the water, the actual draining being done by the slit and the fractures which run out from the slit and the channel for some feet in the form of a herring bone. To obtain the best fracturing the moling should be done as late as possible in spring, before the subsoil becomes dry, and the longer the subsoil is dry after the moling is done the better.

It is useless doing the moling once the subsoil has dried out, as the channel will not form properly because the soil is too crumbly. The draught is also greatly increased. The subsoil should have the consistency of stiff putty when the moling is done, as then the torpedo and plug leave a glazed surface in the channel which hardens into a skin with drying, and this tends to lengthen the life of the drains. The



Guide lining rolling clay downs.

time to mole drain varies with the district and season, but generally will be between August and December.

Depth and Distance apart

The mole plough should be set at a depth to put the channel some 6 in. into the clay and usually this is obtained by pulling at 18 in. depth. Some areas have deeper topsoils and it may be necessary to pull the moles as deep as 23 in. Once the depth required is greater than about 25 in. draining by tiles should be investigated.

Pulling at 18 in. usually gives the maximum efficiency consistent with the minimum of draught needed. Because the fractures only run out for a few feet, best results are obtained from mole draining when the moles are pulled at 5 ft. to 7 ft. intervals. Because the mole plough follows the surface, this should be left as even as possible when a paddock is sown out, and feelings and finishes should not be in evidence. A grassed surface gives a tractor best grip, and it is preferable to have it fairly bare so that grass does not choke up under the beam of the plough and tend to raise it.

Life of Drains and Results

The length of life of mole drains and results of the draining depend on five factors:—

1. Outlets, which are the most important.
2. Length of each mole drain.
3. Available fall.
4. Soil type.
5. Weather and soil moisture conditions after drainage operations.

These are the most important factors in the length of life of the moles. If water runs out of the mole drains as they are pulled, or if there is sufficient rain to cause them to flow within a few weeks of pulling, much earlier breakdown than is usual for the type

of country can normally be expected. If the water cannot flow away immediately and has to lie in the mole channels, it is particularly damaging, as it slakes the skin off the sides of the channel and causes silt to begin to fall into it, especially from the roof.

For these reasons best results are usually obtained from moling done in late spring, while the subsoil is plastic without being wet. This allows the soil to fracture and open up over summer. This does not happen to the same extent at other times of the year.

The length of life of mole drains, other things being equal, depends on the type of clay in the subsoil. The tightest of subsoils hold the majority of drains for 10 to 12 years, but some subsoils will only hold them for 4 to 6 years.

Treatment after Moling

Because of the beneficial results obtained from draining it is recommended that paddocks to be drained should be those sown out in new grass, as this will lengthen their productive life and allow them to build up fertility. When it is desired to plough a paddock for a crop, drainage in spring and ploughing the following autumn will give a better result than that from immediate ploughing, as this allows the drains to harden and the fractures to open out before the heavy implements and bulk lime sowers are taken over the area.

In conclusion it can be said that drainage is more important than top-dressing or fencing and cultivating an area, because until the drainage is done very little response will be obtained from these operations. In other words, basic principles should be applied first by putting the soil in a healthy state by drainage and so providing a secure foundation on which to build.