



4. Suitability of mole drains

Moling is very suitable in heavy clay soil with a minimum of 45% clay content and less than 20% sand at the mole depth (Tuohy et al., 2015). Soil with a minimum of 35% clay and less than 45% sand at mole depth may be suitable (Tuohy, 2013). Soil clay content less than 35% are unsuitable for mole drains because of the stability of the mole channel.

Mole drains are very suitable on uniformly sloped landscapes with slopes ranging from 0.2% to 3.0% because the grade of the mole drains follows the slope of the landscape. If the grade is too steep (>3.0%), erosion may occur in the mole drains. If there is not enough grade in the mole channel, water stagnation will weaken the walls and lead to early collapse. Any irregularities in landscape slope will show up in the mole grade (Vlotman et al., 2020).



5. When to install mole drains

Best installation conditions usually occur during the summer or early fall, when the upper soil layer is as dry as possible (Tuohy, 2013). If the soil at mole depth has too much moisture, it leads to smearing and reduces the effectiveness of the mole drains. As a rule, the soil moisture at the mole depth should be at or just below the plastic limit (Vlotman et al., 2020).

To determine if the soil is below the plastic limit, use a soil auger or shovel to grab a handful of the soil from the mole depth. If the soil sample has gravel, separate those larger than 2 mm as much as possible. Take a small sample of the soil (about the size of a peanut) and immediately roll it between your palm and a smooth surface (glass-like surface) to create a thread. Rolling should be done under the shade to avoid the sun drying the sample. If the larger thread breaks into shorter threads, continue rolling the shorter thread. If the thread crumbles into barrel-shape pieces at a diameter greater than 1/8 inch, the soil is dry enough for moling, that is, the soil is at or below the plastic limit (Figure 7). If the thread reaches 1/8-inch diameter without crumbling into barrel-shape pieces, you have too much moisture for moling (ASTM D4318-17e1).



Figure 7- Barrel-shape soil crumbles made during the rolling process. During the rolling process, if the thread crumbles into barrel-shape pieces before reaching the 1/8" diameter, the soil is dry enough for moling. The item on the left is a bucatini pasta with a 1/8" diameter after soaking in water, which can be used as a reference for the desired 1/8" diameter (photo credit: Zouheir Massri).

9. Summary and recommendations

Mole drains are a low-cost practice to improve soil physical properties and drainage performance. The effectiveness of mole drains depends on the number of soil cracks that facilitate water movement toward the mole channels. Moling is very suitable in heavy clay soil with a minimum of 45% clay content and less than 20% sand at the mole depth.

Plan on installing narrower spacings to achieve your final wider spacing because some of the mole channels will fail. Since the mole drains' effectiveness decreases over time, re-run the mole drains every 3 to 4 years.

Mole drains can be combined with subsurface drainage to improve drainage performance in heavy clay soil. In one design, mole channels empty into a ditch. In the other design, mole channels empty into a gravel-filled trench with a drain pipe.

Expert Reviewed

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