

## Puddling and Baking

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Soils that puddle and bake present some difficult problems on which there is much agricultural experience. These two phenomena occur only in soils with very minute particles, namely, in clays and in silts. They do not occur in sandy soils or in true loams, but in mild form are found in clay loams and silt loams. Puddling takes place in clays and silts when they are wetted and the particles are united into a sort of paste or jelly. As this dries, the soil bakes into a hard crust. Baking and puddling are largely independent of pressure, as they both occur in any bare clay soil that is alternately wetted and dried. Such soils are not desirable for golf courses, but often there is no choice. There are, however, methods which will greatly ameliorate the trouble.

First of all, clay soils should never be worked when wet. No farmer is so foolish as to do this, but we have seen construction work going on on many a clay golf course when the soil was soggy. This will always result in cloddy soil and difficult to bring back again into a friable condition—that is, like fine bread crumbs. *Never work clay soils when wet.*

Clays can be converted into soils resembling loams by adding sand and humus. This should certainly be done on new putting-greens on a clay course. In the top four inches of soil there should be about as much sand as clay, and besides a good deal of good humus.

If an old green is on a clay base much can be done to improve it by top-dressing with sand at frequent intervals until at least an inch has been added. The sand acts as a sponge to absorb the moisture and as a mulch to prevent the clay beneath from puddling and baking. Where sand is cheap, the same method should be used on clay fairways.

It is a curious fact that sand or very sandy soils are most compact when wet, as any one can notice on a beach. On the lower or wettest portions of the beach an automobile runs easily on the surface but on the drier levels it makes ruts in the sand. It has often been remarked that very sandy courses are fastest when wet. But there is no puddling unless silt or clay be present. Sand, when dry, resumes its former loose condition.

Much emphasis has been devoted to the damage by heavy rolling. This occurs only on clayey or silty soils, never on sandy soils. It is probably sound practice never to use a roller heavier than necessary—that is, enough to make the soil sufficiently firm so that foot or heel prints are not made. But even with the use of a light roller, or of no roller at all, puddling or baking will occur on bare clay soil or even where there is only thin turf. Thick turf will act much like a mulch and, therefore, tend to keep the soil beneath from puddling and baking. Therefore it is good practice to use fertilizers to stimulate a good thick turf on the fairways. Sand and fertilizer both are most desirable; but if sand is too expensive the fertilizer will help greatly.

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(For Previous Lists See Pages 199, 220, 248, and 273 of This Volume.)

Concord Country Club, Concord, Mass.

Evanston Community Recreation Association, Evanston, Ill.