Disposal of excess water is one of the principal agricultural problems in the Iowan Drift Area (7). Although much of the soil in this area is upland soil and lies on slopes with adequate surface drainage, yet these hillsides often remain wet and seepy during the month of May and well into June or later. This report presents results of ground water studies made on the Howard County Experimental Farm, operated by the Iowa State Agricultural Experiment Station and located in the area, the farm being typical of many hillside farms in the drainage problems presented. The studies, made during the months of April through October, 1947, include a wetness survey of the whole farm, and a drainage survey of specific problem areas, viz., a tiled area, the artesian area, and the south hillside, these areas being located, respectively, in the northwest forty, the northeast forty and the south forty — the forties comprising the farm.

WETNESS SURVEY, DESCRIPTION OF PROBLEM AREAS

The wetness survey was made on April 25 and 26, two or three days after a 0.35-inch rain, earlier April rains having been: April 15, 0.15 inch; April 11, 0.10 inch; April 10, 1.35 inches; April 6, 0.25 inch; April 5, 0.70 inch; April 4, 0.25 inch; and April 1, 0.16 inch. Four degrees of wetness were recognized: (a) Wet — too wet for plowing, but solid under foot, surface cracks developing; (b) very wet — water presses out of the soil when tapped with the foot; (c) cozy; (d) surface water. The results of the survey are presented (Fig. 1) by superposing varying degrees of shading on a map of the farm which gives soil types, contour lines and plot boundaries. The composite map was prepared to bring out any correlations of wetness with soil type, slope, and cropping.

The regions for special study are seen on Fig. 1. The artesian area is near the top center of the map. Here several springs were running during the wetness survey. These springs ran through April, May, June, and part of July, especially after heavy rains. The tiled area, the tiles running for the most part diagonally up the hillside, is in the west forty; the south hillside is a long, broad slope extending northward over most of the south forty.

In the southeast corner of the west forty is located the west pasture. This area was ponded during the wetness survey and for sometime thereafter. The existence of surface water here was surprising as it lay between two tile lines, the upper (north) one of which should have acted as an interceptor. There was no visible surface water running into the area. A study of the west pasture is included with the tiled area.

The wetness survey indicated some correlation between soil types and wetness, although the relationship is not definite. The Carrington types are in the least wet class of wetness. The Floyd soils as well as the "w" soil complex range from the least wet class to oozzy class of wetness. The reason for this may be related, in part, to plowing management or artificial drainage. A wetness in a certain area may be consequent upon soil characteristic in a soil type some distance away. There was some correlation of wetness with slope. The flatter areas were more often wetter than the steeper slopes, but there were also very wet areas on slopes. There was a correlation of wetness with crops which is not clear on the printed map. Plots in corn (1946) were wetter than adjacent oat plots and much wetter than adjacent meadow plots. Feng and Browning (3) observed that the pore size (and hence permeability) of soil cropped to meadow, oats, and corn is in the order: meadow > oats > corn. In the present observations' bearing power of the root systems and capillary attraction effects may have caused an apparent fluctuation of the indicated pore size relationship.

MOLED AREA

Near the southwest corner of the south forty of an area of surface water, there are two mole tiles. Transverse to these tiles, further toward the drainage, mole drains were installed in the fall of 1946. A report on these mole drains (and others) is given by Schwab (9), who concluded that the moles were not adequately effective to be desirable. The reason for lack of effectiveness is a clogging of the mole channels resulting probably from the presence of numerous sand pockets. The area of surface water below the convergence of the tile lines has not been studied. The wetness of this part of the surface water being hillside artesian results from the same situation (described later) that causes surface water over the area on the south hillside.

There is a region at the south end of the south forty which was not covered in detail by the survey and for which appropriate shadings are given on Fig. 1. The area is bottom land largely under surface water at the time of the