EFFECT OF CROP RESIDUES ON SOIL TEMPERATURE

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SOIL temperature is known to influence not only the growth of higher plants but also the microscopic life of the soil. Particularly, it is important in its effects on those organisms that are concerned in the decomposition of organic matter and in the production of nitrates. Many determinations of soil temperature under mulches have been reported, but the conditions usually have been those of heavy straw mulches on fallow and on uncultivated soil (1, 2, 4, 5, 7). No studies, so far as the authors are aware, have dealt with soil temperature under the conditions of subsurface tillage with moderate amounts of residues.

The purpose of this investigation was to determine soil temperature under the quantities of residues used in the system of subsurface tillage, or stubble mulching (3), as compared with soil temperature when using heavy mulches or the conventional system of plowing. The effect of crop residues incorporated at different times of the year and also the effect of the growing crop on soil temperature were included in this investigation.

METHOD OF TAKING TEMPERATURE

Most of the soil temperature measurements were made with laboratory mercury thermometers set at 1- and 4-inch depths. Some continuous temperature records were made in 1944 with Friez recording thermometers set at 1-inch depth. Mercury thermometers were set approximately in a vertical position either in the row or midway between the row. They were set in duplicate or triplicate on each plot or soil condition. Readings of laboratory thermometers were made at different times of day when it was convenient to get to the farm. An effort was made to make representative readings under different weather conditions.

Air temperatures were taken with thermometers placed about 18 inches above the soil in the shade. Soil and air temperatures are reported as degrees Centigrade by central standard time (CST). All temperature readings here presented were taken with thermometers set in field plots.

RESULTS

CORNFIELD MULCHED WITH STRAW

In 1941 and 1944, wheat straw at the rates of 2, 4, and 8 tons per acre was applied about the first of June to corn planted in late May on plowed land. Considerable care was taken to keep the straw away from the corn which was planted in small furrows. Similar plots were left untreated for comparison.

During the summer of 1941, the temperature of the soil was lowest in the straw-mulched plots as measured by mercury thermometers.