FIG. 2.—The subsoiler apparatus exposed, showing subsoiling beam with attached fertilizer chutes and chisel reaching 7 inches below furrow bottom.

Figure 2 shows details of the subsoiler with the fertilizer chute attachment. These chutes release fertilizer or lime at 2 levels, one just below the plow sole and the other 4 inches deeper in the soil cavity behind and underneath the chisel (figure 2). In this way, these materials are well distributed over the whole depth of shattered subsoil. Horizontally the distribution of these materials in the soil is satisfactory. Though the fertilizer or lime is dropped in a band behind the subsoiler beam, the spacing of these bands is rather close since the center of every furrow is subsoiled.

Soil profile and root studies (figure 3) show that subsoiling in the open plow furrow produces a thorough shattering of the plow and traffic sole in each furrow middle. The lifting and breaking loose of this compaction pan by the subsoiler is not hampered by the weight of an overlying furrow slice. This and the fact that the beam to which the chisel is attached does not have to cut through the plow layer should result in a considerable decrease in draft compared with the conventional method of operating a subsoiler from the land surface. In the latter case the beam itself requires considerable draft in pulling it through the soil.

A good lifting action tends to mix the soil; this is very favorable for the development of a gradual structural transition between the annually plowed layer and the subsoil layer. Even under less than optimum, or wet, conditions, this design allows the chisel to lift and break the subsoil rather than merely smear it tighter as conventional subsoiling would do.

Field trials are being conducted to test this design as compared with other apparatus such as the regular chisel type subsoiler and the subbase or T. N. T. plow. The effects of deep tillage and fertilizer placement are being evaluated in measurements on soil structure, root development and crop production. It is planned to extend the width of fractured zone in the subsoil by replacing the 2.5-inch chisel by a wider chisel or duck-foot type cultivator shovel.


LITERATURE CITED


A SUBSOILER ATTACHMENT FOR DEEP FERTILIZER PLACEMENT

The value of deep placement of fertilizer as a means of increasing crop yields and improving root development has been tested in many states. Cotton yield increases were obtained by deep placement of lime on soils with compacted area near the surface in Missouri (4). In Pennsylvania (2) better root development resulted from deep applications of lime as compared to no lime in the subsoil. Higher corn yields were obtained in Indiana (1) from deep applications of fertilizer compared to surface applications, and in Florida (3) on acid flatwood soils, corn yields were increased significantly by deep application of lime and fertilizer.

The equipment currently in use for deep placement of fertilizer in Florida is shown in figure 1. The deep place-