

PREPARATION OF OOLITIC LIMESTONE SOIL FOR AGRICULTURAL USE

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In sixty years, agricultural production and land preparation have undergone extreme changes on the limestone soils of Dade County. From the days of the pick mattock through the days of steam tractors, the present methods for preparation of these virgin rock soils have evolved.

Prior to 1925 all farming in the South Dade pinelands was confined to pot hole areas. Tree holes were blasted with dynamite. Farmers confined their winter vegetable growing to the marl areas of the east glade and the inland finger glades. Some growers followed these practices through 1935 and even later.

The rocky soil which requires special preparation for vegetable and fruit farming is the Rockdale sandy loam limestone complex. Where this soil type occurs, Miami Oolite appears at the surface and holds the soil particles in innumerable holes which riddle the oolitic limestone. It is necessary to break up this surface rock to provide a planting medium for the various crops produced in this area.

Tractor clearing of rockland started in 1920 in the area of Coral Gables. A 40 horsepower steam-powered wheeled tractor was used to drag heavy flat rails. Tree stumps were usually burned or dynamited during this clearing operation. In 1926 60 horsepower gasoline powered Holt wheeled tractors were used to pull a toothed heavy steel triangle drag. By 1935 the first track-type Caterpillar tractors, with 80 horsepower engines, pulling a heavier triangle drag became available. Land clearing and rock crushing came into its own. In 1940 the horsepower of these tractors was increased to 85 and a 36 inches wide front plow was used. This later was increased to 42 inches.

Until this time rock land vegetable farming was impractical but since 1947 vegetable grow-

ing acreage on the rock has increased steadily. This year there will be over 31,400 acres planted in the rock. The potato and root crops are still restricted to the marl glade land.

The calcareous rock with some areas of sandy and red claylike soils must be cut (plowed and crushed) as deeply as possible to allow for root growth. This is accomplished by clearing and removing pine tree and other initial growth and then plowing with the front end plow (Figures 1 and 2). Each plow cut (or scarifying cut) averages from 1½ inches to 2 inches deep. The rollout from the cut is passed beneath the tracks of the tractor which helps crush the cut rock in this soil scarifying operation (Figure 3). The field is plowed from two to four times. Each cut is made at right angles to the previous cut.

The resultant cut or broken surface material is underlain with apparently solid bed rock (Figure 4). Gang discs and drag, cutting a swath up to twenty-five feet in width, are used for final leveling prior to vegetable planting. (Figure 5). A tomato planting under "Rock cultivation" is shown in Figure 6.

This depth of plowing (method) was satisfactory for vegetable growing. For the more deeply rooted tree crops it was too shallow to maintain good soil moisture nor did it provide an adequate area for root growth and anchorage of the trees. It was apparent that the trees ran out of root area. Some trees became stunted and many were easily blown over during hurricanes.

Tree crops such as limes, avocados and mangos became more important crops after 1935 as the result of easier and more adequate land preparation. This method for tree planting was improved by the introduction of the plow for trenching or ditching in 1947 (Figure 8). After the land was scarified the original ditcher plowed a ditch 14 inches wide by 18-20 inches deep and was mounted on the front of a track-type tractor. This is expected to be increased this year by the use of a 200 horsepower Caterpillar tractor which should plow a ditch 20 inches wide by 20 inches deep. The lime and avocado trees planted in ditches since

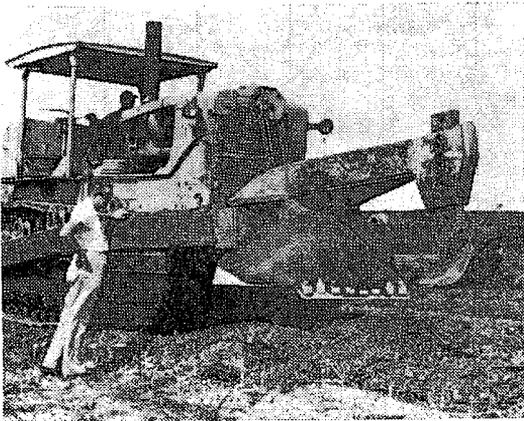


Figure 1. The rock plow and D-9.



Figure 4. The solid rock substrate.

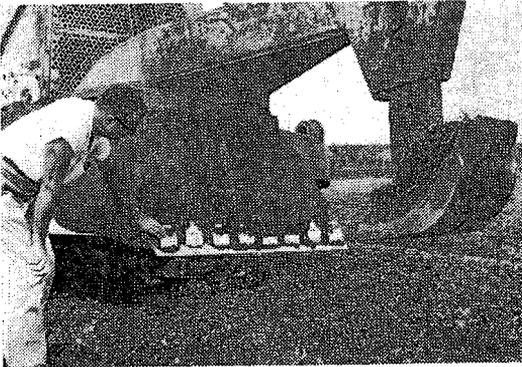


Figure 2. The rock plow in use today.

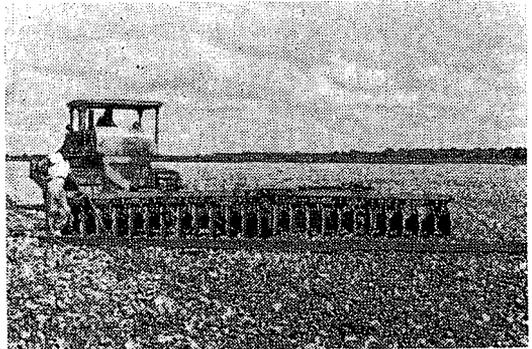


Figure 5. Gang disc and drag.



Figure 3. Final cut on rock soils of Dade County. The weight of the tractor helps crush cut rock.



Figure 6. A rockland tomato field. This is the first time that this field has been cleared, plowed and planted. The size of these "soil particles" will be reduced when the field is replowed as is customary prior to planting for succeeding one or two years.

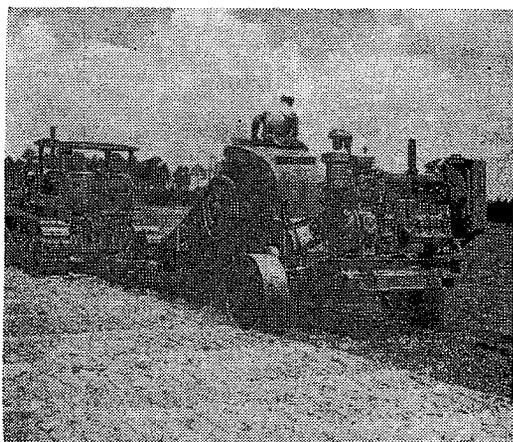


Figure 7. A hammer mill type rock crusher sometimes used to break down cut rock to smaller sizes. This unit scoops up a layer of the cut rock, conveys it to the hammer mill and lays down the crushed material behind it.

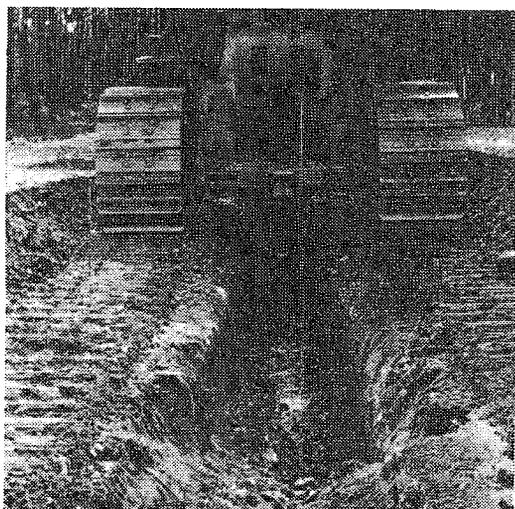


Figure 8. Final cut in tree row trench. This area was unusually sandy.

1947 suffered only a small percentage uprooted in the recent 1960 hurricane "Donna."

In the trenching operation tree row trenches are plowed first. Then these are crossed at right angle with the cross trenches spaced for the desired number of trees in the row. The cross trenches are usually filled and leveled while the tree row trenches are covered and "bedded up." Trees are planted in the cut rock at the intersections of trenches (Figure 9). The beds are pulled down after a suitable interval, this being done in conjunction with the use of drags in clean cultivation (Figure 10).

Planting a tree where ditches intersect allows roots to grow in all four directions. This provides an increased area for root growth, anchorage, and water and nutrient uptake. Observations indicate that the result is increased yield.

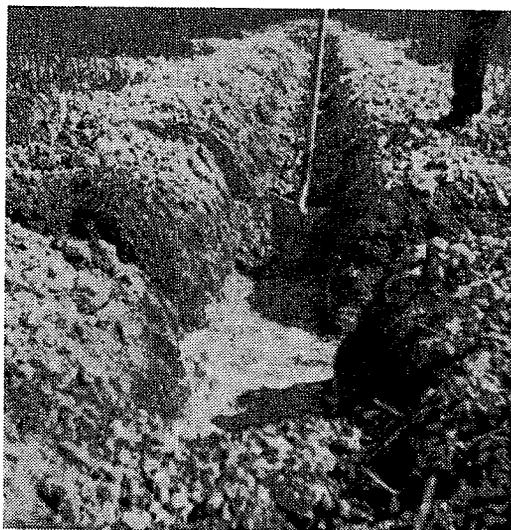


Figure 9. The intersection of tree row trenches cleaned out to show rock substrate. Trenches are filled and not cleaned out prior to planting.

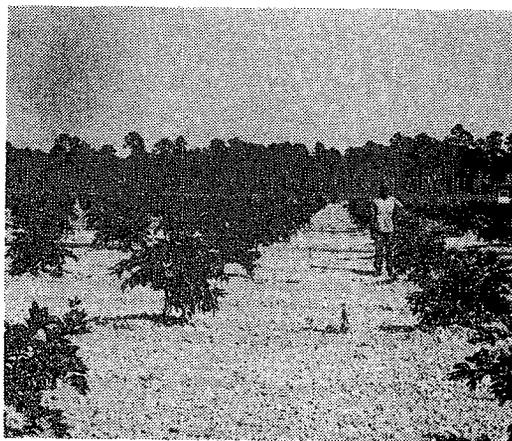


Figure 10. One year old lime registered trees on the rocks. Clean cultivation is practiced by many growers using a drag.