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Pasture Aeration

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Aeration, a process by which soil is mechanically disturbed, is commonly used to renovate established pastures with the objective to increase forage production. There are several types of aerator machines. These include coulters that make a narrow slit in the soil, rollers with spikes that make indentations in the soil, and prongs with

function like a mini-subsoiler. These machines can also be used for other purposes such as incorporating fertilizer, lime or seeds of annual cool-season forages, and weed control.

Although the main objective of aerating pastures is to reduce soil compaction and increase water infiltration, it is very unlikely that soil physical problems will occur in areas of pastureland in Florida. Soil compaction may be observed in areas of continuous and intense traffic of heavy machines or heavy texture clay soils, but this is not a common situation in pastures and hayfields in Florida. In addition, well managed established pastures often exhibit dense root system that can prevent soil from

compaction.

After long periods of drought, the surface of the soil becomes apparently harder and sometimes this situation is confounded with compaction. The apparent "hardness" of the soil surface after prolonged dry periods is a natural characteristic of the soil, also known as soil aggregation, and is not expected to have detrimental effects on forage production. After soil moisture is restored (rainfall or irrigation), soil often return to its adequate physical condition. Soil compaction testing may be done with a penetrometer, which can be used to determine whether the soil is compacted or not. It is important to consider that penetrometer values are highly affected by soil moisture. Thus, the decision regarding soil compaction should also be based on visual observation of the root system (whether the roots growth is restricted or not), soil moisture and changes in soil density.

Aeration is also thought to result in a fast "green up" of forage. This occurs because when the soil is disturbed it also releases organic matter and nutrients to the plants. However, the benefits of the nutrients released after aeration are only temporary and are not expected to improve forage production in the long run.

So, the main question relative to pasture aeration is; does pasture aeration increase forage production? Several studies with different types of aerators have been done in different states but the results are quite variable. Research was conducted at the Range Cattle Research and Education Center in Ona FL to test the efficiency of aeration in increasing forage production. The study was conducted on a typical, poorly drained flatwoods soil (Ona fine sand and Pomona fine sand) using a 13- and 40-year old Pensacola bahiagrass pasture. The 13-yr old bahiagrass pasture was aerated in 1991, while the 40-yr old pasture was aerated in 1992. The machines tested were the Mardin HL-7 tandem chopper, Lawson 8'x16" multi-blade pasture aerator, and an Aerway model AW118 pasture aerator. In addition, there was a control area that was not aerated. Water infiltration rates and penetrometer values (compaction) were affected immediately after the treatment but not at 3, 6, or 12 months after aeration. Soil moisture affected penetrometer values (a measure of soil compaction) for all aeration treatments. Aeration did not increased bahiagrass yields of the 13-yr old pasture. Bahiagrass yields of the 40-yr old pasture were reduced after aeration (Table 1). These results indicate that regardless of the aerator machine used, aeration has no benefits on bahiagrass production and, in some cases, can potentially reduce forage yields.

Machine	13-yr old	40-yr old
	Dry Matter Yield (lb/A)	
Control	12870	11720
Aerway	12180	9760

Lawson	11680	9530
Mardin	11070	9400

Research conducted in pastures established in "heavier" soil types showed similar results. A two-year study was conducted in Mississippi on a silty and a sandy loam soil. The researchers compared the effects of aerway, shank renovator, disk, deep chisel 10" and control (no aeration) on bahiagrass pastures and bermudagrass hayfields at different times of the year. None of the treatments had any positive effect on soil penetration resistance, moisture, and forage yield.

Conclusions

It is very unlikely that pasture aeration will increase water infiltration and forage production in sandy soils in Florida. If soil compaction is suspected, penetrometer, visual observation of root system, soil moisture and density information should be considered.

References

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