Final Report
447594

Title: Evaluation of Moisture Infiltration in Sod based Rotation Study

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Results

Saturated Infiltration and Bulk Density (Table 1)

Saturated infiltration measurements were made August 4 through 8, 2006 using three
double ring Turf-Tech infiltrometer. Six total runs were made per plot only in row
middles which had not experienced wheel traffic. The time to infiltrate a 5cm column of
water was recorded with a subsequent recording of the time for the same column to
infiltrate 8cm. The difference in these two times provided a relative measure of the
saturated infiltration. Bulk density samples were taken simultaneously with infiltrations
using 6” copper cylinders with a 2” diameter driven into the soil, then removed and
sealed with plastic wrap. Samples were weighed for a wet weight and then dried at
105°C for 24 hours then weighed again. These samples in addition to bulk density
provided soil moisture contents at the time of the infiltrometer runs. Of all of these
measurements (infiltration, soil moisture, and bulk density), there was no statistical
difference between treatments.

Resistance to Root Penetration (Figs. 1 and 2)

Resistance to root penetration to a depth of 45cm was measured twice during the season
following saturation and adequate drainage of the profile. An SC 900 Field Scout data
logging penetrometer was utilized in between rows which had not experienced wheel
traffic. Data is presented below. On the June 20 sampling date, rotations 5
(orchardgrass-orchardgrass-cotton-peanut) and 8 (soybean-cotton-cotton-peanut) appear to
have the lowest overall resistance while rotation 3 (cotton-peanut-cotton-peanut) has the
greatest resistance overall. On the June 28 sampling date, the rotation including 2 years
of fescue behaved similarly to the rotation with 2 years of orchardgrass unlike the first
sampling date. Interestingly on this sampling day, these are the only two rotations
fescue-fescue-cotton-peanut (f-f-ct-p and o-o-ct-p) that never reached a resistance of
3000 kPa which is thought to be the resistance at which cotton root growth is inhibited.
Table 1: Saturated infiltration times, soil moisture at sampling and bulk density. No statistical difference between treatments for any measurement.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Infiltration in Minutes</th>
<th>Soil Moisture</th>
<th>Bulk Density</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time to 5cm</td>
<td>Time to 8cm</td>
<td>Time 5cm to 8cm</td>
</tr>
<tr>
<td>Ct-Ct-Ct-Ct</td>
<td>4.1</td>
<td>8.1</td>
<td>4</td>
</tr>
<tr>
<td>Ct-C-Ct-P</td>
<td>6.9</td>
<td>13.7</td>
<td>6.8</td>
</tr>
<tr>
<td>Ct-P-Ct-P</td>
<td>6</td>
<td>11.8</td>
<td>5.8</td>
</tr>
<tr>
<td>F-F-Ct-P</td>
<td>5.9</td>
<td>12</td>
<td>6.1</td>
</tr>
<tr>
<td>O-O-Ct-P</td>
<td>7</td>
<td>13.8</td>
<td>6.9</td>
</tr>
<tr>
<td>S-Ct-Ct-P</td>
<td>5.5</td>
<td>10.8</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Figure 1: Soil resistance to root penetration as measured by a data logging penetrometer on the 20th of June.
Figure 2: Soil resistance to penetration as measured by a data logging penetrometer on the 28th of June.