Producing Tobacco To Meet Customer Needs: II. Evaluation of Organic Fertilizers for Seedling Production in the Float System

W. D. Smith and L. R. Fisher
North Carolina State University
F. R. Walls, Jr. And D. L. Dycus
North Carolina Dept. Of Agriculture

Contract Purchasing

• Increased efficiency in purchasing.
• Improved quality.
• Improved communication between buyer and producer.
• Increased accountability.
• Production of unique types and tobacco for specialty uses.

1 = 80-85% of sales in 2001-02
Materials and Methods

- Treatments
  - 1) 16-5-16 water soluble (control)
  - 2) 8-4-1 bat manure
  - 3) 13-8-2 Peruvian seabird guano
- RCB design with 4 replications. Cultivar = K 326.
- One 288-cell tray per 20 L waterbed.

- Fertilizers added at seeding and 4 weeks later to supply 125 ppm N
- Seeded 4/11/02 and completed 6/10/02 (59 days).
Materials and Methods

• Measurements
  – Total plant stand, usable transplants, seedling fresh weight, seedling dry weight, seedling stem length (at 59 days after seeding).
  – Plant tissue analysis (MRML and whole plant) at 59 days after seeding.
  – Water samples 2x week for pH and nutrient analysis.

Effect of Fertilizer Material on Total Plants at Day 59

LSD= NS
Effect of Fertilizer Material on Seedling Fresh Weight at Day 59

LSD = 8.4

Effect of Fertilizer Material on Seedling Stem Length at Day 59

LSD = 2.0
Effect of Fertilizer Material on Usable Transplants at Day 59

![Bar graph showing the effect of different fertilizer materials on usable plants.](image)

LSD = 10

Effect of Fertilizer Materials on Seedling Growth
Nitrogen Levels in Float Bed
16-5-16

Days After Seeding

= water & fert. added
= water added

Nitrogen Levels in Float Bed
Bat Manure (8-4-1)

Days After Seeding

= water & fert. added
= water added
Nitrogen Levels in Float Bed
Peruvian Seabird Guano (13-8-2)

[Graph showing nitrogen levels for different days after seeding, with bars representing Nitrate, Ammonium, and Urea]

= water & fert. added
= water added

Nitrogen Levels in Float Bed
From 3 Fertilizers

[Graphs showing nitrogen levels for 16-5-6 Seabird Guano, Bat Manure, and Seabird Guano, with bars representing Nitrate, Ammonium, and Urea]

NC STATE UNIVERSITY
Effect of Seabird Guano on Waterbed Alkalinity

- Alkalinity (ppm CaCO3)

- Days After Seeding

- Acidification Threshold

  ↓ = water & fert. added

  ↓ = water added

Effect of Fertilizer Material on Waterbed pH

- pH

- Days After Application

- 16-5-16

- Bat Manure

- Seabird Guano
### Effect of Fertilizer Material on Nutrient Concentration in Plant Tissue

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Nitrogen</th>
<th>Phosphorus</th>
<th>Potassium</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-5-16</td>
<td>1.54</td>
<td>.44</td>
<td>3.33</td>
</tr>
<tr>
<td>Bat Manure</td>
<td>0.71</td>
<td>.35</td>
<td>2.64</td>
</tr>
<tr>
<td>Sea. Guano</td>
<td>1.53</td>
<td>.50</td>
<td>3.39</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td>0.37</td>
<td>0.08</td>
<td>NS</td>
</tr>
</tbody>
</table>

### Effect of Fertilizer Material on Nutrient Concentration in Plant Tissue

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Calcium</th>
<th>Magnesium</th>
<th>Sulfur</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-5-16</td>
<td>0.70</td>
<td>0.86</td>
<td>0.51</td>
</tr>
<tr>
<td>Bat Manure</td>
<td>1.35</td>
<td>0.41</td>
<td>0.28</td>
</tr>
<tr>
<td>Sea. Guano</td>
<td>1.21</td>
<td>0.61</td>
<td>0.50</td>
</tr>
<tr>
<td>LSD (.05)</td>
<td>0.16</td>
<td>0.033</td>
<td>0.08</td>
</tr>
</tbody>
</table>
Summary

• Bat manure had a good ratio of NO₃-N to NH₄-N. However, only 25% of labeled N was available in mineral form.
  – No usable transplants were produced.
  – Too expensive to use at a 4x rate.

Summary

• Preliminary results indicate that Seabird Guano is preferable to Bat Guano as organic fertilizer source.
• Seabird Guano was nearly 100% NH₄-N.
  – Slightly smaller seedlings, but acceptable transplant production (vs. 16-5-16).
  – Will high HCO₃ be a problem in normal production period with reduced evapotranspiration (i.e. less dilution)?
## Production Costs

<table>
<thead>
<tr>
<th>Fertilizer</th>
<th>Cost/Kg Fertilizer</th>
<th>Cost/Kg Nitrogen</th>
<th>Cost/Ha Transplants</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-5-16</td>
<td>$2.20</td>
<td>$14</td>
<td>$4.42</td>
</tr>
<tr>
<td>8-4-1 (Bat Manure)</td>
<td>$6.16</td>
<td>$77</td>
<td>$24.80 ($99.20)</td>
</tr>
<tr>
<td>13-8-2 (Seabird)</td>
<td>$5.87</td>
<td>$45</td>
<td>$14.70</td>
</tr>
</tbody>
</table>