Interim Fertilizer Recommendations for Wet (Flooded) Taro

The recommendations given here are intended to assist commercial taro growers to improve fertilizer programs for wet (flooded) taro and help increase yields, avoid excessive fertilizer applications and costs, limit disease severity resulting from overfertilizing with nitrogen, and reduce environmental pollution. These are “interim” recommendations because they are subject to refinement as more information becomes available.

This information is intended to be used in conjunction with the best-management practices given in Taro, Mauka to Makai; A Taro Production and Business Guide for Hawai‘i Growers, available from CTAHR. Updates to this information will be announced and made available on the Internet website <www.ctahr.hawaii.edu/taronexus/taronexus.htm>. Computers to access the Internet are available at many public library branches.

To use these recommendations, a laboratory analysis for soil pH and soil levels of the nutrients P, K, Ca, and Mg must be done on soil samples from the lo‘i early enough so that the results can be available and fertilizers can be mixed into the soil before planting. Send the samples for analysis to a commercial laboratory or the CTAHR Agricultural Diagnostic Service Center.

Caution—different laboratories may use different analysis methods. The soil analyses for K, Ca, and Mg must be done with ammonium acetate extractant; P analysis must be done with the modified Truog method. Fertilizer recommendations given here are not appropriate for soil data obtained with other extraction methods.

After planting, leaf tissues must be periodically sampled and analyzed to monitor the crop’s nutrient status. Based on these analyses, apply supplemental fertilizer if needed.

Fertilizer recommendations are given as simple fertilizers rather than as complete fertilizers (blends). Use of simple fertilizers allows flexibility in providing the nutrients needed without overapplying other nutrients. Fertilizer levels are given in pounds or tons per acre.

Preplant fertilizer applications based on soil analysis
Compare your soil analysis results to the ranges given in left column of the following sections, and read across to the fertilizer recommendation. These fertilizers should be applied and tilled into the soil before planting.

**Soil pH and calcium**

<table>
<thead>
<tr>
<th>pH</th>
<th>Calcium (Ca)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 5.8</td>
<td>do not apply CaCO₃</td>
</tr>
<tr>
<td>&lt; 5.8 but &gt; 5.5</td>
<td>1 ton CaCO₃</td>
</tr>
<tr>
<td>&lt; 5.5</td>
<td>2 tons CaCO₃</td>
</tr>
</tbody>
</table>

**Soil phosphorus**

<table>
<thead>
<tr>
<th>P₂O₅</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 75 ppm</td>
<td>do not apply P₂O₅</td>
</tr>
<tr>
<td>&lt; 75 ppm but &gt; 30 ppm</td>
<td>100 lb P₂O₅</td>
</tr>
<tr>
<td>&lt; 30 ppm</td>
<td>200 lb P₂O₅</td>
</tr>
</tbody>
</table>

**Soil potassium**

<table>
<thead>
<tr>
<th>K₂O</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 200 ppm</td>
<td>do not apply K₂O</td>
</tr>
<tr>
<td>&lt; 200 ppm</td>
<td>200 lb K₂O</td>
</tr>
</tbody>
</table>

**Soil magnesium**

<table>
<thead>
<tr>
<th>MgSO₄</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 400 ppm</td>
<td>do not apply MgSO₄</td>
</tr>
<tr>
<td>&lt; 400 but &gt; 200 ppm</td>
<td>100 lb MgSO₄</td>
</tr>
<tr>
<td>&lt; 200 ppm</td>
<td>200 lb MgSO₄</td>
</tr>
</tbody>
</table>

### Abbreviations

- > greater than
- < less than
- ≤ equal to or less than
- ≥ equal to or greater than
- Ca calcium
- CaCO₃ calcium carbonate
- Mg magnesium
- MgSO₄ magnesium sulfate
- P phosphorus
- P₂O₅ phosphate
- K potassium
- K₂O water-soluble potassium
- ppm parts per million
- ton 2000 pounds (lb)
- mo month
Fertilizer applications during the first 3 months
After the *huli* are planted, monthly applications of N and K fertilizers can be made if needed. Fertilizer recommended during the first 3 months is as follows:

1 month  
25 lb N as urea, plus  
50 lb K₂O if soil K was < 200 ppm

2 months  
25 lb N as urea; 50 lb K₂O

3 months  
50 lb N as urea; 50 lb K₂O

Monitoring the crop with leaf tissue analyses
Leaf tissue analysis samples should be taken from the *lo‘i* at 3 months and 6 months after planting to adjust the amounts of N, K, Ca, and Mg applied to the crop. If leaf analysis levels are low, more fertilizer is needed. The recommendations given here are designed to ensure that the crop gets a total of approximately 300 lb of N and 400 lb of K₂O from the soil or fertilizers. It is assumed that the crop’s need for P is met by the pre-planting fertilizer application.

At 3–4 weeks after the second fertilizer application and before the third fertilizer application, take a leaf sample consisting of the most recently matured leaf from about 10 plants. This leaf is usually leaf number 3 or 4, counting the newest or emerging leaf as leaf number 1. Send the sample for analysis to a commercial laboratory or the CTAHR Agricultural Diagnostic Service Center. When the analysis results are received, make fertilizer applications based on the following sections. At 3–4 weeks after the fifth fertilizer application and before the sixth one, take another leaf sample. All fertilizer applications after 6 months will be based on the analysis of this sample.

Post-planting fertilizer application levels (per acre) based on leaf tissue analysis

**Leaf nitrogen**

> 4.2% ....................... do not apply N

< 4.2% but > 3.8% .......... 20 lb N at 4 mo, 30 lb at 5 mo,
40 lb at 6 mo

< 3.8% but > 3.4% .......... 40 lb N at 4 mo, 50 lb at 5 mo,
60 lb N at 6 mo

≤ 3.4% ..................... 60 lb N at 4 mo, 60 lb at 5 mo,
60 lb at 6 mo

**Leaf potassium**

> 4.0% ....................... do not apply K₂O

< 4.0% but > 3.5% .......... 30 lb K₂O at 4 mo, 40 lb at 5 mo,
50 lb at 6 mo

≤ 3.5% ..................... 75 lb K₂O at 4 mo, 75 lb at 5 mo,
75 lb at 6 mo

**Leaf calcium**

> 0.8% ....................... do not apply gypsum

< 0.8% but > 0.6% .......... 100 lb gypsum at 4, 5, and 6 mo

< 0.5% but > 0.4% .......... 150 lb gypsum at 4, 5, and 6 mo

≤ 0.4% ..................... 200 lb gypsum at 4, 5, and 6 mo

**Leaf magnesium**

> 0.30% ....................... do not apply MgSO₄

< 0.30% but > 0.25% ...... 100 lb MgSO₄

≤ 0.20% ..................... 150 lb MgSO₄

The authors
J. Silva, G. Uehara, R. Yamakawa—College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa
P. Bunn—Brewer Environmental Industries, Inc.
L. Santo—Hawaii Agricultural Research Center
M. Isherwood, L. Wong—Hawaii Department of Agriculture

Disclaimer
Many factors affect the growth of a taro crop and its ability to take up nutrients. The recommendations given here are intended as a general guide and may not be suitable for all situations. Neither the authors, their employers, nor the University of Hawaii shall be liable for damages arising from the use of or reliance on the information given here.

For best results, keep a record of fertilizer applications, make notes on crop growth, and measure yields. Observations over several crop cycles are often needed to develop the best schedule of fertilizer applications for a particular situation.