HS1123

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Plant Part Selection and Preliminary Sufficiency Ranges for Sap Testing Interpretation of Greenhouse Herbs [1]

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"Quick test" kits have been used for testing plant sap nitrate nitrogen (NO_3-N) and potassium (K). These tests have been widely used in the Florida vegetable industry since the early 1990s (Fletcher et al., 1993; Hochmuth, et al., 1988; Hochmuth, 2003; Hochmuth et al., 2003; Vann et al., 1993). The objective is to use portable testing equipment that can be taken to the field by growers to assess the nutrient status of the crop. One of the most popular "quick tests" has been the Cardy meters, one for NO_3-N and one for K. A drop of plant sap is placed on calibrated electrodes and the concentration of NO_3-N or K is read on a digital scale. Consult the publication entitled "Calibrating sap-testing meters" (Studstill et al., 2006) for a detailed description of how to properly use these meters.

Recent interest has increased in herbs as an alternative crop throughout Florida. Production of herbs has increased both in the field and greenhouses. Greenhouse hydroponic herb production, primarily basil, increased from near zero acres in 1988 to nearly 20 acres in 2004 (Tyson et al., 2004). Several studies with herbs have been conducted from 2000-2006 at the North Florida Research and Education Center – Suwannee Valley near Live Oak, Florida (Stapleton and Hochmuth, 2001). Many of the studies evaluated various nutrient programs for producing high-quality fresh herbs using hydroponic systems. These studies provided several opportunities to document observed sap concentration of NO_3-N and K in the plant sap of basil (*Ocimum basilicum*), cilantro (*Coriandrum sativum*), dill (*Anethum graveolens)*, spearmint (*Mentha spicata*), and oregano (*Origanum vulgare)* (Table 1). These concentrations represent target nutrient levels based on repeated tests and under growing conditions that resulted in adequate yield and quality.

Sap testing is typically done on petioles because they are easily identifiable succulent organs and they yield usable volumes of sap when pressed. However, herbs may not have large identifiable petioles. Botanically, petiole is defined as "leaf stalk," petiolule as "leaflet stalk" and vein as "strand of fibrovascular tissue in a leaf or other laminar

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structure" (Radford *et al*, 1968). Hence, the plant part used to develop the target nutrient concentrations (Table 1) should be also used for routine analysis (Figs. 1-6). A minimum of 20 plants should be sampled for routine analysis in order to ensure a representative sample. When a problem is suspected, take two separate samples, one from symptomatic, and one from healthy plants.

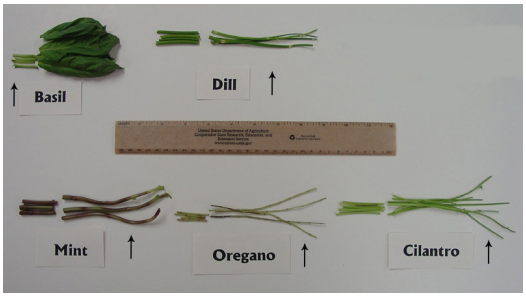

Figure 1. Leaf parts of basil, dill, mint, oregano, and cilantro selected for sap collection. (Plant parts may not anatomically correspond to a petiole. Using the same leaf part in routine sap testing is necessary if the typical ranges presented above are to be used. The arrow marks plant part used for sap testing.)

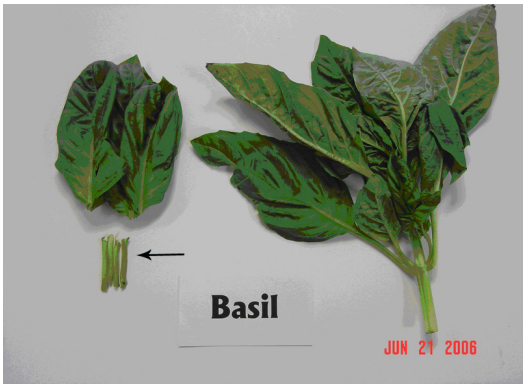

Figure 2. Basil leaf part used for sap collection and analysis.(The arrow marks plant part used for sap testing.)

Figure 3. Cilantro leaf part used for sap collection and analysis.(The arrow marks plant part used for sap testing.)

Figure 4. Dill leaf part used for sap collection and analysis.(The arrow marks plant part used for sap testing.)

Figure 5. Spearmint leaf part used for sap collection and analysis. (The arrow marks plant part used for sap testing.)

Figure 6. Oregano leaf part used for sap collection and analysis.(The arrow marks plant part used for sap testing.)

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Table 1. Leaf part used and corresponding plant sap concentrations of nitrate-nitrogen and potassium ranges typically found in several greenhouse herbs. (See Fig.1 for illustration)

Crop	Plant Part Sampled	Fresh Plant Sap Concentrations [z,y]	
		NO_3-N (mg/L)	K (mg/L)
Basil	Most recently matured leaf petiole	1000-2000	1000-2000
Cilantro	Newest 4-6 inch section of vein after all leaves removed	1500-2500	3500-5500
Dill	Newest 4-6 inch section of vein after all leaves removed	1000-1500	3500-5500
Spearmint	Newest 4-6 inch section of vein after all leaves removed	1500-2500	1000-2000
Oregano	Newest 4-6 inch section of vein after all leaves removed	2000-3000	2500-3500

[Z]Plant sap was expressed from the designated plant part and placed on Cardy meters for nitrate-nitrogen and potassium.
[Y]1 mg/L = 1ppm