

Petiole and Leaf Analysis in Strawberry

Mark Bolda

UCCE Santa Cruz County
Strawberry and Caneberry

Why Analyze Strawberry Leaves for Nutrition?







Three important plant nutrients

- Nitrogen (N): 2- 4% plant dry weight, essential for plant growth.
- Phosphorous (P): should be 0.25 -0.4% dry weight, for structural elements
- Potassium (K): 1.5- 2.5% dry weight, critical for early plant development

Nitrate= NO₃
Ammonium= NH₄

Analysis of Plant Parameters

- Soils
- Plant Tissues

Soil Observation



Comparing Soil Analysis with Tissue Analysis

April 2004

| DESC | Plant | | | Soil | | |
|---------------------------|-------------------------------|-----------------------|-------------------------------|--------------|----------------|------------|
| | N (Total) [SOP 525] % | K [SOP 550] % | P (Total) [SOP 590] % | NO3-N ppm | Olsen-P ppm | X-K ppm |
| Holly Diamante | 2.11 | 1.64 | 0.57 | 10.2 | 58.9 | 110 |
| Holly Camarosa | 2.30 | 1.73 | 0.40 | 1.4 | 65.9 | 110 |
| Higher Ground Seascape | 2.90 | 1.96 | 0.42 | 16.4 | 75.9 | 394 |
| Salas Diamante (Invierno) | 2.45 | 2.02 | 0.40 | 30.6 | 48.1 | 171 |
| Salas Diamante (Verano) | 2.61 | 2.45 | 0.34 | 6.4 | 78.3 | 201 |
| Salas Diamante 2 | 2.56 | 2.00 | 0.37 | 2.9 | 46.6 | 102 |

Soil Analysis

Soil

| | | |
|-------------------------------|-------------------------------|---------------------------|
| NO3-N [SOP 312] ppm | Olsen-P [SOP 340] ppm | X-K [SOP 360] ppm |
| 179 | 82.8 | 144 |
| N (Total) [SOP 525] % | P (Total) [SOP 590] % | K [SOP 550] % |
| 2.30 | 0.29 | 1.85 |

Plant

Analysis of Petioles and Leaves

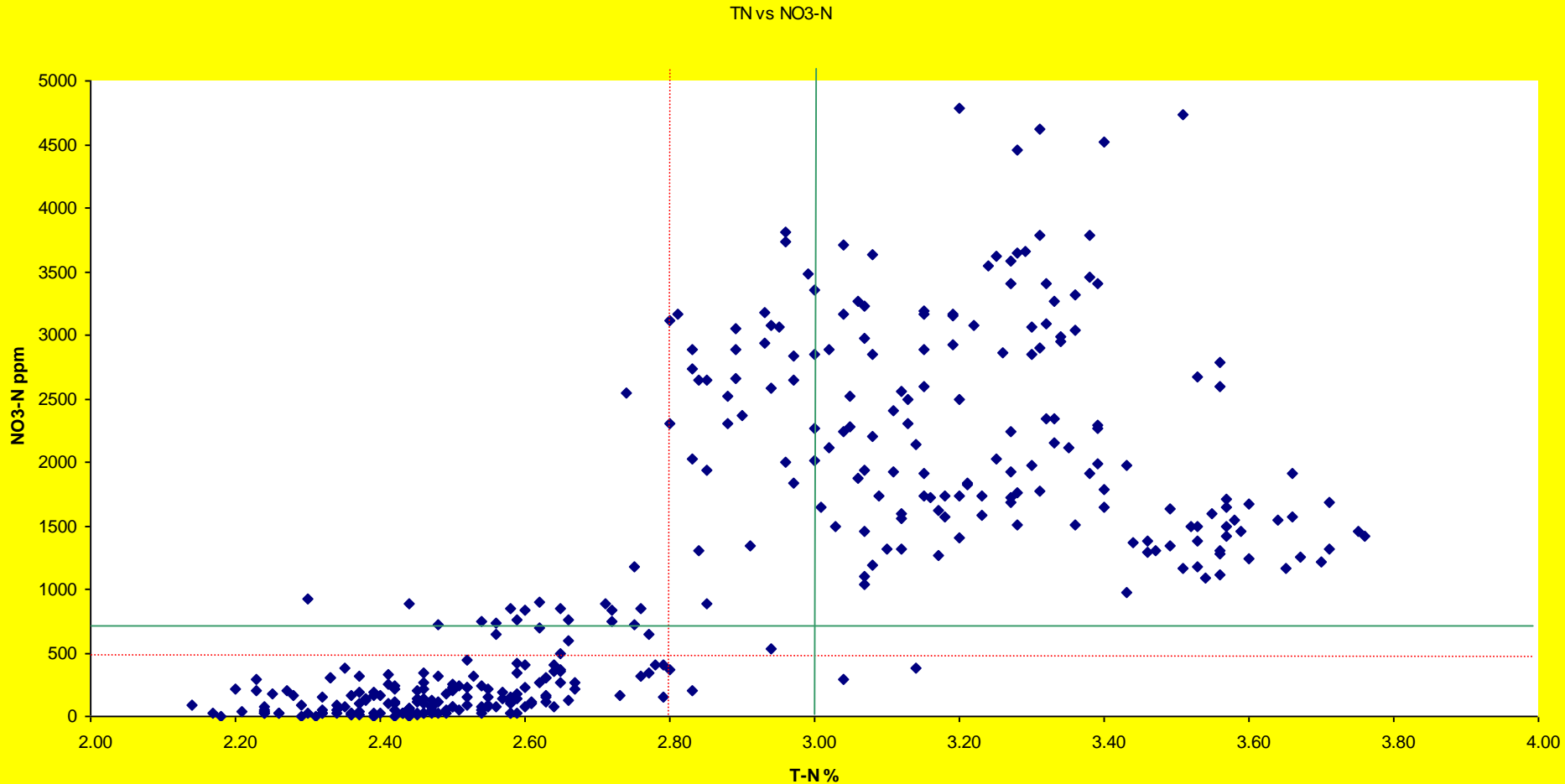
- Leaf analysis gives us N-P-K concentrations in the plant, while petiole analysis gives us the state of the nitrate not yet assimilated. In other words, it is not yet incorporated.



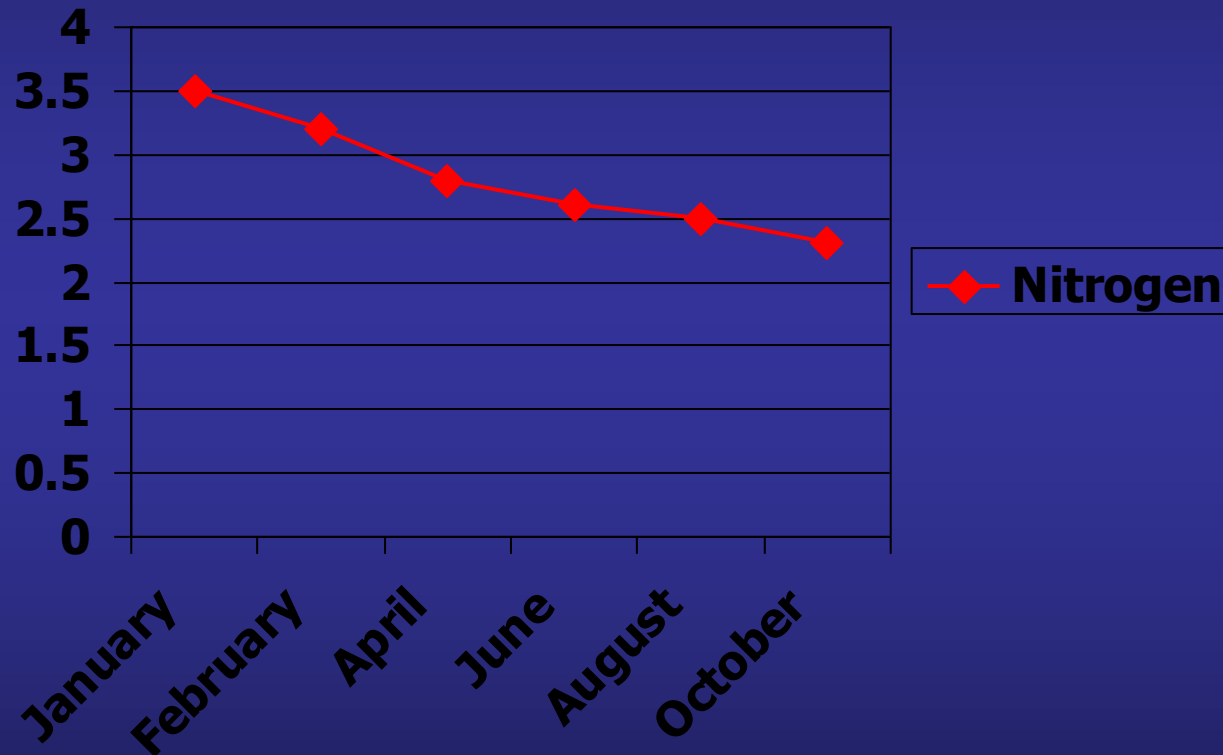
Difference between the use of petiole and leaf analysis.

- Petiole analysis is more sensitive to changes in soil nitrate, while leaf analysis gives the nutritional state of the plant.
- Petiole analysis will also be affected by changes in temperature, solar radiation and soil moisture.

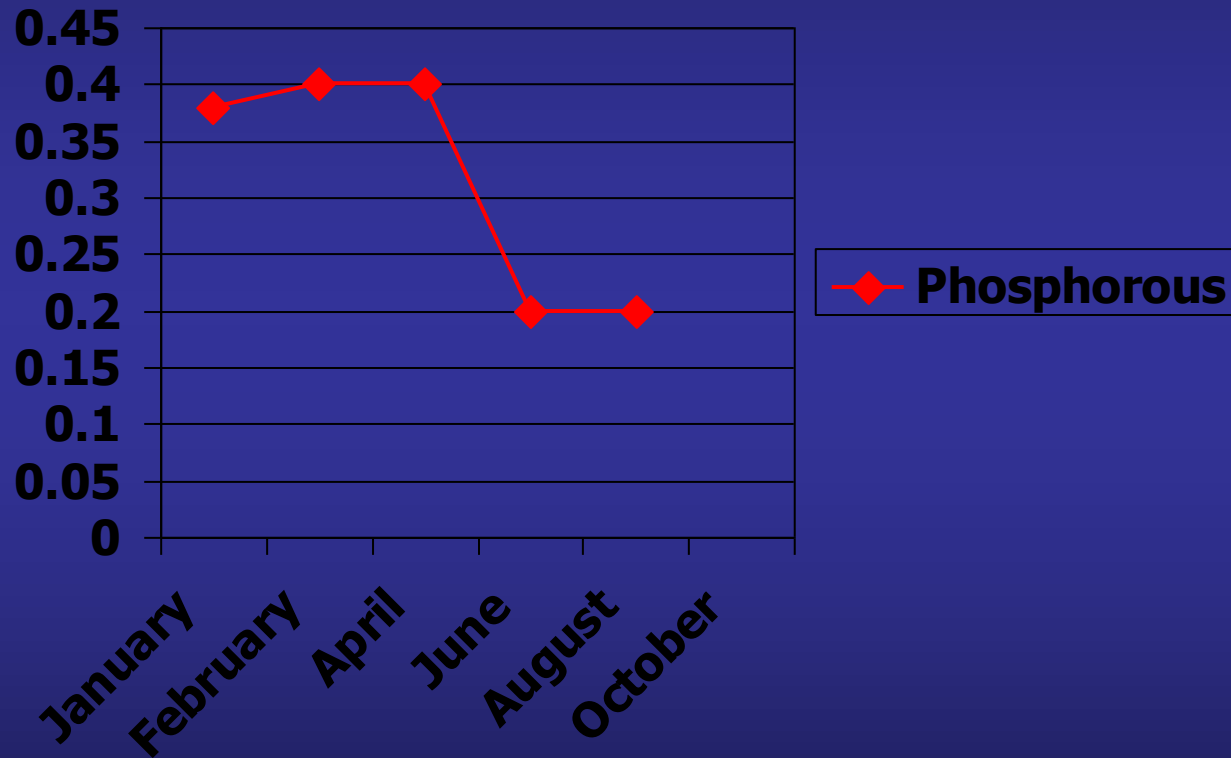
Comparing Petiole Nitrate Analysis with Leaf Nitrogen Analysis



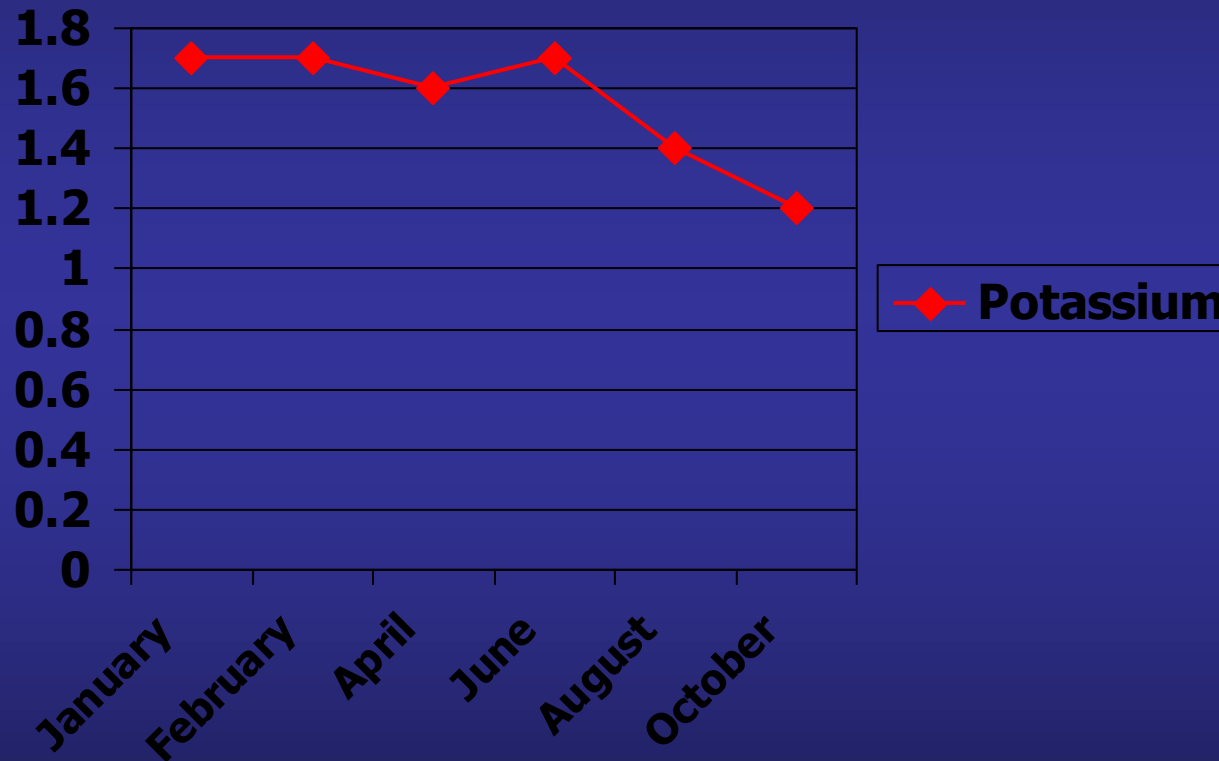
Nitrogen Levels in the Leaf over Time



Phosphorous Levels in the Leaves



Potassium Levels in the Leaves



Other problems that may look like nutritional deficiencies.

- Insects
- Pathogens
- Mechanical Damage









Fungicide Toxicity



Problem 1.



Problem 1.



Santa Maria- Results

Junio 2007

| N (Total) | P (Total) | K | S (Total) | B (Total) | Ca (Total) | Mg (Total) | Zn (Total) | Mn (Total) | Fe (Total) | Cu (Total) |
|---------------------|---------------------|---------------------|-----------------------|-----------------------|---------------------|---------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| [SOP 525] % | [SOP 590] % | [SOP 550] % | [SOP 590] ppm | [SOP 590] ppm | [SOP 590] % | [SOP 590] % | [SOP 590] ppm | [SOP 590] ppm | [SOP 590] ppm | [SOP 590] ppm |
| 2.15 | 0.33 | 1.65 | 1570 | 48 | 0.69 | 0.26 | 20 | 88 | 277 | 4.3 |
| 2.54 | 0.33 | 1.56 | 1710 | 73 | 0.74 | 0.29 | 19 | 118 | 296 | 4.8 |
| 2.55 | 0.32 | 1.48 | 1850 | 117 | 1.27 | 0.38 | 23 | 143 | 310 | 5.6 |
| 2.41 | 0.33 | 1.56 | 1710.00 | 79.33 | 0.90 | 0.31 | 20.67 | 116.33 | 294.33 | 4.90 |
| 2.59 | 0.28 | 1.24 | 1640 | 101 | 1.71 | 0.54 | 23 | 131 | 396 | 4.8 |
| 2.35 | 0.28 | 1.41 | 1650 | 72 | 1.25 | 0.40 | 17 | 108 | 405 | 3.6 |
| 2.60 | 0.27 | 1.42 | 1680 | 81 | 1.49 | 0.51 | 18 | 136 | 296 | 4.2 |
| 2.51 | 0.28 | 1.36 | 1656.67 | 84.67 | 1.48 | 0.48 | 19.33 | 125.00 | 365.67 | 4.20 |

How to take samples for nutrient analysis

- Diagnostics

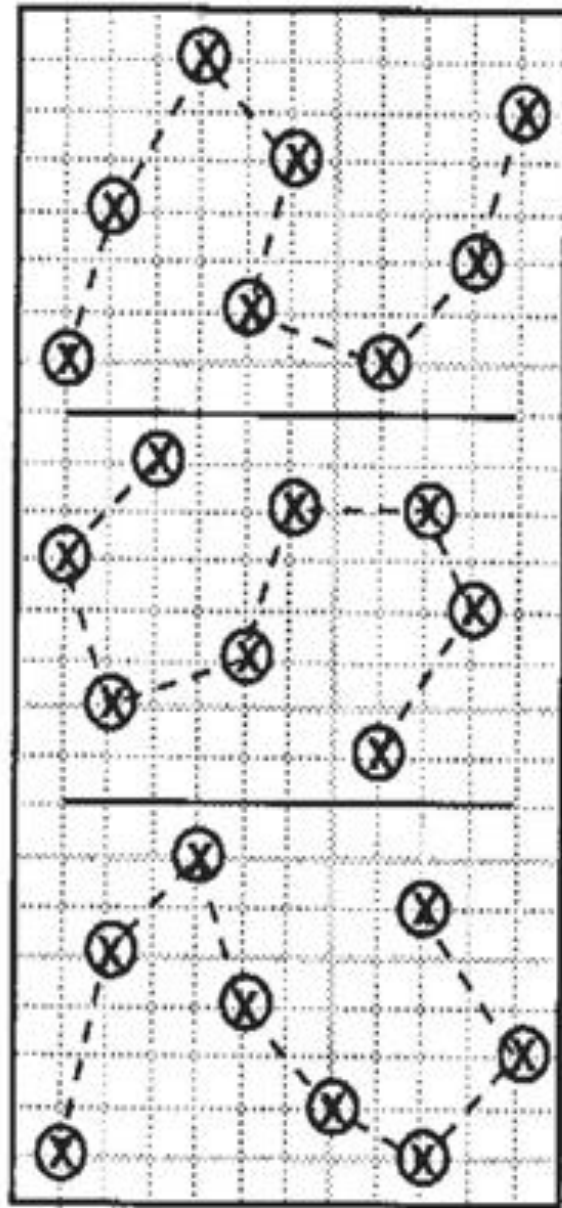
Take samples around symptomatic plant, then take samples from around non symptomatic plant.

- 15 a 20 leaves and petioles are sufficient for each sample.
- Send whole petioles.



Preferred area for
leaf sampling.
These are leaves of
middle age.

Water Flow



Conclusion

- Yes, tissue analyses give us an idea of what the nutritional state of the plant is.
- It is important for us to take samples which provide us with the maximum of information.