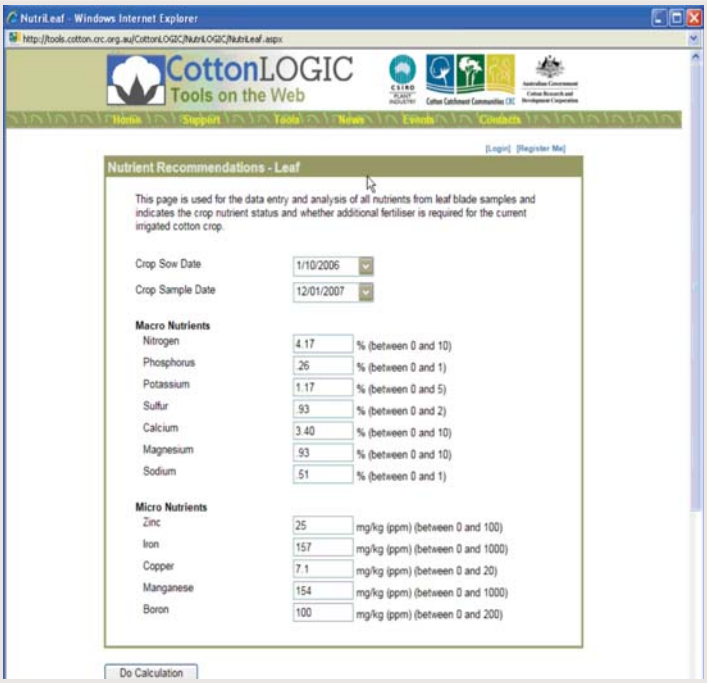
NutriLOGIC

On Farm Series: February 2008 | Produced by Cotton Catchment Communities CRC

The Redeveloped NutriLOGIC

The NutriLOGIC program has recently undergone a major revision; it is now more user-friendly, provides information and analytical support for all major nutrients, provides interpretation of soil, petiole and leaf analyses and is relevant for cotton crops at all yield levels.



What is NutriLOGIC?

NutriLOGIC is a web based decision support tool for interpreting soil and plant tissue results and calculating nutrition requirements. NutriLOGIC can be accessed through the Cotton Catchment Communities CRC website.

Monitoring the nutrient status of each cotton field is essential to optimise yields and use fertilisers effectively. Inappropriate use of fertilisers affects profitability through increased input costs while excessive use of N fertilisers may impact on the environment through greenhouse gas emissions and contamination of groundwater.

NutriLOGIC-on-the-web helps interpret soil and plant tissue analyses for all major nutrients, and indicates when fertiliser application may be warranted for individual fields. Growers need only enter the sowing and sampling dates, and the chemical analyses from their laboratory report. To save time NutriLOGIC automatically retrieves Growing Day Degree data from the weather station selected, based on the crop sowing and sampling dates entered.

Plant Tissue Analyses and NutriLOGIC

Plant analyses taken during crop growth can indicate nutrient deficiencies, which if identified early enough, may be rectified by applying the appropriate fertiliser.

Petiole Analyses

Petiole nitrate-N analysis in particular can be a reliable means of indicating crop nitrogen nutrition status. NutriLOGIC-on-the-web interprets petiole nitrate nitrogen analyses to indicate crop N status and suggests N fertiliser addition where required.

Petioles are ideal for monitoring nitrate-N and potassium concentrations up to early flowering, but they are not recommended for other nutrients.

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Of the other nutrients, petioles normally contain about half of the concentrations found in the leaf blade, but this varies, making petioles less reliable as a sampling tool.

Petiole nitrate-N level declines with time. By mid-flowering, petiole nitrate-N levels have usually declined to low levels and it is hard to distinguish between crops having sufficient or insufficient N. Beyond mid-flowering, leaf tissue tests are a better method of monitoring crop nutrition as they can be used for monitoring all nutrients including micronutrients.

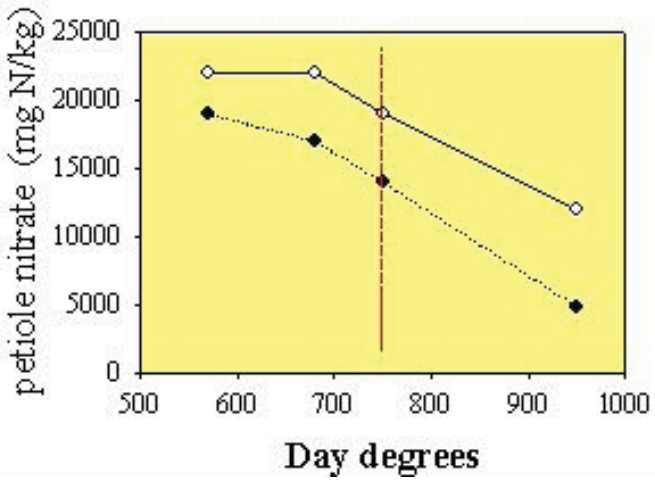

Figure 1. Petiole nitrate declines during the early season. The 2 crops have adequate N (o) or insufficient N (•). *Source: Ian Rochester*

Petioles can be analyzed for sap concentration or for nutrient concentration in dry matter. For petiole sap analysis moisture loss must be closely controlled whereas with dry matter analysis moisture content is not critical.

The new NutriLOGIC allows users to compare their petiole data with the optimum petiole nitrate status, according to the stage of crop development.

Leaf Analyses

NutriLOGIC-on-the-web can now interpret both major and minor nutrient levels in leaves sampled throughout the season.

After flowering, leaf blades offer a better means of monitoring crop nutrition. The

Collect petiole or leaf samples from the fourth or fifth unfolded leaf from the top of the plant *Photo: CSIRO*

leaf blade can be used for monitoring all nutrients including micronutrients. Leaf tissue tests can be used for identifying nutrient imbalances, deficiencies and toxicities and can do so more precisely than soil testing and assist in optimising fertiliser programs.

The revised NutriLOGIC can assess leaf tissue data and indicate whether the level is high, normal or low, according to the stage of crop development. Research results over a wide range of seasons and experiments (including high yielding crops) have been combined into a number of simple nutrient response curves for all the major and minor nutrients.

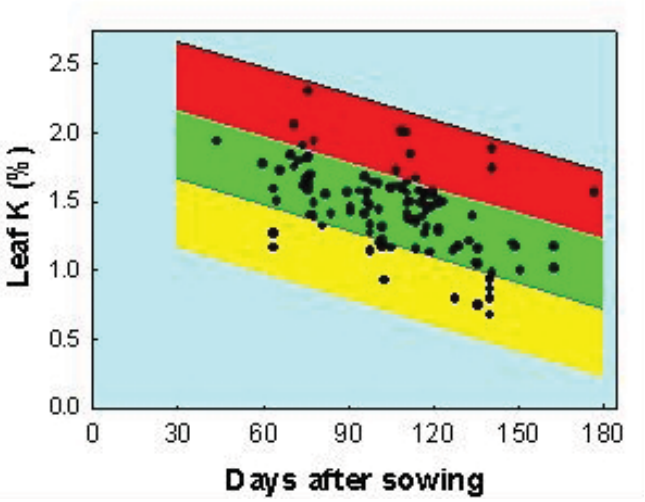

Figure 2. High, normal and low concentrations of leaf potassium throughout the season. *Source: Ian Rochester*

For example, Figure 2 shows the optimum range used in NutriLOGIC for leaf

potassium. The shaded areas indicate high, normal and low concentrations of leaf potassium throughout the season.

Table 1 below is derived from NutriLOGIC and outlines ideal, high and low leaf tissue levels of each major nutrient at two stages during the season. The concentrations of most nutrients change as the crop matures. For example, leaf N and K decline while leaf S, Ca and Mg increase with time.

Table 1. Ideal, high and low leaf tissue levels of major nutrients at two stages during the season.

Days after sowing		Ideal	High	Low
Macronutrients (%)				
N %	70	4.49	4.99	3.99
	120	4.01	4.51	3.51
P %	70	0.34	0.39	0.29
	120	0.31	0.36	0.26
K %	70	1.66	1.69	1.64
	120	1.35	1.37	1.32
S %	70	0.88	0.91	0.85
	120	1.10	1.113	1.07
Ca %	70	3.16	3.08	3.24
	120	3.70	3.78	3.78
Mg %	70	0.7	0.71	0.68
	120	0.81	0.82	0.79
Micronutrients (ppm or mg/kg)				
Na	70	<1050	1900	
	120	<1200	2100	
Cu	70	7.39	8.39	6.39
	120	6.43	7.43	5.43
Zn	70	28	34	22
	120	23.3	29.3	17.3
Fe	70	225	305	145
	120	155	235	75
Mn	70	104	134	74
	120	111	141	81
B	70	69	89	49
	120	88	108	68

Source: NutriLOGIC and Ian Rochester

Any action taken based on leaf test results is really dependent on the nutrient in question, how limiting it may be and the stage of crop development.

NutriLOGIC-on-the-web is an uncomplicated tool delivered through the Cotton CRC website (www.cottoncrc.org.au) designed to aid cotton nutrient management.

The information presented is derived from up-to-date cotton nutrition research.

NutriLOGIC-on-the-web also provides general information on soil fertility and cotton nutrition through direct links to NUTRIpak and SOILpak. These links contain further information on cotton crop nutrition requirements, sampling techniques for soil or plant tissue, soil structure and soil chemistry.

Future upgrades will include graphing capabilities and integrate information on nutrient removal, based on cotton yields.

NutriLOGIC can be found on the Cotton Catchment Communities web site at http://tools.cottoncrc.org.au/CottonLOGIC/

For more information contact your local Cotton Extension Officer.

Central Queensland Regional Cotton Extension Officer on 07 4983 7403 & 0409 499 691

Darling Downs Regional Cotton Extension Officer on 07 4669 0815 or 0428 271 599

Macintyre Regional Cotton Extension Officer on 07 4671 6711 or 0428 879 900

St George Regional Cotton Extension Officer on 07 4625 4779 or 0427 635 621

Gwydir Regional Cotton Extension Officer on 02 6750 6308 or 0427 018 684

Macquarie Regional Cotton Extension Officer on 02 6883 7101 or 0407 952 056

Southern NSW Regional Cotton Extension Officer on 02 6993 1608 or 0447 773 791