HE application of synthetic fertilisers is one of the biggest crop inputs for Australian cotton growers. A recent sustainability study conducted by Cotton Australia showed that overapplication of N fertiliser is contributing the carbon emissions from the cotton industry. To improve the industry’s emission levels we must look to improve our nutrition management and align farm practice with research outcomes.

CottonInfo showcased modern nutrition research recently in a series of forums in northern NSW. Meetings held at Moree, Gunnedah and Narromine contained presentations from six researchers showing the benefits of optimising their nutrition program. The days highlighted the importance of improving fertiliser use efficiency within their cropping systems. The meetings showed that improving nutrient efficiency can lead to both environmental and economic advantages in northern cotton systems.

CottonInfo nutrition technical lead Jon Baird said these workshops are important events as they allow researchers and growers to interact, providing researchers with an extension platform for their latest research, while growers in return provide feedback that allows better alignment of research to the industry’s requirements.

The research was presented from locally funded projects invested by CRDC and the Department of Agriculture, Water and the Environment. Nutrition experts included Dr Graeme Schwenke, Dr Guna Nachimuthu (NSW DPI), Dr Ben Macdonald, Dr Mark Farrell (CSIRO) and Dr Patrick Fillipe (Sydney Uni) along with Jon Baird (NSW DPI & CottonInfo).

The N workshops covered:

- The use of various N products such as urea, ammonia and liquid fertilisers;
- Enhanced fertilisers including inhibitors (nitrification and urease inhibitors) and polymer-coated urea;
- Management strategies of application timing; and,
- Graeme Schwenke explained to the groups the optimum N management strategies to reduce tailwater losses.

Tailwater N losses occur commonly during the early season irrigations (irrigation events 1–3) when high soil nitrate levels are not being utilised by the plant and are instead leached from the planting hill into the tailwater drains. In some instances, these losses can account for up to 20 per cent of applied fertiliser, with the percentage increasing with higher application rates (see Figure 1).

Other topics included:
The improvement of yield and nitrogen use efficiency when N fertiliser is applied to match plant use;
- The use of enhanced efficiency fertilisers in cotton systems;
- Mineralisation potential of irrigated cotton soils;
- Phosphorus response to applied cotton; and,
- Previews of new research projects looking at preferential N form uptake and soil variability mapping.

The series of workshops highlighted the advantages to applying optimum N management in cotton systems, with a reduction in N losses (especially from early season irrigations) and the improvement in fertiliser use for the development of reproductive matter. By applying more than 50 per cent of N fertiliser in-crop, the adverse vegetative growth associated with excessive N application was decreased. This improved N fertiliser uptake, nitrogen use efficiency, and improved the nitrogen harvest index.

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**FIGURE 1: Nitrogen leached from irrigated cotton located at Myall Vale, NSW**

The crop had 292 kg/ha of N fertiliser applied in a 70:30 per cent split ratio.
*Denotes in-crop broadcast urea N application. Courtesy Dr Graeme Schwenke (NSW DPI).

**FIGURE 2: Yield prediction based on mapping the soil constraints in northern NSW conducted by Sydney University**

Actual vs Predicted Yield

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**Nitrogen influence on cotton growth**

<table>
<thead>
<tr>
<th>Fertiliser N</th>
<th>Nil N fertiliser</th>
<th>155 kg N/ha</th>
<th>355 kg N/ha</th>
<th>Prob (L.S.D.)</th>
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</thead>
<tbody>
<tr>
<td>Yield (bales/ha)</td>
<td>8</td>
<td>13</td>
<td>13</td>
<td>0.01 (3)</td>
</tr>
<tr>
<td>Boll number (m)</td>
<td>95</td>
<td>150</td>
<td>150</td>
<td>0.05 (34)</td>
</tr>
<tr>
<td>N uptake (kg N/ha)</td>
<td>101</td>
<td>192</td>
<td>243</td>
<td>0.01 (66)</td>
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<tr>
<td>Harvest Index (NHI)</td>
<td>0.49 (0.48)</td>
<td>0.36 (0.42)</td>
<td>0.24 (0.35)</td>
<td></td>
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