TECHNICAL BULLETIN 165
BENEFITS OF INTEGRATED FERTILISER MANAGEMENT (IFM) FOR COTTON
by Dr Hooshang Nassery, Head of Technical

WHAT'S IN THIS BULLETIN

This Technical Bulletin (TB) explains how an Integrated Fertiliser Management program (IFM) enables collaboration and interaction between seed, root and foliage, thereby resulting in improved fertiliser efficiency in modern cotton crops.

OVERVIEW AND PARTICULAR ISSUES

Integrated Fertiliser Management (IFM) employs seed and foliage in addition to roots for supplying nutrients to plants. This process allows collaboration and interaction between seed, root and foliage, resulting in improved fertiliser efficiency use that results in higher yield.

The priming of cotton seed is not as easy as cereal seeds due to its impermeable and leathery seed coat. Ginning may cause cracks in the seed coat to allow limited priming to occur. Most cotton growers have adopted injection at sowing as an alternative to seed priming. Seed scarification can also be used as another means of making cotton seeds suitable for priming.

WHAT IFM OFFERS FOR BOTH DRYLAND AND IRRIGATED COTTON

IFM offers the following benefits:

1. Due to the low content of available phosphorus and trace elements in cotton seeds, seed priming or injection results in better germination, vigour and yield potential.
2. Using seed, root and foliage to supply major and trace elements to plants, increases the efficiency of nutrient uptake and maintains crop nutrient balance.
3. Foliar spray and seed priming provides a near complete coverage and absorption, as opposed to soil application of fertiliser that is diluted widely, causing low uptake efficiency in most scenarios.
4. Foliar spraying benefits the crop most when nutrient supply through the soil is reduced, either voluntarily or due to drought or other limitations that reduce availability.
5. Applying a foliar spray such as RLF Broadacre Max with low biuret Urea stimulates root exudation of organic acids (e.g. citric acid) leading to the unlocking of phosphorus and trace elements.
6. Stimulated exudation of hydrogen ion results from foliar use of nitrogen, that forces the root system to pump out hydrogen ion in exchange for potassium to maintain the balance with nitrogen. This acidification is also a force for cell wall softening and root growth.
7. Adding potassium supplement such as RLF KC30 to the tank mix where premature senescence (PMS) occurs prevents the incident of PMS. This is commonly observed in irrigated cotton where high levels of sodium and calcium in soil or irrigation water reduces potassium uptake.

8. The senescence of dryland cotton is more likely the result of suboptimal levels of trace elements and phosphorus, that slows down conversion of light to chemical energy resulting in photo-oxidation of chlorophyll. Therefore foliar tank mixes having phosphorus, potassium and trace elements delays or prevents yellowing and PMS in dryland cotton.

9. Where premature senescence is known to occur due to low availability of potassium and/or high levels of sodium in soil or water, frequent foliar sprays of a KC30 or AcetaK at 4L/h is required to prevent PMS and yield decline. KC30 is compatible with Broadacre Max, while AcetaK is not compatible and it should be used only when potassium is required.

10. Manganese and zinc deficiencies are commonly associated with the yellowing of leaves where Roundup is commonly used, such as in Roundup Ready Flex Cotton (RRF Cotton), therefore foliar sprays with Broadacre Max takes care of such trace element deficiencies.

11. Dryland cotton benefits from IFM more than irrigated cotton, since nutrient deficiencies develop faster under dryland conditions.

12. Root mass and root surface area has a greater role in dryland cotton for water and nutrient uptake than irrigated cotton.

**Typical Examples**

1. Timing

Projected dry matter production/hectare in a cotton field and timing of foliar spray of Broadacre Max and Potassium sources for prevention of premature senescence

![Graph showing projected dry matter production and foliar spray timing]
2. Recommended Fertiliser Program

A typical RLF recommendation for irrigated and dry land cotton is shown in the following table.

<table>
<thead>
<tr>
<th>Product</th>
<th>Timing</th>
<th>Irrigated Cotton</th>
<th>Skip-row Dryland Cotton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power NP+C</td>
<td>Injection at Sowing</td>
<td>10–20L/h</td>
<td>5–10L/h</td>
</tr>
<tr>
<td>Broadacre Max</td>
<td>20–30cm tall</td>
<td>2L/h, 30% banding</td>
<td>1L/h with 30% banding</td>
</tr>
<tr>
<td>Broadacre Max</td>
<td>First squaring</td>
<td>2L/h, 50% banding</td>
<td>1L/h with 50% banding</td>
</tr>
<tr>
<td>Broadacre Max+ KC30</td>
<td>First flower</td>
<td>3L/h, full cover</td>
<td>2L/h with full cover</td>
</tr>
<tr>
<td>KC30 or Aceta K</td>
<td>Full flower</td>
<td>3L/h full cover</td>
<td></td>
</tr>
</tbody>
</table>

*KC30 is required at 3L/h on its own, or with Broadacre Max to prevent premature senescence (PMS)*

The above timing is selected for best response to foliar fertiliser, however if tank mixing with other chemicals warrants fewer sprays, the spray timing and frequency is at the discretion of the grower.

The timing of the first and second spray has a bigger influence on yield potential, and that of third and fourth sprays has a greater impact in preventing PMS.