

Making those key decisions

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In this edition of Germinating Ideas we will look at two very important decision points in the management of your crop. These are decisions you will have to make in the next few months. The first is the last irrigation decision, which can often create a dilemma.

The second is the decision to defoliate, setting the crop up for defoliant and timing the application.

To Water or not to Water

Every season one of the most difficult decisions that has to be made is when to apply the last irrigation. Each region is different and there is such a wide range of factors that need to be considered that it is impossible to give general recommendations for the timing of the final irrigation.

But the importance of timing the last irrigation cannot be over emphasised. Watering too late can expose the crop to the risk of weather damage and also encourage regrowth, while cutting off water too early can reduce yield and quality.

The general principals for timing the last irrigation involve assessing crop maturity and the amount of stored soil moisture. Anticipated crop water use must also be taken into consideration.

Assessing crop maturity is relatively easy. Cutting bolls and assessing the seed coat colour can determine plant maturity. Mature bolls will have a brown tinge on the seed coat. Consecutive first position bolls will be set about every four days depending on temperature.

So by finding the uppermost mature boll and counting the number of nodes to the last harvestable boll, it is possible to estimate the number of days till the crop is mature. If large numbers of second and third position bolls occur then maturity may be harder to determine.



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Crop water use can be measured using a neutron probe or estimated using models such as Hydrologic. After cutout, daily water use declines and crops are less sensitive to moderate levels of moisture stress. Rooting depth is maximised after peak flowering. These three factors combine to allow longer intervals between the final irrigations.

Weather conditions should also be considered. During late summer it can be humid and wet. Late waterings will encourage boll rot, particularly on tall and leafy or lodged crops.

Allowing the crop to dry the soil profile reduces the risk of rain delaying picking and assists in rapid, even defoliation with no regrowth.

Timing the last irrigation is never easy and requires careful consideration and management to maximise yield and minimise risk.

Defoliation for Quality Cotton

Careful harvest preparation management of cotton is critical for the production of the quality fibre for which the Australian industry is world famous. CSIRO locally-bred and adapted varieties bearing the Sicot, Sicala and Siokra names have global reputations for high yield and premium colour, micronaire, length and strength. Correct crop stage and product choice and timing contribute to achieving optimum yield and quality under given seasonal conditions.

Harvest preparation is the last agronomic management strategy before picking and the consequences of inappropriate decisions can be very costly, ranging from re-treatment to yield loss and quality discounts in extreme cases.

Australian cotton processors strive to maintain the quality fibre of the seed cotton delivered to their gins and awareness of module storage requirements is very high in the Australian industry. But for the gin to produce a premium bale for the market, growers need to ensure that defoliation and harvest have resulted in the delivery of a premium module.

Cotton harvest

The optimum harvest date occurs when all the physiologically mature bolls are open and before yield loss from adverse weather has occurred. The harvest preparation program must account for: variety, crop type (dryland or irrigation);



Correct timing of defoliation is vital to maximise yield and fibre quality.

agronomic management; weather conditions; and, harvest system. These factors can vary considerably across the industry, region and farm.

Defoliation is necessary for cotton harvest to avoid excessive trash, control moisture in the module and increase the efficiency of the harvest process. Timely harvest preparation can assist in reducing late season insect and mite pests and reduce their selection for resistance.

Many 'rules of thumb' associated with cotton defoliation have been derived from research into the effect of crop termination on yield and quality. But the main skills required to achieve a good defoliation are correct crop maturity assessment and patience.

The weather can play a major role in the outcome of the cotton crop and prolonged wet weather can have a devastating effect on yield and quality. The weather is beyond our control, but other factors that influence the final result are often very much within our control.

The physiology of defoliation

In modern commercial cotton production defoliation is artificially enhancing the natural process of senescence and abscission. In nature abscission (leaf fall) is generally preceded by senescence (leaf aging). Defoliant and desiccants are applied commercially to mimic this natural process allowing control over the harvest program.

Senescence of the cotton leaves is genetically programmed by the existence of a thin layer of cells at the base of the leaf petiole where the petiole joins the main stem. Over time and hastened by environmental impact, changes in the normally controlled ratios of plant hormones result in a loss of leaf function. Cells in the abscission layer die, resulting in a loss of chlorophyll and water and in the separation of the leaf from the plant. This natural growth process requires the cycle of nutrient uptake, crop growth, plant moisture status and boll maturity.

The aim of defoliation is to artificially induce changes in plant hormones within the leaf through chemical reaction, injury or stress by the application of defoliant, growth regulators and/or desiccants. Under favourable conditions harvest aids will promote leaf abscission,

enhance boll opening and prepare the crop for an even, early harvest.

Safe timing of defoliation

The crop is safe to defoliate when the youngest boll expected to be harvested is physiologically mature. Traditionally the percentage of open bolls has provided a reliable guideline for timing of defoliation application. Prior to the development of the plant growth regulators, a high percentage of open bolls was needed before desiccants could be safely applied. In recent times the use of products that enhance natural plant processes has enabled a more precise methodology for defoliation timing.

Cotton bolls are physiologically mature when the fibre is well developed, seeds are solid and cotyledons fully developed and seed coats are turning brown in colour. The 'cutout boll' will generally be between six and four nodes from the terminal and is the last harvestable boll on the plant. The maturity of the last harvestable boll generally coincides with other indicators of crop development.

Percentage open

The crop can be defoliated safely after 60 to 65 per cent of the bolls are open. But under moisture stress or when the first application is a desiccant a higher percentage of open bolls is desirable.

Nodes above cracked boll

When the nodes above the highest open boll in the first position are between three and four on average, the cutout boll will be mature and unaffected by defoliation.

Maturity assessment

When mature bolls become difficult to cut with a knife, seed is well developed and seed coat has begun to tan. When 98 per cent or greater of the harvestable bolls have reached this condition then the crop is safe to defoliate.

Consequences of early defoliation

While the objective of the harvest preparation process is to balance optimum crop maturity against yield loss, fibre degradation and the best use of harvest equipment, the risk is that both yield and quality can be damaged by premature

defoliation. A further consequence of premature defoliation can be poor efficacy of the chemical defoliant, delayed harvest and increased cost from correcting this problem.

Studies on premature defoliation and boll opening of cotton have shown that both yield and fibre quality can be reduced.