

Using MAXIM® to improve fruit set and fruit quality

Litchi fruit development is determined by a number of interacting factors. Litchi trees have the ability to flower profusely, yet only 1 to 5% of the female flowers set fruit depending on tree health, cultivar, year and growing environment. Yield is often inadequate, mainly because of massive fruitlet drop during the early period of fruit development.

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SUBTROP

Fruit set (retention) can be improved by promoting pollination, ensuring micronutrients such as zinc and boron are not limiting, optimising irrigation / reducing water stress, girdling and sound pest and disease control. Later in the development cycle, fruit size is often hampered by insufficient irrigation, poor nutrition (especially calcium) and pest and disease damage. Fruit size is an important quality parameter and is as crucial as yield in the determination of profitability in litchi production.

Any abiotic stress during fruit development induces ethylene production. Ethylene triggers the abscission of organs which causes fruit drop. However, abscission is regulated by the balance between ethylene and auxin at the abscission zone and auxin

is able to suppress ethylene-induced fruit abscission. Auxin also plays a role in fruit size as it stimulates cell division and enhances cell enlargement. It increases fruit growth rate and influences size, ripening time, colour and storage quality. Thus auxins can be used to manipulate and improve fruit set and subsequent fruit quality in litchis when applied at the correct time.

MAXIM® (trichlopyr 3,5,6-TPA) is a synthetic auxin-like growth regulator that is registered for use on litchi (currently only on cv. 'Mauritius'). Its effect is two-fold, in that it improves fruit retention (i.e. helps the fruit 'push through' this potentially 'harsh' period) and it increases fruit size. The benefits of using this growth regulator should not be underestimated and several authors have shown it to greatly increase yield, cause a significant increase in fruit size and even enhance the red colour of the ripe fruit of several litchi cultivars (Cronje and Mostert, 2008; Cronje *et al.*, 2009; Stern *et al.*, 2000; 2001).

As the timing of application determines the result of a MAXIM® treatment, it is crucial to apply it at the precise physiological stage. For effective treatment, fruit must be of a certain weight. For fruit drop reduction, a single application after the end of the second physiological fruit drop, when average fruit is at the 2 gram stage, is recommended (20 ppm or 2 tablets/100 L water). For both fruit drop reduction and increased fruit size, a single application after the end of the second physiological fruit drop, when average fruit is at the 3 to 4 gram stage, is advised (40 ppm or 4 tablets/100 L water)*. This results in more fruit of

an optimum marketable size. In small fruit situations, an increase in the fruit size peak will occur. However, if applied when the fruit is too big, the effect will be minimal.

The average fruit weight can be determined as follows: select 200 fruit at random (e.g. 20 fruit on each of 10 trees) in a uniform block that has to be sprayed. Determine the fruit weight of each fruit and calculate the average weight. It is important to weigh all fruit of all different sizes that will not naturally fall off.

Guidelines

Some guidelines to promote the efficacy of MAXIM®:

- Use a spray volume adequate to the size and canopy of the trees (using only carefully calibrated orchard spray equipment). Apply to the point of run off at a rate of 2 000 to 2 500 L/ha (approximately 4 to 15 L per tree depending on tree size and spacing) as a medium cover spray.
- The optimum time for application is early in the morning when dew has evaporated from the leaves and temperatures are lower. Never spray when temperatures are abnormally high or low.
- Do not apply to trees under severe stress (e.g. drought) and / or trees with nutrient deficiencies.
- It is recommended to add a wetting agent to the MAXIM® spray mixture at a rate of 20 ml/100 L water (depending on the label of the wetter).
- If the pH of the spray water is higher than 6, add a pH buffering agent to correct the water pH to between pH 4.5 and 5.0 before adding MAXIM®

Boordbestuur • Orchard management

FROM PAGE 45



to the spray water.

- Never use calendar dates to determine the spraying date for MAXIM®, as the application date, according to the correct fruit weight, may vary from year to year.

* The current withholding period for MAXIM® is 28 days

References

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Tabel 1. Besproeiingsriglyne Oktober - Desember
Table 1. Irrigation guidelines October - December

Besproeiingsgids (L/boom/dag) • Irrigation chart: (L/tree/day)

Boomspasiëring	Blaarbedekking (m ² /ha)	Boord-volwassenheid	Okt	Nov-Des
Tree spacing	Leaf covering area (m ² /ha)	Orchard maturity (%)	Oct	Nov-Dec
12 x 12 (65 trees/ha)	700	10	54	65
12 x 12 (65 trees/ha)	1750	25	135	162
12 x 12 (65 trees/ha)	3500	50	269	323
12 x 12 (65 trees/ha)	5250	75	404	485
12 x 12 (65 trees/ha)	5600	80	431	517
12 x 12 (65 trees/ha)	6300	90	485	582
12 x 12 (65 trees/ha)	7000	100	538	646
10 x 10 (100 trees/ha)	700	10	35	42
10 x 10 (100 trees/ha)	1750	25	88	105
10 x 10 (100 trees/ha)	3500	50	175	210
10 x 10 (100 trees/ha)	5250	75	263	315
10 x 10 (100 trees/ha)	5600	80	280	336
10 x 10 (100 trees/ha)	6300	90	315	378
10 x 10 (100 trees/ha)	7000	100	350	420
12 x 6 (139 trees/ha)	700	10	25	30
12 x 6 (139 trees/ha)	1750	25	63	76
12 x 6 (139 trees/ha)	3500	50	126	151
12 x 6 (139 trees/ha)	5250	75	189	227
12 x 6 (139 trees/ha)	5600	80	201	242
12 x 6 (139 trees/ha)	6300	90	227	272
12 x 6 (139 trees/ha)	7000	100	252	302
9 x 6 (185 trees/ha)	700	10	19	23
9 x 6 (185 trees/ha)	1750	25	47	57
9 x 6 (185 trees/ha)	3500	50	95	114
9 x 6 (185 trees/ha)	5250	75	142	170
9 x 6 (185 trees/ha)	5600	80	151	182
9 x 6 (185 trees/ha)	6300	90	170	204
9 x 6 (185 trees/ha)	7000	100	189	227
10 x 5 (200 trees/ha)	700	10	18	21
10 x 5 (200 trees/ha)	1750	25	44	53
10 x 5 (200 trees/ha)	3500	50	88	105
10 x 5 (200 trees/ha)	5250	75	131	158
10 x 5 (200 trees/ha)	5600	80	140	168
10 x 5 (200 trees/ha)	6300	90	158	189
10 x 5 (200 trees/ha)	7000	100	175	210