

Maximise Your Crop's Colour Potential

Guaranteed Analysis

Nitrogen (N):	5.0 %
N as nitrate	2.1 %
N as ammonium	2.9 %
Phosphorus (P):	15.0 %
Potassium (K):	2.1 %
Calcium (Ca):	4.0 %
Magnesium (Mg):	0.2 %
Manganese (Mn):	0.4 %
Zinc (Zn):	0.4 %
Copper (Cu):	0.5 %
Molybdenum (Mo):	0.008 %
Boron (B):	0.05 %
Fulvic Acid:	0.5 %
Specific Gravity:	1.31 kg/L
pH:	< 2.0

Horticulture Foliar Application:

Generally 2 to 10 L/ha with at least 200 L/ha of water.

For colour enhancement in Apples, 2 or 3 applications at 5 L/ha are suggested. Apply 2 – 3 weeks before harvest, with water rates of 1000 L/ha or a 0.5% solution.

Crop Booster PLUS

Crop Booster PLUS, a product designed to aid in colour development in apples.

Benefits of Crop Booster PLUS

- **Phosphorus** drives energy production and thus fuels enzymatic reactions that are directly involved in colour formation specifically the formation of PAL. Good fruit Phosphorous levels (> 90 to 100ppm fresh wt) are considered essential for improved storage, firmness and tolerance of low temperature. Foliar phosphorus applications in conjunction with Calcium have been shown to increase Calcium levels in fruit.
- **Potassium** appears to enhance anthocyanin accumulation and red colouration of apples by promoting normal fruit development through translocation of complex sugars to the fruit and throughout the tree. Potassium may compensate for some of the negative effects of higher Nitrogen on apple colouration, and it is directly involved in water movement, fruit quality and disease resistance within the tree.
- Foliar **Calcium** has long been known to decrease the potential of bitter and storage pit and evidence suggests that Calcium plays a secondary role in colour production.
- **Copper** and **Zinc** are important elements through direct roles within enzymes that are involved in pre-cursors to pigment synthesis. Copper is also directly associated with colour development.
- **Boron** and **Calcium** work in synergy to help maintain cell structure and thus shelf-life.
- Ammonium **Nitrogen** applications have shown an increase in leaf and fruit Phosphorus when applied together.



FERTILIZERS

Contact us for more information

1800 768 224 | www.sltec.com.au | enquiries@sltec.com.au

Crop Booster Plus - Apple Fact Sheet

Achieving high pack-out percentages and a marketing advantage for your red apples is a constant target. At SLTEC we are always striving to provide the Horticultural industry with the tools it needs to maximise its efficiencies and product quality. This passion has led us to developing **Crop Booster PLUS**, a product designed to aid in colour development in apples.

Crop Booster PLUS, when used as directed, can assist you with fruit colour. As you may be aware, there are several factors that influence the desirable red pigmentation in apples. We have summarized this process and described some of the nutrients that are required to maximize your crops potential in achieving red pigmentation.

Red colour development in apples is due to the formation of anthocyanin pigments in the apple skin. Anthocyanin production is influenced by a range of environmental and management factors in the orchard.

It is well recognised that cool nights (<18°C), dewy mornings and mild days (20 to 25°C) in the 2 to 3 weeks prior to harvest enhance colour development of fruit.⁵ Light levels are also an important factor in anthocyanin synthesis, while levels below 40% of full sunlight on fruit can have a significant effect and reduce colour development.³ Generally this is controlled through canopy management practices such as; selection of rootstock, balanced nitrogen management, summer pruning, the use of growth regulators, and the use of reflective mulch to enhance light penetration and distribution.

Another factor is excessive crop loading. It not only reduces fruit size but reduces the leaf to fruit ratio, therefore, colouration through competition for assimilates is increased, leading to lower fruit pigmentation. Water stress can enhance

anthocyanin accumulation but at the expense of fruit size, while excess irrigation generally retards colour development.^{3,5}

Growth regulators can influence colour development. In some varieties AVG (ReTain®) is thought to aid in colour development by delaying harvest.³ However AVG is an ethylene inhibitor and may also inhibit red colour development on low colouring strains in warm growing regions.^{10,11} Ethephon® advances maturity and will increase the intensity of the pigmentation that is already present.

Some of the most important steps in the formation of anthocyanins are the availability of sugars and the activity of the enzyme phenylalanine ammonia-lyase (PAL). Phosphorus and Calcium have been associated with the production of PAL.⁸ As well as other enzyme activities in plant cells, Copper is a catalyst in anthocyanin production and a component of cyanin pigments.

Ammonium, Potassium and Calcium Phosphate treatments to fruit have all been shown to increase fruit Phosphorus and to reduce storage disorders over untreated controls. However excess levels of individual cations such as Potassium have also been associated with increased incidence in bitter pit through direct competition with Calcium, so a balanced nutritional approach is required.⁷

The balanced inclusion of elements important for anthocyanin formation in **Crop Booster PLUS** provides another tool for enhancing fruit colour. Two to three applications just prior to harvest are recommended to enhance your crops colour potential. Intensity of pigment in apples treated with foliar phosphorus close to harvest may also continue to improve during cool storage in many varieties.²

1. Matoh & Kobayashi (1998). Boron and calcium: essential inorganic constituents of pectic polysaccharides in higher plant cell walls.
2. Journal of Plant Research 111 (1), pp179-190.
3. N Sanders - AgroFresh – pers com Feb 2012
4. Ritenour & Khemira (1997). Red colour development of apple, a literature review. Washington State University, Tree Fruit Research & Extension Center.
5. Siegelman & Hendricks (1958). Photocontrol of anthocyanin synthesis in apple skin. Plant Physiology 33 (3), pp185-190.
6. Tree Fruits Tasmania, No. 3, December 1999, Tasmanian Department of Primary Industry Water and Energy.
7. Vestreheim (1970). Effects of chemical compounds on anthocyanin formation in 'McIntosh' apple skin. Journal of the American Society for Horticultural Science 95, pp712-715.
8. Webster & Lidster (1986). Effects of phosphate sprays on 'McIntosh' apple fruit and leaf composition, flesh firmness and susceptibility to low temperature. Canadian Journal of Plant Science 66 (3), pp617-626.
9. ZhengHua, Hiroshi & Shuichi (2002). Stimulation of 'Fuji' apple skin color by ethephon and phosphorus-calcium mixed compounds in relation to flavonoid synthesis. Scientia Horticulturae 94 (1), pp193-199.
10. Little and Holmes (2000). A guide to production, post harvest treatment and storage of pome fruit in Australia.
11. Steve McCartney (2012) Southeast Apple Specialist (NCSU) - Some uses of Plant Growth Regulators in Modern Apple Production Systems. (Handout from APAL March 2012 Future Orchards field day) and pers com March 2012.
12. Andrew Rath - Valent Biosciences - pers comm May 2012.



FERTILIZERS

Contact us for more information

1800 768 224 | www.sltec.com.au | enquiries@sltec.com.au