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Helpful Facts Regarding Foliar Nutrition of Citrus

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The pervasiveness of different foliar nutrition products results in uncertainty regarding the optimal use and application of foliar nutrition. This document addresses the practical aspects of this practice in the Citrus Industry.

Citrus trees typically have three cycles of new vegetative growth (flushes) during the growing season. Proper foliar nutrition during spring leaf flush is critical since it coincides with both flowering and early fruit development. During this period, there is a relatively short window for a very high demand of carbohydrates and several macro- and micronutrients critical to chlorophyll production, photosynthesis (energy production), and fruit set. Foliar application of nutrients during spring leaf expansion will therefore help citrus trees that might be deficient in key nutrients to facilitate early carbohydrate production, as required for fruit set and fruit growth after flowering. In areas with cold, wet winters, uptake of macronutrients might also be limited – in this regard, foliar application of nutrients to supplement the trees' requirement might be needed. Micro-nutrient deficiency, as established through foliar analysis, during flower induction (February to May) also needs to be addressed. Citrus generally responds well to foliar nutrition because of the high number of cuticular pores (main mechanism of nutrient absorption). Foliar sprays of macro-nutrients cannot replace soil applications and should therefore only be considered for remedial actions and specific interventions or manipulations.

Practical considerations for foliar nutrition are:

1. ***The mass of the nutrient applied per tree or per ha*** – one of the most important issues that determines the efficacy of foliar sprays is the mass of the nutrient that needs to be applied per tree or per ha. Products (especially chelated formulations) should be evaluated to establish whether enough of the required nutrient can be applied at a sufficiently high concentration to raise the trees' concentration as desired, while also being cost-effective. Refer to **Table 1** below for the minimum or ideal concentrations at which nutrient elements must be applied for successful use as foliar sprays. In addition to the nutrient concentration in the spray solution, the total quantity of the nutrient that can be applied also depends on the volume of water that can be retained on the surface of the leaves. This depends on the size of the droplets. To retain 2 000 liters of water per ha on the leaves, the correct droplet size must be selected; 500 to 1 000 micron, or 0.50 to 1.00 mm, is the ideal size. For the most effective uptake, the droplet size must be as large as possible – this means that effective nutrient uptake is attained at larger droplet size than would be suitable for fungicide application.

2. ***Product formulation*** – the nitrate formulation of K, Ca and Mg products are effective as foliar sprays, as are sulphates of Mg, Mn and Zn. If the effective concentration of the relevant nutrient (element) is less than 80% of the benchmark chemical's concentration (as provided in **Table 1**), it is doubtful that the product will be effective. Properly selected additives (e.g., chelates and stickers) can improve absorption if it allows proper drop size and does not reduce the time that the leaves remain wet. The efficiency of foliar nutrition is also improved by adding a 0.2% to 0.4% solution of LB urea to the spray mixture, negating the value of chelates.

3. ***Contact time*** – nutrients can only be absorbed when in solution. Also note that up to 80% of the absorption takes place in the period directly after spraying; therefore, the spray solution must take as long as possible to dry out (i.e., the droplet size must be as large as possible). A contact period of at least 15 to 20 minutes should be sought. Foliar nutritional sprays should be applied during cooler times, or when the relative humidity is higher – so that the spray solution takes longer to dry out. It is better, therefore, to apply foliar nutritional sprays during the night, the early morning, or late afternoon. An exception, however, is that of urea being applied in cool night conditions; the long period that the leaves remain wet with urea can cause leaf scorching (if applied at rates higher than 1%). Avoid the use of wetters that

decreases the surface tension of the mixture and the drop size, reduces the efficacy of uptake of nutrients due to a faster rate of drying off and reduced time for absorption. Application using an excessive spray volume is a waste of product and can even reduce the efficiency of wetting. An application rate of 10 L per tree (for mature trees) is regarded as optimal.

4. ***The choice of product*** - this is to a large extent irrelevant since the efficiency of uptake is overwhelmingly dependent on the concentration of the nutrient being applied, not the formulation. In a study that compared the efficiency of uptake and cost efficiency of amino acid chelates, EDTA chelates and inorganic salts (SO_4 salts) of Mn, Cu, Zn and Fe, it was found that the SO_4 formulations performed the best (van der Merwe, 2015).

In **Table 1,** the minimum concentration of each nutrient required to ensure sufficient uptake (irrespective of the product formulation) is provided. Although chelates and stickers can improve absorption, for any product to be effective, the specific nutrient should have a concentration of at least the value stipulated in the blue column of **Table 1** in the final spray mixture. Acidification of spray mixtures also improve efficacy of certain products (e.g., for $ZnNO_3$ and $MgNO_3$, a pH at 5.5 to 6.5 is recommended). Acidification is not always required and might even be detrimental – always carefully read the product's label. Chemicals that react and then cause scorching of the fruit or leaves, or that renders one or both less effective, should not be mixed. Examples of these are:

- Copper oxychloride mixed with zinc- or magnesium nitrates can result in fruit and leaf damage due to phytotoxicity. The latter two products are applied in acidic medium and excessive amounts of copper then dissolve from the copper oxychloride suspension to increase the soluble copper concentration to phytotoxic levels.
- Potassium nitrate has an alkaline reaction. Applied with zinc nitrate, it will precipitate the zinc to make it ineffective.
- Mixtures of magnesium and phosphate can also form insoluble magnesium phosphate in the tank.
- Borates and sulphur containing chemicals must never be mixed with oils. Also avoid applying oils within four weeks after sulphur containing products were used.

Due to the risk of causing lesions on fruit (especially from Cu-residues that might react with other products, even if sprayed later after a Cu application, while Cu residue is still present on fruit and leaves, it can cause scorching), it is furthermore better to address potential micro-nutrient deficiencies annually *before fruit set*. However, if there still are fruit on the trees at this stage, apply the micro-nutrients directly after 100% petal fall (when the fruitlets are still very small and without lesions). Macro-nutrients (e.g., N, P & K) can be applied at any time during the season.

Also refrain from spraying within seven days after a foliar nutrition was applied – the re-wetting of the residues on the leaves can cause scorching, especially if the pH of the applied product is not appropriate for the product already on the leaves. **Figure 1** shows the stage regarded as most optimal to apply the annual micro-nutrient spray.

Finally, if a complete mixture of micronutrients is required, the mixture provided in **Table 2** may be used.

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Figure 1. The most optimal time/stage to apply annual micro-nutrient routine sprays.

Table 1. Time of application, reasons for application and minimum recommended concentrations at which some of the established products used for foliar nutrition should be applied for maximum efficacy – take note of the comments below the table.

Nutrient being applied	Phenological stage (time)	Reason for application	Product	Proposed dosage	Minimum required concentration of the nutrient in any spray mixture	Maximum safe concentration
N	Eight to six weeks prior to the balloon stage (not on new flush)	To improve the intensity and quality of the flowers	ᵝLB Urea (46%)	1%	600 mg/L	1.4%
	After fruit set up to February/March	To improve the N nutrition status of the tree		1-1.4%		1.5%
P	Six weeks after petal drop	Decrease acid level of fruit (instead of Ca-arsenate)	MAP (26% P, 12% N)	2%	2300 - 5 200 mg/L	2%
	Six, four and two weeks before harvest	To increase fruit sugar	MKP (23% P, 28% K)	1.0 - 1.5%		
K	Six to eight weeks *prior* to balloon stage or *after* fruit drop*	To improve the intensity and quality of flowers (only KNO_3) and/or the K nutrition status of the tree at any phenological stage to improve fruit set and size (both KNO_3 & K_2SO_4)	KNO_3 (38%)	3-4%	1 140 - 1 520 mg/L	4%
			K_2SO_4 (45%)	3-4%	1 350 - 1 800 mg/l	
Ca	Due to the physiology of calcium, Ca is neither stored for later use, nor can an existing deficiency be corrected. Foliar sprays have limited to no value.					
Mg	Due to a low Mg-status 8 to 6 weeks prior to balloon stage, or if there is a possibility that a deficiency might develop in October November.	To improve the Mg nutrition status of the tree – $MgSO_4$ is preferred when trees are over-supplied by N	$MgNO_3$ (10% Mg, 11% N)	1 250 g/100L	1 000 mg/L	4%
			$MgSO_4$ (20%)	1 250 g/100L		
Cu	Prior to blossom#	To improve the Cu nutrition status of the tree	Copper oxychloride	150 g/100L	125 mg/L	400 g/100L**
			$CuSO_4$ (25%)	75 g/100L		200 g/100L**
Mn	Prior to blossom if deficiency is noted, or if the leaf Mn concentration is < 40 mg/kg Also, in October/November if flushes show deficiency	To improve or maintain the Mn nutrition status of the tree	$MnSO_4$^ (23%)	200 g/100L	370 mg/L	Not specified
			$MnNO_3$ (14%)	200 g/100L		
Zn	Prior to blossom, if the leaf Zn concentration is below <25 mg/kg Also, when deficiency is noted on later flushes (October/November), especially in the Western Cape	To improve/maintain the Zn nutrition status of the tree and improve pollination, fruit set and growth	$ZnNO_3$ (5.5%)	200 ml/100L	80 mg/L	Not specified
			Zn-EDTA (10%)	100 g/100L		
			$ZnSO_4$ (22%)	100 g/100L		
B	Prior to blossom, if the leaf B concentration is below <25 mg/kg Also, if there are concerns regarding deficiency (October/November)	To improve/maintain the B nutrition status of the tree, improve pollination, fruit set and growth	Solubor® (20%)	150 g/100L	240 mg/L	Not specified
			Boric acid (H_3BO_3) (17%)	170 g/100L		
Mo	Prior to blossom, if the leaf Mo concentration is below 0.05 mg/kg.	To improve the Mo nutrition status of the tree	Ammonium molybdate (52 %)	15-50 g/100L	50 mg/L	Not specified
			Sodium molybdate (39%)	15-50 g/100L		
Fe	The lack of relocation of iron in the tree makes foliar sprays an ineffective method to maintain or correct the iron status of trees.					

Notes pertaining to Table 1 to take note of:

[B] Low biuret urea that contain *less than 0.5%* biuret must be used.

* Due to the risk of granulation of fruit (e.g., certain mandarins), KNO_3 should not be applied within three weeks following an application of Corasil-P®/Maxim®.

** Foliar sprays containing > 2 000 mg Cu/L water are potentially dangerous and could be toxic, causing leaf burn and leaf drop. Any copper product can darken blemishes on the skin of fruit.

[#] Even on mature fruit Cu sprays will accentuate any fresh blemish. Suspensions (e.g., copper oxychloride and copper hydroxide) contain more total Cu than soluble or chelated products – increasing the risk of dark blemishes. A suspension of copper oxychloride that is acidified by buffers (e.g., with zinc or magnesium nitrate) can result in increased solubility of Cu, even to toxic levels.

^ $MnSO_4$ is compatible with $MnNO_3$, $MgNO_3$, sodium borate and urea.

® Do not mix Solubor® or any borate with oil or oil-based compounds.

Table 2. A mixture that will ensure efficient, cost-effective simultaneous application of all the micronutrients.

Compound	LB Urea	$ZnSO_4$	$MnSO_4$	Copper oxychloride	Solubor
Dosage (g/100L)	500	100	100-200	75	150

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CRI Snykant

Verseker die toekoms van sitrus deur wetenskap

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Nuttige Feite Rakende Blaarvoeding van Sitrus

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Die omvangrykheid van verskillende blaarvoedingsprodukte lei tot onsekerheid oor die optimale gebruik en toediening van blaarvoeding. Hierdie dokument spreek die praktiese aspekte van hierdie praktyk in die Sitrusbedryf aan.

Sitrusbome het tipies drie siklusse van nuwe vegetatiewe groei (groeistuwings) gedurende die groeiseisoen. Behoorlike blaarvoeding tydens lenteblaarstuwing is krities aangesien dit met beide blom en vroeë vrugontwikkeling saamval. Gedurende hierdie tydperk is daar 'n relatief kort venster vir 'n baie hoë aanvraag na koolhidrate en verskeie makro- en mikro-elemente, wat krities is vir chlorofilproduksie, fotosintese (energieproduksie) en vrugset. Blaarvoeding tydens lente sal dus sitrusbome wat moontlik 'n tekort aan sleutel- voedingstowwe het help om vroeë koolhidraatproduksie te fasiliteer, soos benodig vir vrugset en vruggroei ná blom. In gebiede met koue, nat winters, kan opname van makro-elemente ook beperk wees – in hierdie verband kan blaartoediening van voedingstowwe, om die bome se behoefte aan te vul, nodig wees. Mikro-elemettekorte, soos vasgestel deur blaarontleding, tydens blominduksie (Februarie tot Mei), moet ook aangespreek word. Sitrus reageer oor die algemeen goed op blaarvoeding as gevolg van die hoë aantal kutikulêre porieë (hoofmeganisme van voedingstofabsorpsie). Blaarbespuitings van makro-elemente kan nie grondtoedienings vervang nie en moet dus slegs vir regstellende aksies en spesifieke ingrypings, of manipulasies, oorweeg word.

Praktiese oorwegings vir blaarvoeding is:

1. ***Die massa van die voedingstof wat per boom of per ha toegedien word*** – een van die belangrikste kwessies wat die doeltreffendheid van blaarbespuitings bepaal, is die massa van die voedingstof wat per boom of per ha toegedien moet word. Produkte (veral gecheleerde formulasies) moet geëvalueer word om vas te stel of genoeg van die vereiste voedingstof teen 'n voldoende hoë konsentrasie toegedien kan word om die bome se konsentrasie, soos verlang, te verhoog, terwyl dit ook koste-effektief is. Verwys na **Tabel 1** hieronder vir die minimum of ideale konsentrasies waarteen voedingselemente toegedien moet word vir suksesvolle gebruik as blaarbespuitings. Benewens die voedingstofkonsentrasie in die spuitoplossing, hang die totale hoeveelheid voedingstof wat toegedien kan word ook af van die volume water wat op die oppervlak van die blare vasgehou kan word. Om 2000 liter water per ha op die blare te behou, moet die korrekte druppelgrootte gekies word; 500 tot 1000 mikron, of 0.50 tot 1.00 mm, is die ideale grootte. Vir die mees effektiewe opname moet die druppelgrootte so groot as moontlik wees – dit beteken dat effektiewe voedingstofopname by groter druppelgroottes bereik word as wat geskik sou wees vir swamdodertoediening.

2. ***Produkformulasie*** – die nitraatformulasie van K-, Ca- en Mg-produkte is effektief as blaarbespuitings, so ook sulfate van Mg, Mn en Zn. Indien die effektiewe konsentrasie van die betrokke voedingstof (element) minder as 80% van die maatstaf chemikalie se konsentrasie is (soos voorsien in **Tabel 1**), is dit twyfelagtig of die produk doeltreffend sal wees. Behoorlik geselekteerde bymiddels (bv. chelate en kleefmiddels) kan absorpsie verbeter as dit behoorlike druppelgrootte toelaat en nie die tyd verminder wat die blare nat bly nie. Die doeltreffendheid van blaarvoeding word ook verbeter deur 'n 0.2% tot 0.4% oplossing van LB ureum by die spuitmengsel te voeg, wat tot gevolg het dat die waarde van chelate van geen waarde is nie. nul maak.

3. ***Kontaktyd*** – voedingstowwe kan slegs geabsorbeer word wanneer dit in oplossing is. Let ook daarop dat tot 80% van die absorpsie plaasvind in die tydperk direk ná bespuiting; daarom moet die spuitoplossing so lank as moontlik neem om uit te droog (m.a.w. die druppelgrootte moet so groot as moontlik wees). 'n Kontaktyd van ten minste 15 tot 20 minute word verkies, gevolglik moet blaarvoedingsbespuitings gedurende koeler tye toegedien word, of wanneer die relatiewe humiditeit hoog is, sodat die spuitoplossing

langer neem om uit te droog. Dit is dus beter om blaarvoedingsbespuitings gedurende die nag, vroegoggend of laatmiddag toe te dien. 'n Uitsondering is egter dié van ureum wat in koel nagtoestande toegedien word; die lang tydperk wat die blare nat bly met ureum kan blaarskroei veroorsaak (indien toegedien teen dosisse hoër as 1%). Die gebruik van benatters, wat die oppervlakspanning van die mengsel verlaag en die druppelgrootte verklein, en dus die doeltreffendheid van opname van voedingstowwe verminder moet vermy word. Dis as gevolg van 'n vinniger tempo van afdroging en verkorte tyd vir absorpsie. Toediening met 'n oormatige spuitvolume is 'n vermorsing van produk, en kan selfs doeltreffendheid van blaarbenatting verminder – 'n toedieningshoeveelheid van 10L per boom (vir volwasse bome) word as optimaal beskou.

4. ***Die keuse van produk*** - dit is tot 'n groot mate irrelevant, aangesien doeltreffendheid van opname oorweldigend afhang van die konsentrasie van die voedingstof wat toegedien word, en nie van die formulasie nie. In 'n studie wat die doeltreffendheid van opname en kostedoeltreffendheid van aminosuurchelate, EDTA-chelate en anorganiese soute (SO_4-soute) van Mn, Cu, Zn en Fe vergelyk het, is gevind dat die SO_4-formulasies die beste resultate gelewer het (van der Merwe, 2015).

In **Tabel 1** word die minimum konsentrasie van elke voedingstof, wat benodig word om voldoende opname te verseker (ongeag die produkformulasie), verskaf. Alhoewel chelate en kleefmiddels absorpsie kan verbeter, moet die spesifieke voedingstof 'n konsentrasie hê van ten minste die waarde wat in die blou kolom van **Tabel 1** in die finale spuitmengsel aangedui word vir enige produk om doeltreffend te kan wees. Versuring van spuitmengsels verbeter ook die doeltreffendheid van sekere produkte (bv. vir $ZnNO_3$ en $MgNO_3$ word 'n pH van 5.5 tot 6.5 aanbeveel). Versuring is nie altyd nodig nie en kan selfs nadelig wees – lees altyd die produk se etiket noukeurig. Chemikalieë wat reageer en dan skroei van die vrugte of blare veroorsaak, of wat een of albei minder doeltreffend maak, moet nie gemeng word nie.
Voorbeelde hiervan is:

- Koperoksichloried gemeng met sink- of magnesiumnitrate kan vrug- en blaarskade as gevolg van fitotoksisiteit veroorsaak. Laasgenoemde twee produkte word in 'n suur medium toegedien - oormatige hoeveelhede koper los dan uit die koperoksichloriedsuspensie op om die oplosbare koperkonsentrasie tot fitotoksiese vlakke te verhoog.
- Kaliumnitraat het 'n alkaliese reaksie - met sinknitraat sal dit die sink presipiteer om dit ondoeltreffend te maak.
- Mengsels van magnesium en fosfaat kan ook onoplosbare magnesiumfosfaat in die tenk vorm.
- Borate en swawel-bevattende chemikalieë moet nooit met olies gemeng word nie – en vermy ook die toediening van olies binne 'n week nadat swawel-bevattende produkte gebruik is.

As gevolg van die risiko om letsels op vrugte te veroorsaak (veral van Cu-reste wat met ander produkte kan reageer, selfs al word dit later ná 'n Cu-toediening gespuit terwyl Cu-residu nog op vrugte en blare teenwoordig is, kan skroei veroorsaak), is dit verder beter om potensiële mikro-elementtekorte jaarliks *vóór vrugset* aan te spreek. Indien daar egter op hierdie stadium nog vrugte aan die bome is, dien die mikro-elemente toe direk ná 100% blomblaarval (wanneer die vruggies nog baie klein en sonder letsels is). Makro-elemente (bv. N, P & K) kan enige tyd gedurende die seisoen toegedien word.

Weerhou ook daarvan om ander produkte binne sewe dae nadat 'n blaarvoeding toegedien is te spuit – die herbenatting van die residue op die blare kan skroei veroorsaak, veral as die pH van die toegediende produk nie vir die produk wat reeds op die blare is, geskik is nie. **Figuur 1** toon die stadium wat as die mees optimale beskou word om die jaarlikse mikro-elementbespuiting toe te dien.

Ten slotte, as 'n volledige mengsel van mikro-elemente benodig word, kan die mengsel wat in **Tabel 2** verskaf word, gebruik word.

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Figuur 1. Die mees optimale tyd/stadium om jaarlikse mikronutriënt roetine bespuitings toe te dien.

Tabel 1. Tyd van toediening, redes vir toediening en minimum aanbevole konsentrasies waarteen van die gevestigde produkte wat vir blaarvoeding gebruik word, vir maksimum doeltreffendheid toegedien moet word – let op die opmerkings onder die tabel.

Nutriënt wat toegedien word	Fenologiese stadium (tyd)	Rede vir toediening	Produk	Voorgestelde dosis	Minimum vereiste konsentrasie van die nutriënt in enige spuitmengsel	Maksimum veilige konsentrasie
N	Ag tot ses weke voor die ballonstadium (nie op nuwe groeistuwing nie)	Om die intensiteit en kwaliteit van die blomme te verbeter	ᵝLB Ureum (46%)	1%	600 mg/L	1.4%
	Ná vrugset tot Februarie/Maart	Om die N-voedingstatus van die boom te verbeter		1-1.4%		1.5%
P	Ses weke ná blomblaarval	Verminder die suurvlak van vrugte (i.p.v. Ca-arsenaat)	MAP (26% P, 12% N)	2%	2300 – 5 200 mg/L	2%
	Ses, vier en twee weke voor oes	Om vrugsuiker te verhoog	MKP (23% P, 28% K)	1.0 – 1.5%		
K	Ses tot ag weke *voor* ballonstadium of *na* vrugval*	Om die intensiteit en kwaliteit van blomme (slegs KNO_3) en/of die K-voedingstatus van die boom tydens enige fenologiese stadium te verbeter, om vrugset en -grootte te verbeter (beide KNO_3 & K_2SO_4)	KNO_3 (38%)	3-4%	1 140 – 1 520 mg/L	4%
			K_2SO_4 (45%)	3-4%	1 350 – 1 800 mg/l	
Ca	Weens die fisiologie van kalsium, kan Ca nie vir later gebruik opgeberg word nie, óf kan bestaande tekorte nie gekorrigeer word nie. Blaarbespuitings het beperkte tot geen waarde.					
Mg	Weens 'n lae Mg-status 8 tot 6 weke voor ballonstadium, of indien daa'n'n moontlikheid is 'nt 'n tekort in Oktober/November kan ontwikkel.	Om die Mg-voedingstatus van die boom te verbeter – $MgSO_4$ word verkies wanneer bome óór-voorsien is van N	$MgNO_3$ (10% Mg, 11% N)	1 250 g/100L	1 000 mg/L	4%
			$MgSO_4$ (20%)	1 250 g/100L		
Cu	Voor bloeiselvorming#	Om die Cu-voedingstatus van die boom te verbeter	Koperoksichloried	150 g/100L	125 mg/L	400 g/100L**
			$CuSO_4$ (25%)	75 g/100L		200 g/100L**
Mn	Voor bloeiselvorming, indien tekort opgemerk word, of indien die blaar Mn-konsentrasie < 40 mg/kg is Ook in Oktober/November indien groeistuwings tekort toon	Om die Mn-voedingstatus van die boom te verbeter of te behou	$MnSO_4$^ (23%)	200 g/100L	370 mg/L	Nie gespesifiseer
			$MnNO_3$ (14%)	200 g/100L		
Zn	Voor bloeiselvorming, indien die blaar Zn-konsentrasie onder <25 mg/kg is Ook wanneer tekort op later groeistuwings (Oktober/November) opgemerk word, veral in die Wes-Kaap	Om die Zn-voedingstatus van die boom te verbeter of te behou, en bestuiwing, vrugset en groei te verbeter	$ZnNO_3$ (5.5%)	200 ml/100L	80 mg/L	Nie gespesifiseer
			Zn-EDTA (10%)	100 g/100L		
			$ZnSO_4$ (22%)	100 g/100L		
B	Voor bloeiselvorming, indien die blaar B-konsentrasie onder <25 mg/kg is Ook indien daar kommer oor tekorte is (Oktober/November)	Om die B-voedingstatus van die boom te verbeter of te behou, en bestuiwing, vrugset en groei te verbeter	Solubor® (20%)	150 g/100L	240 mg/L	Nie gespesifiseer
			Boorsuur (H_3BO_3) (17%)	170 g/100L		
Mo	Voor bloeiselvorming, indien die blaar Mo-konsentrasie onder 0.05 mg/kg is	Om die Mo-voedingstatus van die boom te verbeter	Ammoniummolibdaat (52 %)	15-50 g/100L	50 mg/L	Nie gespesifiseer
			Natriummolibdaat (39%)	15-50 g/100L		
Fe	Die tekort aan hervestiging van yster in die boom, maak blaarbespuitings 'n oneffektiewe metode om die ysterstatus van bome te behou of te korrigeer.					

Notas met betrekking tot Tabel 1 om van kennis te neem:

[B] Lae biuret ureum wat *minder as 0.5%* biuret bevat, moet gebruik word.

* As gevolg van die risiko van granulasie van vrugte (bv. sekere mandaryne), moet KNO_3 nie binne drie weke ná 'n toediening van Corasil-P®/Maxim® toegedien word nie.

** Blaarbespuitings wat > 2 000 mg Cu/L water bevat, is potensieel gevaarlik en kan toksies wees, wat blaarbrand en blaarval veroorsaak. Enige koperproduk kan vlekke op die skil van vrugte verdonker.

[#] Selfs op volwasse vrugte sal Cu-bespuitings enige vars letsel beklemtoon. Suspensies (bv. koperoksichloried en koperhidroksied) bevat meer totale Cu as oplosbare of gecheleerde produkte – wat die risiko van donker vlekke verhoog. 'n Suspensie van koperoksichloried wat deur buffers versuur word (bv. met sink of magnesiumnitraat) kan verhoogde oplosbaarheid van Cu tot gevolg hê, selfs tot toksiese vlakke.

^ $MnSO_4$ is verenigbaar met $MnNO_3$, $MgNO_3$, natriumboraat en ureum.

® Moenie Solubor® of enige boraat met olie of olie-gebaseerde verbindings meng nie.

Tabel 2. 'n Mengsel wat doeltreffende, koste-effektiewe gelyktydige toediening van al die mikronutriënte sal verseker.

Verbinding	LB Ureum	$ZnSO_4$	$MnSO_4$	Koperoksichloried	Solubor
Dosis (g/100L)	500	100	100-200	75	150

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