

Summary of Registered Chemicals, MRLs & PHIs on Macadamias in SOUTH AFRICA



are available under the Members section: "FOOD SAFETY, REGISTERED CHEMICALS & MRLs" on the SAMAC website (



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Disclaimer: This publication provides a list of registered chemicals and withholding periods for pesticides & plant growth regulators registered under Act 36 of 1947 for use on South African macadamias. Listed in the tables below are MRLs & PHIs for South Africa and countries/regions to which South Africa exports macadamia nuts. The purpose of this publication is to inform growers, processors and marketers of the export requirements with regards to pesticide residues. It is important to note that South African MRLs & PHIs do not apply to other countries and even though a pesticide may be registered in South Africa, this may not be the case in the receiving, overseas country. Organisations marketing to overseas countries should be aware that the information provided below represents the official standards, but not necessarily the marketing requirements. Marketers should refer to their contractual agreements concerning agreed residue limits.

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Actives Registered for use on Macadamias in South Africa	SA MRL	EU Harmonised MRL	Australia MRL	MRL	USA MRL	CODEX MRL	China MRL	JAPAN MRL (under "Other Nuts")	"Export default MRL"	Withholding period / PHI (pre-harvest interval)	Remarks
	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(Days)	
Abamectin	-	0.01*	0.01 (Temporary)	0.01	0.005	-	-	0.01	0.01	14	* Future 0.006
Acephate	-	0.02	-	0.10	0.05	-	-	0.10	0.01	35	
Acetempirid	-	0.07	-	-	0.10	0.06	-	0.10	-	28	
Alpha-Cypermethrin	0.05	0.05	0.05	0.05	0.05	-	-	0.20	0.05	30	
Azoxystrobin	0.01	0.01	2*	0.02	0.01	-	-	1.00	0.01	45	*Under Tree nut grouping
Beauveria bassiana (strain PPRI 5339)	-	-	-	-	-	-	-	-	-	-	
Beta-cyfluthrin	-	0.02	0.05	0.01	-	-	-	0.04	0.02	14	
Beta-cypermethrin	0.05	0.05	-	-	-	0.05	-	0.20	0.05	30	
Bifenthrin	-	0.05	0.05	0.05	0.05	-	-	0.05	0.01	28	
Boscalid	1.00	0.05	0.50	0.70	0.05	-	-	1.00	0.01	14	
Carbaryl	-	0.02	2*	0.10	1.00	-	-	1.00	0.01	-	*Nut-in-Shell MRL = 10
Carfentrazone-ethyl (determined as carfentrazone and expressed as carfentrazone-ethyl)	-	0.01	0.05	0.10	-	-	-	0.08	0.01	-	
Chlorantraniliprole	0.1*	0.05	0.02	0.02	0.02	0.02 (Temporary)	0.02	0.04	0.05	14	*Future 0.1
Chlorothalonil	-	0.01	-	-	-	-	-	0.10	0.01	120	
Chlorpyrifos	0.01	0.05	0.05 (Temporary)	0.10	-	-	-	0.20	0.01	83	
Clethodim	-	0.10	-	-	-	-	-	0.01	0.01	28	
Cycloxydim (including degradation and reaction products which can be determined as 3-(3-thianyl) glutaric acid 5-dioxide (BH 517-TGSO2) and/or 3-hydroxy-3-(3-thianyl) glutaric acid 5-dioxide (BH 517-5-OH-TGSO2) or methyl esters thereof, calculated in total as cycloxydim)	-	0.05	-	-	-	-	-	0.05	0.01	40	
Cyfluthrin (cyfluthrin including other mixtures of constituent isomers (sum of isomers))	0.02	0.02	0.05	0.01	-	-	-	0.04	0.02	14	
Cypermethrin (cypermethrin including other mixtures of constituent isomers (sum of isomers))	0.05	0.05	0.01	-	0.05	0.05	0.05	0.20	0.05	30	
Cyprodinil	1.00	0.02	-	0.04	-	-	-	0.10	0.01	7	
Difenoconazole	0.01*	0.05	0.01	0.03	0.03	0.03	0.03	0.03	0.01	45	* Future MRL
Diuron (Diuron including all components containing 3,4-dichloraniline moiety expressed as 3,4-dichloraniline)	-	0.02	-	-	0.05	-	-	0.05	0.01	-	
Emamectin benzoate	0.01*	0.01	-	0.02	0.001	-	-	0.01	0.01	14	*This is a proposed MRL and must still be confirmed by Dept. of Health
Ethephon	-	0.10	0.10	0.50	-	-	-	0.20	0.01	-	
Fluazifop-p-butyl (fluazifop acid (free and conjugate))	0.05	0.01	-	0.10	0.01	-	-	0.10	0.05	40	
Fludioxonil	-	0.01	-	-	-	-	-	0.20	0.01	-	
Furfural (aldehyde)	-	1.00	-	-	-	-	-	-	0.01	-	
Gamma-cyhalothrin	-	0.01	-	0.05	-	-	-	-	0.01	14	
Glufosinate ammonium (sum of glufosinate, its salts, MPP and NAG expressed as glufosinate equivalents)	-	0.10	0.10	0.10	0.10	-	-	0.10	0.01	-	
Glyphosate (various salts)	-	0.10	0.20	1.00	-	-	-	1.00	0.01	-	
Helicoverpa armigera Nucleopolyhedrovirus (HearNPV)	-	-	-	-	-	-	-	-	-	0	
Imidacloprid	-	0.05	-	0.05	0.01	-	-	0.04	0.01	200	
Indoxacarb (Oxadiazine)	-	0.02	-	-	-	-	-	0.01	0.01	14	
Lambda-cyhalothrin	0.01*	0.05	-	0.05	0.01	0.01	0.01	0.50	0.01	82 (7)	*Future 0.1; ONLY KARATE ZEON & KARATE EC have a new 7 day PHI.
Metalaxyl-M (mefanoxam)	0.5	0.05*	-	-	-	-	-	0.01	0.01	-	*Future 0.01
Methoxyfenozide	3*	0.10	0.05	0.10	0.10	-	-	0.10	0.10	14	* Proposed MRL, must still be confirmed by Dept. of Health
Novaluron (benzoyl urea)	-	0.01	-	0.01	-	-	-	0.01	0.01	84	
Paclbutrazol	0.05	0.50	-	-	-	-	-	0.01	0.05	-	
Paraquat	-	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.01	-	
Permethrin (sum of isomers)	-	0.05	-	-	-	-	-	0.05	0.01	-	
Pymetrozine	-	0.02	-	-	-	-	-	0.01	0.01	21	
Pyraclostrobin (sum of pyraclostrobin and its metabolite BF 500-3)	-	0.02	0.01	0.04	0.02	-	-	1.00	0.01	14	
Spinetoram (EU: XDE-175)	-	0.05	0.02*	0.10	0.01	-	-	0.10	0.01	7	*Under Tree Nut grouping
Tau-fluvalinate	-	0.01	-	-	-	-	-	0.01	0.01	30	
Thiamethoxam	-	0.01	-	0.02	-	-	-	0.02	0.01	93	
Trifluralin	-	0.01	-	0.05	-	-	-	0.05	0.01	-	
Zeta-cypermethrin	0.05	0.05	0.05	0.05	0.05	-	-	0.20	0.05	30	

Notes:

\* "Export default MRL" - Random nut samples drawn and tested by the DAFF laboratory and must be below these "default" residue levels for export

\* = no value has been set, and does NOT necessarily mean = 0

MRL = Maximum Residue Level (Measured in mg/kg = ppm)

PHI = Pre Harvest Interval (Time from spray/application up to harvest / handling of nut in husk - measured in days)

Pest	Active Ingredient	Trade name/s	Company	Formulation		Dosage (Per 100 L water, or as indicated)	Withholding Period (Days)	Application (For high volume applications, unless otherwise indicated)
				Type	Grams pure active ingredient			ALWAYS READ THE LABEL FOR DETAILED INSTRUCTIONS
African Bollworm	Bollworm eggs are laid singularly on any plant part. Eggs are round and white when freshly laid, but turn darker as shell hardens. Larvae vary in colour from greenish-yellow to pinkish-brown to nearly black. A distinctive characteristic of the larvae is the pale stripe along each side of the body. Larvae feed on young leaves, flowers and young fruit.							
	alpha-cypermethrin	Fastac SC	BASF	SC	100 g/L	5 ml (0.0005% active ingredient)	30	Apply as a full cover corrective spray when necessary. High volume application: 125 - 175 ml Fastac® SC / ha. <b>Optimum pH 4. Warning against ballworm resistance.</b>
	chlorantraniliprole / lambda-cyhalothrin	Ampligo	Syngenta	EC	100 g/L / 50 g/L	200 - 500 ml/ha	14	Apply before pests reach damaging levels based on economic thresholds. Scout fields and repeat sprays if populations start to rebuild, with a minimum of 7 days between applications. Do not make more than 4 applications per season. <b>Optimum pH 3.5 - 4.</b>
	emamectin benzoate	Proclaim	Syngenta	WG	50 g/L	22 - 34 g OR 220 - 336 g/ha	14	Timing and frequency of applications should be made at first signs of insect infestation as indicated by local spray threshold. For best results apply soon after pest eggs have hatched. Treatment must be made before larvae penetrate fruit or stems.
	Helicoverpa armigera Nucleopolyhydrovirus (HearNPV)	Graboll	Chempac	River BioScience (Pty) Ltd	SC	7.5 x 10 <sup>12</sup> occlusion bodies/L	200 ml/ha in sufficient water for full cover film application	0
Boldex®		Madumbi Sustainable Agriculture	5 x 10 <sup>9</sup> occlusion bodies (OBS)/ml			12 ml + non-ionic surfactant at registered rate or Breakthru™ 5 ml. Use the highest medium cover spray rate (6000 L/ha) for citrus.	0	Apply as a medium cover spray immediately after egg hatching and before larvae exceed 10 mm in length. Apply during early morning. Thorough coverage of the crop is essential as Helicoverpa must be ingested. For heavy infestations where more than 60% of flower clusters are infested with bollworm larvae a chemical alternative should be considered or used in conjunction with Helicoverpa for extended efficacy. <b>Optimum pH 5 - 7. Apply by ground rig or hand held equipment in a minimum of 400 litres of water per hectare. Aerial – High Volume : Apply in a minimum of 30 litres of water per hectare.</b>
Bark & stem borers (Larvae)	Brown, slightly hairy larvae up to 3 cm long. Ringbark thin branches that eventually lead to die back. Signs of infestation are larval excreta held together by cobweb-like threads on branches. Young larvae bore into hard wood making a hole 7 cm deep and 0.5 cm in diameter.							
	carbaryl	Sevin® XLR Plus	Universal Crop Protection	SC	480 g/L	450 ml	- (Stem application)	Spray the lesions. Do not spray the whole tree but only the affected areas on the stem. <b>More stable in acidic media.</b>
Banded fruit weevil (snoutbeetle)	Adults are 7 mm long, dull greyish-brown with a much lighter or white V-shaped band at the rear of the abdomen. Pupae are 7-8 mm long and have stout, hooked bristles. Larvae are creamy white, legless and up to 6 mm long, with long hairs on the body. They have orange head capsules and black jaws. Eggs are oblong, about 0.9 mm long and creamy white when first laid, but turning black at each end as they age. Adults attack leaves, green stems and fruit. Typical leaf damage symptoms appear as shot-holes rather than as leaves with ragged edges.							
	alpha-cypermethrin	Fastac SC	BASF	SC	100 g/L	10 ml	30	Apply at first sign of feeding damage. Repeat application 3 - 4 weeks later if necessary. High volume application: 250 - 350 ml Fastac® SC / ha. <b>Optimum pH 4.</b>
Carob moth / Litchi moth	Both species are minor pests in Macadamia orchards. Eggs of the Carob moth are oval, compressed, white but become red-brown later. Litchi moth's eggs are 1 mm, flat, oval and silvery-white. The Litchi moth's larvae is pinkish red, 15mm long and feed on the inside of the green husk. The Carob moth's larvae is pink but 18 mm long.							
	chlorantraniliprole / lambda-cyhalothrin	Ampligo	Syngenta	EC	100 g/L / 50 g/L	200 - 500 ml/ha	14	Apply before pests reach damaging levels based on economic thresholds. Scout fields and repeat sprays if populations start to rebuild, with a minimum of 7 days between applications. Do not make more than 4 applications per season. <b>Optimum pH 3.5 - 4.</b>
Codling Moth	<b>Minor pest in Macadamia orchards.</b>							
	emamectin benzoate	Proclaim	Syngenta	WG	50 g/L	22 - 34 g OR 220 - 336 g/ha	14	Timing and frequency of applications should be made at first signs of insect infestation as indicated by local spray threshold. For best results apply soon after pest eggs have hatched. Treatment must be made before larvae penetrate fruit or stems.
	chlorantraniliprole / lambda-cyhalothrin	Ampligo	Syngenta	EC	100 g/L / 50 g/L	200 - 500 ml/ha		Apply before pests reach damaging levels based on economic thresholds. Scout fields and repeat sprays if populations start to rebuild, with a minimum of 7 days between applications. Do not exceed 4 applications per season. <b>Optimum pH 3.5 - 4.</b>

Pest	Active Ingredient	Trade name/s	Company	Formulation		Dosage (Per 100 L water, or as indicated)	Withholding Period (Days)	Application (For high volume applications, unless otherwise indicated)  ALWAYS READ THE LABEL FOR DETAILED INSTRUCTIONS
				Type	Grams pure active ingredient			
Cotton Aphid	Cotton aphids are dark grey or dull black and about 1.5 mm in length. The nymphs have a very distinctive appearance, being spotted with an exudation of powdery wax. The occurrence of aphids is correlated directly with growth flushes of the trees.							
	chlorpyrifos	Pyrinex 250 CS	Adama SA	CS	250 g/L	200 ml	83	Apply as a full cover spray when nuts have reached marble size and as soon as the pest is noticed. Repeat the application 4 weeks later. Apply a third application 4 weeks after the second application if required. <b>Optimal pH 4.</b>
False Codling Moth	Larvae are pinkish in colour. Young larvae hatch & bore into the husk. If the shell is still soft, they are able to tunnel through and feed on the kernel. Once shell has hardened, tunneling is usually confined to the inner surface of the husk, but may penetrate the shell of some mature nuts. The entry hole on the husk often has larval faeces (frass) protruding from it.							
	<i>Bacillus thuringiensis, subspecies kurstaki</i> (strain SB4)	BetaPro™	BASF	WG	Approx 100 000 ITU/mg	160 g/ha @ 1000 L water/ha or 320 g/ha @ > 1000 L water/ha	-	Apply preventively when FCM warrants control or where pheromone traps dictate applications. Apply as a full cover film spray, using conventional spray equipment. Good coverage is essential. BUT not to the point of run off. Due to UV sensitivity, it is recommended that Beta Pro™ is applied during the afternoon, or evenings. For extended modes of action, use in combination with BroadBand™ at the recommended rate. See BroadBand™ label.
	<i>Beauveria bassiana</i> (strain PPRI 5339)	BroadBand	BASF	ESC	min 4 x 10 <sup>9</sup> viable spores/ml	100 - 200 ml (min. 500-1000 ml/ha)	-	<b>Preventative:</b> Apply 100 ml/ 100L water (Min. 500 ml/ha). Initiate when first FCM's are observed.Repeat every 5 to 7 days with min. of 3 applications. <b>Curative:</b> Apply 200 ml/ 100L water (Min. 1 000 ml/ha). Repeat 3 to 5 days at the normal dose rate (100 ml/100L water) with a min. of 3 applications. Apply in late afternoon or evening.
	acetamidrid	Aceta Star®	Adama SA	EC	16 g/L	150 ml	28	Apply as a full cover spray to the point of run-off. Monitor for the pest and start application when the first signs of pest presence are observed. Apply at intervals of 7–10 days. To avoid the development of resistance, apply as part of an integrated pest management strategy. Do not exceed 2 applications per growing season. <b>Do not spray on the trees while flowers are present due to adverse effects on honeybees.</b>
	bifenthrin				30 g/L			
	acetamidrid (acetamidine)	Cormoran™ 180 EC	Adama SA	EC	80 g/L	50–75 ml	84	Apply CORMORANTM 180 EC as a high-volume spray to the point of run-off, ensuring thorough coverage. Monitor for the pest and start application when the first signs of pest presence are observed. The application rate depends on the level of infestation and size of the larvae at application. Apply in an integrated pest management programme, alternating with products with a different mode of action. Apply one application of CORMORANTM 180 EC per season. Emergency registration: Please refer to the comments under 'DIRECTIONS FOR USE'.
	novaluron (benzoyl urea)				100 g/L			
	chlorantraniliprole / lambda-cyhalothrin	Ampligo	Syngenta	EC	100 g/L / 50 g/L	200 - 500 ml/ha	14	Apply before pest reaches damaging levels based on economic thresholds (10 moths/trap/week). Scout fields and repeat sprays if populations start to rebuild, with a minimum of 7 days between applications. Do not apply more than 4 applications per season. <b>Aerial application:</b> Apply in 30-40L/ha. <b>Optimal pH 3.5 - 5.</b>
		Altacor®	DuPont SA	WG	350 g/Kg	10 g/100L spray (Max 300 g/ha)	10	Apply ALTACOR® as a full cover foliar application at spray volumes from 2000 up to 4000 litres spray mixture per hectare depending on the stage of the crop. The addition of a registered non-ionic wetter, such as TREND®90, may enhance the insect control potential of ALTACOR®. Ensure thorough coverage of the foliage and developing fruit.
		Coragen®	DuPont SA	SC	200 g/L	17.5 ml/100L spray mixture	10	Apply as a full cover spray at volumes from 2000 to 4000 litres spray mixture per hectare depending on the stage of the crop. Add a wetter, e.g. TREND®90. Repeat application after 10 days if necessary and do not exceed 2 applications per season.
	<i>Cryptophlebia leucotreta granulovirus</i> (CrieGV-SA)	Cryptogran	River BioScience (Pty) Ltd		at least 5 x 1010 occlusion bodies (OBs)/ml	10 ml + 250 ml molasses + wetter such as Break-Thru @ 3-5 ml OR 10 ml + 225g powdered molasse + Break-Thru (3 - 5 ml) OR 10 ml + 150 / 200g mancozeb + oil	0	Apply as a full cover film spray when the pest occurs. Sprays should be applied shortly after moth flight peaks. A final application 4 weeks before harvest is recommended. Apply during late afternoon or evening. <b>Optimal pH 5 - 8.</b>
	Dodeceny Acetate E8 (15 g) +Dodeceny Acetate Z8 (15 g)	Splat	River Bioscience	AP	30 g/Kg	1000 g per ha every 10 to 12 weeks beginning in October	28	Apply 1000 g as 500 by 2 g point sources with SPLAT mechanical Applicator. Reapply 10 to 12 weeks later. Apply as 750 1.3 g point sources to the top third of trees with grease gun or 500 by 2 g point sources with caulking gun.
	emamectin benzoate	Proclaim	Syngenta	WG	50 g/L	22 - 34 g OR 220 - 336 g/ha	14	Timing and frequency of applications should be made at first signs of insect infestation as indicated by local spray threshold. For best results apply soon after pest eggs have hatched. Treatment must be made before larvae penetrate fruit or stems. Thorough spray coverage is critical. For best results, apply with spray oil (non-dormant). Use low rates for low to moderate infestations and the highest rate for high infestations. Applications may be repeated to maintain control, typically at 7 - 14 day intervals. Do not apply more than 4 applications per season.
	methoxyfenozide	Runner 240 SC	Dow AgroSciences	SC	240 g/L	60 ml	14	Apply as a high volume application. Start application in the susceptible period, usually from the beginning of November to the end of December. Monitoring must be carried out to determine presence of pest. Do not apply more than three (3) times per season. Has ovicidal (egg) and larvicidal (larvae) properties. <b>Optimum pH 4 - 9.</b>
	indoxacarb (oxadiazine)	Steward 150 EC	DuPont SA	EC	150 g/L	50 ml/100L spray mixture	14	Apply STEWARD® 150 EC as a full cover foliar application at spray volumes from 2000 up to 4000 litres spray mixture per hectare depending on the stage of the crop. The addition of a registered non-ionic wetter, such as TREND®90, may enhance the insect control potential of STEWARD® 150 EC. Ensure thorough coverage of the foliage and developing fruit. Apply STEWARD® 150 EC when moth catches in pheromone traps indicate an infestation of False Codling moth or at the onset of ripening. Further applications should be made at 10 day intervals if necessary.
	permethrin(E)-7-dodeceny-acetate(E)-8-dodeceny-acetate(Z)-8-dodeceny-acetate	Last Call FCM	Insect Science	VP	60/0.40 g/kg	140 - 150 g/ha (2800 - 3 000 droplets/ha)	-	Monitor for moth flights - 1 trap / 4 ha. Put traps in top 2/3 of tree. Apply when the male moths of the first generation of the season appear. Repeat application every 28 days. DO NOT apply more than 5 times per season. To control larvae - apply registered chemical 16 and 8 weeks before harvest on the outside 6 rows of treated area
	E-8-dodeceny acetate (77 %) / Z-8-dodeceny acetate (23 %)	X-Mate™ FCM	Insect Science	VP	0.9625/0.2875 g/kg	1 dispenser per 250 m <sup>2</sup>	-	Use 40 – 42 X-Mate™ F.C.M. dispensers in total per hectare per production season irrespective of tree density. Use the table provided on the label as a guideline to determine your correct placement within the orchard. Always ensure 1 dispenser is placed per 250 m <sup>2</sup> . Hang the dispensers evenly and uniformly throughout the orchard.
spinetoram	Delegate 250 WG	Dow AgroSciences	WG	250 g/kg	20 g	7	Apply as a high volume application when pest usually occurs. Normally from early-mid November to harvest. Apply two to three applications in this period. If additional applications are required use a product with a different mode of action. Will also control THRIPS. <b>Optimum pH 5 - 8.</b>	
E-8 - dodeceny acetate Z-8 - dodeceny acetate E/Z-8 – dodeceni	Isomate® FCM	Nulandis	VP	0.24 g/kg	800 dispensers in total per ha per production season irrespective of tree density	-	End September to beginning of October (before first FCM emergence). Hang 500 ISOMATE FCM dispensers in all relevant orchards followed by 300 Isomate FCM dispensers at the beginning of January.	
Leaf rollers	Larvae of leaf rollers spin macadamia leaves together to form a protective niche. Larvae are yellow-green and reach a length of 20 - 25 mm. The body of the larva is naked except for a few scattered fine hairs. Larvae are very secretive and avoid exposure. The moths lay their eggs in masses (8 - 300 eggs) which measure about 6 x 4 mm. The eggs overlap each other like fish scales. Moths are small and seldom seen.							
	emamectin benzoate	Proclaim	Syngenta	WG	50 g/L	22 - 34 g OR 220 - 336 g/ha	14	Timing and frequency of applications should be made at first signs of insect infestation as indicated by local spray threshold. For best results apply soon after pest eggs have hatched. Thorough spray coverage is critical. For best results, apply with spray oil (non-dormant). Use low rates for low to moderate infestations and the highest rate for high infestations. Applications may be repeated to maintain control, typically at 7 - 14 day intervals. Do not apply more than 4 applications / season.

Pest	Active Ingredient	Trade name/s	Company	Formulation		Dosage (Per 100 L water, or as indicated)	Withholding Period (Days)	Application (For high volume applications, unless otherwise indicated)
				Type	Grams pure active ingredient			ALWAYS READ THE LABEL FOR DETAILED INSTRUCTIONS
Macadamia Nut Borer	Larvae are greyish in colour. Young larvae hatch & bore into the husk. If the shell is still soft, they are able to tunnel through and feed on the kernel. Once shell has hardened, tunneling is usually confined to the inner surface of the husk, but may penetrate the shell of some mature nuts. The entry hole on the husk often has larval faeces (frass) protruding from it.							
	permethrin / Z-8-dodecen-1-yl acetate	Last Call MNB	Insect Science	VP	60/0.16 g/kg	150 g/ha (3 000 droplets/ha)	-	Start applying before the moths of the first generation of the season appear. Repeat application every 28 days. DO NOT apply more than 5 times per season.
	acetamiprid (neonicotinoid)	ALLICE 20 SP	Arysta LifeScience	SP	200 g/kg	50 g ALLICE 20 SP/100 l water OR 40 g ALLICE 20 SP + 20 g Emma/100 l water	50	Use appropriate scouting and monitoring techniques to predict the onset of pest infestation. In orchards with a known history of Macadamia nut borer infestation or a predicted high level of infestation, make the first two applications with ALLICE 20 SP + Emma mixture. Thereafter, continue the programme with EMMA solo (Refer to the EMMA label).
	Acephate (Organophosphate)	Orthene 75 SP	Arysta LifeScience	SP	750 g/kg	75 g	35	Make the first application after flowering stage when the pest activity is first observed but before the neonate larvae enter the nuts. All applications should be made as a medium to full cover spray. Do not exceed more than 4 applications.
	emamectin benzoate	EMMA	Arysta LifeScience	SG	50 g/kg	20 g EMMA + 40 g Allice 20 SP/100 l water AND/OR 30 g EMMA/100 l water	50	Use appropriate scouting and monitoring techniques to predict the onset of pest infestation. In orchards with a known history of Macadamia nut borer infestation or a predicted high level of infestation, make the first two applications with EMMA + Allice 20 SP mixture. Thereafter, continue the programme with EMMA solo.
		Vitex 50	Meridian Agrochemical Company	WG	50 g/kg	20 g VITEX 50 + 40 g TAMPRID / 100 l water And / or 30 g VITEX 50 / 100 l water	50	Use the appropriate scouting and monitoring techniques to predict the onset of pest infestation. Start applications when the pest eggs are hatching, but before the neonate larvae penetrate the nuts. A medium cover spray is essential to ensure that all the nut clusters are adequately protected. If high infestations of MNB persist, repeat the application after 7-10 days. Do not exceed a maximum of 2 applications of the mixture of VITEX 50 + TAMPRID per growing season. Do not exceed a maximum of 4 applications of VITEX 50 per season either solo or in the mixture.
Z-8-dodecenyl acetate (100 %)	X-Mate™ MNB	Insect Science	VP	1.25g/kg	1 dispenser per 400 m2 (25 dispensers per Ha)	-	Use 25 X-Mate™ M.N.B. dispensers in total per hectare per production season irrespective of tree density. Use the table provided on the label as a guideline to determine your correct placement within the orchard. Always ensure 1 dispenser is placed per 400 m <sup>2</sup> . Hang dispensers evenly and uniformly throughout the orchard. Hang X-Mate™ M.N.B. dispensers out from mid to end August, before first Macadamia nut borer emergence.	
Mealy bug	Small ± 3-4 mm long oval-shaped stationary insects, covered with a white waxy covering. Generally found clustered on fruit stalks and husks where they release copious quantities of honeydew which gives the leaves an initial shiny appearance, but later turns black due to sooty mould.							
	chlorpyrifos	Dursban® 750 WG	Dow AgroSciences	WG	750 g/kg	64 g	83	Apply as a post flower, full cover spray in October. Follow-up with an additional application if necessary. Ensure thorough coverage of target area. Wetting bark of stem and all branches is essential. Will also control thrips, if present.
Mites (European Red mites, Red Spider Mites)	Mites are extremely small and not visible to the naked eye. Typical damage from mites is distorted leaves with margins cupped downwards, and brown, rusty scarring on the husk (very similar to thrips damage)							
	abamectin	AgriMec Gold	Syngenta	SC	84 g/L	130 - 320 ml/ha + light mineral spray oil (0.25%)	14	Do not apply more than 320 ml/ha per application. If a second application is necessary wait at least 21 days before repeating application. Do not apply more than 640 ml/ha AGRIMEC GOLD per growing season. Ensure product is mixed with non-ionic activator type spray oil. DO NOT use any other type of adjuvants. <b>Optimum pH 6 - 7.</b>
Plant parasitic nematodes	furfural (aldehyde)	Protect	Illovo Sugar Limited	EC	990 g/L	400 or 600 L/ha in at least 600 L water/ha or Dripper application: 4 - 6 L/100 m row	-	Application of Protect for this specific treatment must take place 7 days pre plant.
Stink bug	Green to brown shield bugs which suck the sap from macadamias resulting in premature nut drop of young nuts, and kernel damage to older nuts.							
	Acephate (Organophosphate)	ACE® 750 SP	Nulandis	SP	750 g/kg	75 g	35	Apply after flowering stage as a medium to full cover spray when the pest is noticed. Apply a 4-spray foliar programme with 4-6 week intervals. Do not exceed more than 4 applications. <b>Optimal pH 5.</b>
	alpha-cypermethrin	Ag-Alpha Cyper 100 SC	Ag-Chem Africa	SC	100 g/L	10 ml	30	Apply the first application when the nuts are marble size (October/November). Apply a follow-up application and a possible third application at 4-week intervals. <b>Optimum pH 4.</b>
		Alpha-Thrin 100 SC	Villa Crop Protection					Apply the first application when the nuts are marble size (October/November). Apply a follow-up application and a possible third application at 4-week intervals. <b>Optimum pH 4.</b>
		Avalanche	Klub MS					Apply the first application when the nuts are marble size (October/November). Apply a follow-up application and a possible third application at 4-week intervals. <b>Optimum pH 4.</b>
		Fastac SC	BASF					Apply the first application when the nuts are marble size (October/November). Apply a follow-up application and a possible third application at 4-week intervals. <b>Optimum pH 4.</b>
		Magnum Super SC	Technichem Crop Protection	Apply the first application when the nuts are marble size (October/November). Apply a follow-up application and a possible third application at 4-week intervals. <b>Optimum pH 4.</b>				
	Polytrin Super 100 SC	Villa Crop Protection	EW	Apply the first application when the nuts are marble size (October/November). Apply a follow-up application and a possible third application at 4-week intervals. <b>Optimum pH 4.</b>				
	Ichiban 100 EW	Meridian Agritech	EW	Apply the first application when the nuts are marble size (October/November). Apply a follow-up application and a possible third application at 4-week intervals. <b>Optimum pH 4.</b>				
	Beauveria bassiana (strain PPRI 5339)	BroadBand	BASF	ESC	min 4 x 10 <sup>8</sup> viable spores/ml	100 - 200 ml (min. 500-1000 ml/ha)	-	<b>Preventative:</b> Apply at 100 ml/100L water (Min. 500 ml/ha). Initiate when first stink bugs are observed. Repeat 5 to 7 days with a min. of 3 applications. <b>Curative:</b> Apply at 200 ml/100L water (Min. 1 000 ml/ha). Repeat 3 to 5 days at the normal dose rate (100 ml/100L water) with a min. of 3 applications. Apply in late afternoon/evening. Increased efficacy when combined with a registered pyrethroid insecticide.
beta-cyfluthrin	Bulldock® 050 EC	Bayer	EC	50 g/L	15 ml	14	Ensure thorough coverage of the nuts, branches and leaves. Application should commence when the nuts are at marble size (October/November) or when the economic threshold level of stink bug is reached (An average of 0.4 stink bugs per tree using the "knockdown" technique). Follow-up applications, at 4-5 week intervals may be required, depending on re-infestation. <b>Optimum pH 4 - 5 but stable between pH 4 - 7.</b>	
	Bulldock® Beta 125 SC		SC	125 g/L	6 ml			
beta-cypermethrin	Akito	Arysta LifeScience	EC	100 g/L	10 ml	30	Time of application is based on stink bug numbers. This is determined by means of the tree shake or "knockdown" method. Start monitoring stink bug numbers two weeks after flowering. Apply as soon as the economic threshold level of stink bug is reached (An average of 0.4 stink bugs per tree using the "knockdown" technique). Two or three applications per season may be needed. <b>Optimum pH &lt; 8.</b>	
chlorantraniliprole / lambda-cyhalothrin	Ampligo	Syngenta	EC	100 g/L / 50 g/L	200 - 500 ml/ha	14	Apply before pest reaches damaging levels based on economic thresholds. Scout fields and repeat sprays if populations start to rebuild, with a minimum of 7 days between applications. Do not apply more than 4 applications per season. <b>Aerial application:</b> Apply in 30-40L/ha. <b>Optimal pH 3.5 - 5.</b>	
chlorpyrifos	Pyrinex 250 CS	Adama SA	CS	250 g/L	200 ml	83	Apply as a full cover spray when nuts have reached marble size and as soon as the pest is noticed. Repeat the application 4 weeks later. Apply a third application 4 weeks after the second application if required. <b>Optimal pH 4.</b>	
chlorpyrifos cypermethrin	Cyperfos 500 EC	Nulandis	EC	450 g/L / 50 g/L	105 ml	83	Apply after flowering stage as a medium to full cover spray when the pest is noticed. Repeat every 4-6 weeks if necessary, but do not exceed more than 4 applications. <b>Optimal pH 4.</b>	

Pest	Active Ingredient	Trade name/s	Company	Formulation		Dosage (Per 100 L water, or as indicated)	Withholding Period (Days)	Application (For high volume applications, unless otherwise indicated)
				Type	Grams pure active ingredient			ALWAYS READ THE LABEL FOR DETAILED INSTRUCTIONS
Stink bug	cypermethrin	Ag-Cypermethrin 200 EC	Ag-Chem Africa (Pty) Ltd	EC	200 g/L	20 ml	90	Start application when the nuts are marble size as a high volume spray. Repeat 4 weeks later. A third application may be necessary 4 weeks after the second, but not later than 90 days before harvest. <b>PLEASE NOTE THERE IS A FAULT ON THE LABEL AT PRESENT. WITHHOLDING DAYS NOT 30 BUT 90!</b>
		Farmag Cypermethrin	Castle Ag-Chem					
	cypermethrin	Avi-Sipermethrin	Avima	EC	20 g / L	20 ml	30	Time of application is based on stink bug numbers. This is determined by means of the tree shake or "knockdown" method. Start monitoring stink bug numbers two weeks after flowering. Apply as soon as the economic threshold level of stink bug is reached (An average of 0.4 stink bugs per tree using the "knockdown" technique). Two or three applications per season may be needed. <b>Optimum pH 3 - 4.</b>
		Bitrad Cypermethrin	Bitrad Consulting					
		Cypermethrin 200 EC	Villa Crop Protection (Efekto)					
		Cyperin 200 EC	Nulandis					
		Kemptrin 200 EC	Arysta LifeScience					
		Polythrin® 200 EC	Villa Crop Protection					
	Sipermethrin	Arysta LifeScience						
	Cypermethrin	Arysta LifeScience						
	gamma-cyhalothrin	Vantex 60 CS	Chemnova	CS	60 g/L	4.2 ml	14	Application timing is based on stink bug numbers. Scouting for stink bug is done according to the tree shake or "knockdown" method. Start monitoring stink bug numbers two weeks after flowering, when the economic threshold level of stink bug is reached (An average of 0.4 stink bugs per tree using the "knockdown" technique). Up to 6 applications may be needed at 4 weeks interval. <b>Optimum pH 4.</b>
	lambda-cyhalothrin	Karate 10 CS	Syngenta	CS	100 g/L	5 ml	7	Application timing is based on stink bug numbers. Scouting for stink bug is done according to the tree shake or "knockdown" method. Start monitoring stink bug numbers two weeks after flowering when the economic threshold level of stink bug is reached (An average of 0.4 stink bugs per tree using the "knockdown" technique). Two to three applications may be needed per season. <b>Optimum pH 4 - 6 (Lambda 50 EC - pH 5 to 7).</b>
		Karate Zeon 10 CS						
		Karate Zeon						
Karate® EC		Ag-Chem Africa	EC	50 g/L	10 ml	82		
Ag-Lambda 50 EC								
Attacke							RT Chemicals/Enviro	
Judo 50 EC	Villa Crop Protection							
Lambda EC	Arysta LifeScience							
Lambda 50 EC	Universal Crop Protection							
pymetrozine	Chess*	Syngenta	WG	500 g/kg	40 g	21	Ensure good coverage (diffuse wetting type) of the target area through a medium cover spray as soon as threshold levels are reached (An average of 0.4 stink bugs per tree using the "knockdown" technique). Repeat application after 28 days if necessary, but not later than 21 days before harvest. Do not apply less than 3000 L/ha, but if less than 3000 L/ha is applied, do not use less than 1.2 kg Chess/ha. It is recommended that Chess be used mainly during Jan - March. <b>Optimum pH 7.</b>	
	Trivia 500 WDG	Villa Crop Protection	WDG	500 g/kg	40 g	21	Apply as a medium cover spray as soon as threshold levels are reached and ensure good coverage (diffuse wetting type) of the target area. Threshold of average of 0.4 Stinkbugs per tree as per the <b>Dichlorvos</b> technique. Repeat application after 4 weeks later if necessary, but not after 21 days before harvest. Do not apply less than 3000 litres spray mixture per hectare, but if less than 3000 litres per hectare is applied, <b>do not use less than 1.2 kg TRIVIA 500 WDG</b> per hectare.	
tau-fluvalinate	Klartan® 240 EW	Adama SA	EW	240 g/L	30 ml	30	Apply as a full cover spray in a programme of three applications with intervals of 28 days. Start the first application as soon as an average of 0.4 stink bugs per tree are counted. This can be determined by means of the tree shake method with monitoring commencing two weeks after flowering. <b>Optimum pH 5.</b>	
thiamethoxam	Actara SC	Syngenta	SC	240 g/L	9 ml/tree followed by 6 ml/tree	93	First application (9ml/tree) at end of flowering followed by a second application 90 days thereafter. Best results are achieved in orchards with a drip irrigation system where product is applied directly under the dripper. Where there are two drippers per tree, the application volume should be divided in two equal parts and half applied under each dripper. In orchards with micro irrigation systems, apply around the base of the trunk. Mix with 1L of water and apply with a jug. Irrigate within 24 hours of application. Efficacy of Actara might be affected if used on older trees (12 years +) or soil with clay > 25%.	
zeta-cypermethrin	Fury 10 EW	FMC Chemicals	EW	100 g/L	20 ml	30	Time of application is based on stink bug numbers. This is determined by means of the tree shake or "knockdown" method. Start monitoring stink bug numbers two weeks after flowering. Apply as soon as the economic threshold level of stink bug is reached (An average of 0.4 stink bugs per tree using the "knockdown" technique). Two or three applications per season may be needed. <b>Optimum pH &lt; 8.</b>	
Thrips (various species)	Minute insect about 1 mm in length with four narrow fringed wings. Immature stages are light in colour. Adults usually darker and active. Feed by rasping the leaf surface causing small, malformed leaves or feed on the outer husk causing a brown or silvery bronze discolouration.							
	imidacloprid	Kohinor 350 SC	Adama SA	SC	350 g/L	18 ml/tree	112	Apply Kohinor 350 SC in 2L of water to soil directly around the base of tree trunk during flowering period (start of flowering to full bloom). Clear application area from weeds and mulch. Irrigate within 24 h after application. Do not apply soil drench treatment through irrigation system. Will also control Aphids.
	spinetoram	Delegate 250 WG	Dow AgroSciences	WG	250 g/kg	10 g	7	Commence spraying at the first signs of thrips presence. Repeat application when necessary. Apply as a light cover spray ensuring thorough coverage of the target area. Will also control FCM at a rate of 20g/100L water.
	Pyrinex 250 CS	Adama SA	CS	250 g/L	200 ml		Apply as a full cover spray when nuts have reached marble size and as soon as the pest is noticed. Repeat the application 4 weeks later. Apply a third application 4 weeks after the second application if required. <b>Optimal pH 4.</b>	
<b>Note:</b> New registrations in the current year are highlighted in yellow								

## Products registered for Disease control on Macadamias in South Africa



Updated: December 2017 (vers 3) - SUBTROP/SAMAC (Valid for 2017/2018 season)  
The latest updates are available under the Members section: "FOOD SAFETY, REGISTERED CHEMICALS & MRLS" on the SAMAC website ([www.samac.org.za](http://www.samac.org.za))



Disease	Active Ingredient	Trade name/s	Company	Formulation		Dosage (Per 100 L water, or as indicated)	Withholding Period (Days)	Application (For high volume applications, unless otherwise indicated)
				Type	Grams pure active ingredient			ALWAYS READ THE LABEL FOR DETAILED INSTRUCTIONS
Alternaria & foliar diseases	azoxystrobin / difenoconazole	Amistar Top	Syngenta	SC	200 g/L / 125 g/L	500 - 1 000 ml <b>Aerial and Ground Applications</b>	45	Apply as part of a protectant programme before disease occurs with no more than 2 consecutive sprays 10 to 14 days apart. Do not apply more than 4 sprays per season. Do not use with an adjuvant. Spray volumes for aerial sprays: 30 - 40 L water/ha.
	azoxystrobin	Ortiva			250g/L	880 ml/ha		Apply prior to disease development and repeat application at 7 - 21 day intervals, with no more than 2 sequential applications. For blossom blight begin application at early bloom and continue through petal fall. An adjuvant may be added at the registered rate. <b>Optimum pH 5 - 5.5.</b>
Alternaria & Botrytis fruit rot (Botrytis cinerea)	cyprodinil (analinopyrimidine)	Chorus	Syngenta	WDG	500 g/kg	380 - 500 g/ha	7	Make the first application during early bloom and repeat applications at 14 day intervals if conditions remain favourable for disease development. An appropriate water volume that will ensure good coverage is essential for effective disease control. Application may be made by ground or air but no more than 2 applications by air. DO NOT apply more than 1400 g/ha per plot of land per year.
Soil fungi	furfural (aldehyde)	Protect	Illovo Sugar Limited	EC	990 g/L	400 or 600 L/ha in at least 600 L water/ha or Dripper application: 4 - 6 L/100 m row	-	Application of Protect for this specific treatment must take place 7 days pre plant.
Blossom blight, Anthracnose / husk rot; <b>Husk spot.</b>	pyraclostrobin / boscalid	Bellis®	BASF	WG	128 g/kg + 252 g/kg	800g /ha	14	Apply Bellis® in a preventative program, commencing at flower tassel emergence, followed with a second application two weeks later. Apply Bellis® in 1200 - 1500 L water / ha. <b>Optimal pH 7.</b>
Blossom blight, Anthracnose / husk rot	azoxystrobin	Ortiva	Syngenta	SC	250g/L	880 ml/ha	45	Apply prior to disease development and repeat application at 7 - 21 day intervals, with no more than 2 sequential applications. For blossom blight begin application at early bloom and continue through petal fall. An adjuvant may be added at the registered rate. <b>Optimum pH 5 - 5.5.</b>
	azoxystrobin / difenoconazole	Amistar Top			200g/L / 125 g/L	500 - 1000 ml <b>Aerial and Ground Applications</b>		Apply as part of a protectant programme before disease occurs with no more than 2 consecutive sprays 10 to 14 days apart. Do not apply more than 4 sprays per season. Do not use with an adjuvant. Spray volumes for aerial sprays: 30 - 40 L water/ha.
	Chlorothalonil (phthlimide)	Bravo 720	Syngenta	SC	720g/L	3.5 L/ha <b>Aerial and Ground Applications</b>	120	Begin applications at beginning of the flowering period followed by an application at full bloom. Make additional applications as required on 14 - 28 days intervals. Make 2 - 5 applications with BRAVO 720 during each growing season.
Scab	azoxystrobin	Ortiva	Syngenta	SC	250g/L	880 ml/ha	45	Apply prior to disease development and repeat application at 7 - 21 day intervals, with no more than 2 sequential applications. For blossom blight begin application at early bloom and continue through petal fall. An adjuvant may be added at the registered rate. <b>Optimum pH 5 - 5.5.</b>
	azoxystrobin / difenoconazole	Amistar Top			200g/L / 125 g/L	500 - 1000 ml <b>Aerial and Ground Applications</b>		Apply as part of a protectant programme before disease occurs with no more than 2 consecutive sprays 10 to 14 days apart. Do not apply more than 4 sprays per season. Do not use with an adjuvant. Spray volumes for aerial sprays: 30 - 40 L water/ha.

**Note:**  
New registrations in the current year are highlighted in yellow



**Products registered for Weed control on Macadamias in South Africa**



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Active Ingredient	Trade name/s	Company	Formulation		% Clay	Dosage (Per ha, or as indicated)	Time of application	Withholding Period (Days)	Application (For high volume applications, unless otherwise indicated)	
			Type	Grams pure active ingredient					ALWAYS READ THE LABEL FOR DETAILED INSTRUCTIONS	
carfentrazone-ethyl	Aurora™ 40 WG	FMC Chemicals (Philagro)	WG	400 g/kg	-	25 g + 3 L glyphosate	Post Emergence	-	Annual broad-leaved weeds. Only in tank mix with glyphosate (3 L/ha).	
clethodim	Sequal 240 EC	Villa Crop Protection	EC	240 g/L	-	0.5 L - 1.0 L + adjuvants	Post Emergence	28	Grasses & broad leaved weeds: Apply to actively growing grass weeds during the weeds' growth stages as indicated on the label.	
	Series 240 EC	Universal Crop Protection								
cycloxydim	Focus® Ultra	BASF	EC	100 g/L	-	0.8 - 4 L	Post Emergence	40	Annual and perennial grasses & broad leaved weeds. Dosage depends on grass species and their growth stage.	
diuron	Diurex 800 SC	Adama	SC	800 g/L	-	200 ml in sufficient water for full cover film application	Pre Emergence	-	Mainly annual broad-leaved weeds in established orchards & annual grasses. Apply onto clean, moist, cultivated soil during the growing season. Repeat the application after 2 - 3 months if required.	
	Diuron 800 SC	GAP Chemicals								
		Arysta LifeScience								
	Ag-Diuron 800 SC	Ag-Chem Africa								
	Diurex 80 WG	Adama	WG	800 g/kg	-	2 kg	-	-	-	
	Diuron 800 WG Karmex DF	Arysta LifeScience								
	FarmAg Diuron 800 WG	SafeGuard Crop Protection	WP	-	-	-	-	-	-	-
	Diuron 800 WP	Arysta LifeScience								
Develop 800 WDG	Villa Crop Protection	WDG	-	-	-	-	-	-	-	
Extend 800 WDG	Universal Crop Protection									
fluazifop-p-butyl	Fusilade Forte	Syngenta	EC	150 g/L	-	1.67 - 3.33 L	Post Emergence	40	Grasses: apply at a post-emergence stage to seedlings up to 6 leave stage. Can be mixed with Diuron 800 SC for broadleaves.	
	Volley 125 EC	Arysta LifeScience		125 g/L	-	2 - 4 L				
glufosinate ammonium	Basta	Bayer	SL	200 g/L	-	3 - 7.5 L	Post Emergence	-	Annual and perennial grasses, broad-leaved weeds, yellow and purple nutsedge: Commence spraying during late spring when soil moisture is sufficient and weeds are actively growing. Repeat spray 7 - 8 weeks later if necessary. Prevent spray contact with leaves, active buds and fruit of trees. Dosage depends on the size of the weeds.	
	Best-Buy 200 SL	Almond Agro Chemicals (Arysta)								
	Nirvana	Meridian Agrochemical Company								
	Silent	Wentek Chemicals (Pty) Ltd								
Glufos 200 SL	Sharda International Africa cc									
glyphosate (various salts)	Various	Various	Various	Various	-	100 - 200 ml (min. 500-1000 ml)	Post Emergence	-	Annual and perennial weeds. Prevent spray contact with leaves, green stems and fruit.	
paraquat dichloride	Paraquat 200 SL	Meridian Agrochemical Company	SL	200 g/L	-	1.25 - 5 L G31:G41 200 - 750 L water	Post Emergence	-	Annual grasses and broad leaved weeds. Use the higher dosages for spraying dense weed growth, and direct spray on the weeds below the trees. Avoid spray contact with the green parts of trees.	
	Sharda Paraquat 200 SL	Sharda International Africa cc								
	Shinguat 200 SL	Ag-Chem Africa								
	Gramoxone	Syngenta		120 g/L						
	Preeglone	Syngenta								
	Parody 200 SL	Arysta LifeScience								
trifluralin	Makhrotref 480 EC	Makhro-Agro	EC	480 g/L	-	8 L	Pre Plant	-	Annual grasses and certain broad-leaved weeds. Apply on clean, cultivated soil before establishment of orchards.	
	Rifle 480 EC	Villa Crop Protection								
	Trifluralin 480 EC	Universal Crop Protection / Dow AgroSciences								
	Triflurex 480 EC	Adama								



## Registered Plant Growth Regulators for use on Macadamias in South Africa



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Growth regulating activity	Active Ingredient	Trade name/s	Company	Formulation		Dosage (Per 100 L water, or as indicated)	Withholding Period (Days)	Application (For high volume applications, unless otherwise indicated)
				Type	Grams pure active ingredient			ALWAYS READ THE LABEL FOR DETAILED INSTRUCTIONS
Abscission of mature nut in husk	ethephon*	Ethapon SL	Applied Agricultural Products (Nulandis)	SL	480 g/L	156 - 208 ml (750 - 1 000 ppm) Beaumont ONLY	-	Application time depends on season and production area (usually between early March and mid July). Test nuts for maturity and only apply once the crop is mature. Application to trees with nuts of varying maturity may result in abscission of immature nuts. Ensure thorough coverage, with specific attention to those parts of the trees carrying the crop – <u>ensure thorough coverage of nuts</u> . For applications with mist blowers, use the lower rate late in the harvest period and the higher rate earlier in the harvest period. For applications with hand lances use only the lower rate at all times. Never use aerial applications. Application during cold weather may result in a significant decline in efficacy. Avoid application during and after floral initiation. Do not apply to sick or stressed trees. Apply with a wetter.
		Ethepon 480 SL	Villa Crop Protection					
		Ethepon 480 SL	Universal Crop Protection					
Vegetative growth control	paclobutrazol	Cultar <sup>A</sup>	Syngenta	SC	250 g/L	Initial treatment: a) Trees 2 - 4 years old apply 4 - 8 ml/tree. b) Trees 5 - 7 years old apply 10 - 15 ml/tree. c) Trees 8 years and older apply 20 ml/tree. Apply in 250 - 500 ml water as a soil drench around the trunk of the tree.	-	Initial treatment: Apply in 250 to 500 ml water as a soil drench around the trunk of the tree. Uniform growth control can be achieved by a split treatment. Apply 4 ml in September and 4 ml in February.
		Avocet <sup>B</sup>	Universal Crop Protection					

Note: \*Nelmak 2, 816 and 791 show excessive leaf drop with the use of Ethepon.