

Options for Management of Codling Moth

This document tries to answer some questions growers may have about the cost of options for managing codling moth with or without release of sterile codling moths. Armed with this information, growers will be better prepared to discuss, evaluate and decide whether or not to support a similar SIR Program or adopt another management strategy to save and build upon the achievements of the present SIR Program.

1. What does area-wide codling moth management mean?

Area-wide codling moth management means all commercial pome fruit growers must control codling moth using prescribed control methods in a timely and proper manner. This mandatory compliance will extend to nearby non-commercial (ornamental and backyard) host tree (apple, pear, crabapple, quince) owners to reduce threats to commercial orchards. Host tree owners face enforcement action if they do not do a satisfactory job of controlling codling moth.

2. How does area-wide codling moth management differ from how we used to control codling moth?

An area-wide codling moth management program requires: a) timely and proper application by all growers of one or more preventative and control methods (sterile moth release, mating disruption, chemicals, preventative and cultural practices); b) moth trapping in all apple and pear blocks, c) enforcement of tree-owner cooperation to control codling moth, and d) accurate record keeping.

3. What are the recommended control options available for codling moth?

Table 1 describes the advantages and limitations of the recommended methods available to growers to control codling moth. The area-wide management concept can use any of the three methods, however mating disruption and sterile insect release techniques are most effective when applied on an area-wide basis.

Table 1. Advantages and Limitations of Pesticides, Mating Disruption and Sterile Insect Technique for Control of Codling Moth.

Control Method	Advantages	Limitations
Pesticides	<ol style="list-style-type: none"> 1. Kill codling moth larvae 2. Suited to most orchards 3. Some products control other pests (e.g. Assail, Confirm, Intrepid) 4. Do not require area-wide program 	<ol style="list-style-type: none"> 1. Some products toxic to people and beneficials 2. Spray drift risk to neighbors 3. Public concern about personal and food safety 4. Proper rate, timing and application essential for effective control 5. Risk of pesticide resistance 6. Risk of environmental pollution
Mating disruption	<ol style="list-style-type: none"> 1. Needs only one application/season 2. Non-toxic to applicator, beneficials, environment 	<ol style="list-style-type: none"> 1. Expensive compared to pesticides 2. Proper rate, timing and application essential for good control 3. Not suited for use orchards less than 2 ha

	<ol style="list-style-type: none"> 3. Can reduce amount of pesticide applied 4. Allows development of biological control programs for other pests 5. No risk of resistance 	<p>in area, sloping, high codling moth pressure</p> <ol style="list-style-type: none"> 4. Most effective when applied area-wide 5. Requires low to moderate codling moth pressure 6. Monitoring codling moths more difficult 7. Requires removal of nearby unmanaged codling moth sources 8. Usually require one first-brood cover spray
Sterile insect technique	<ol style="list-style-type: none"> 1. Can be used in all orchards 2. Non-toxic to applicator, beneficials, environment 3. Can reduce the amount of pesticide applied 4. Can keep codling moth below action thresholds 5. Allows development of biological control programs for other pests 6. Sterile moths move into adjacent wild and urban sites 7. Both sterile male and female moths contribute to control 	<ol style="list-style-type: none"> 1. Requires rearing facility and support staff for moth rearing and release 2. Requires area-wide use to be most effective and affordable 3. Requires low codling moth pressure 4. Monitoring wild codling moths more difficult 5. Requires removal of nearby unmanaged codling moth sources 6. Only controls codling moth 7. May require additional controls 8. Sterile males are less competitive than wild males in the spring

4. How does the cost of using sterile moths compare to other codling moth control methods?

Cost of area-wide codling moth program based on estimated total apple and pear acreage of 11,434 acres (4627 hectares):	
Area-wide program without sterile insect release:	\$170.68/acre (\$421.59/ha)
Cost of sterile insect release/acre:	\$127.44/acre (\$314.78/ha)
Area-wide program with sterile insect release:	\$298.12/ acre (\$736.67/ha)

Regional District Funding Support:

After 2005, the five participating Regional Districts' may consider an annual contribution of \$1,224,479 (based on tax of \$0.0.10/\$1000 per estimated assessed land value) to support a full area-wide sterile insect release program.

This support is equivalent to **\$107/acre (\$264/ha)** for each grower.

Grower Costs/acre (ha) with Funding Support from Regional Districts

i) Area-wide program with sterile insect release (after 2005)

Full sterile insect release program cost (\$298) minus Regional District support (\$107)

= **\$191/acre (\$220/ha)**

Growers would be responsible for any additional control costs (sprays, mating disruption). See Table 2 for costs of products and Table 3 for various combinations of control product applications.

ii) Area-wide program without sterile insect release (after 2005):

Regional Districts are not likely to provide financial support for any area-wide program that does not include sterile insect release throughout the program area. Therefore growers would have to cover the cost of administering an area-wide program at an estimated cost of **\$170.68/acre (\$421.59/ha)** (includes monitoring, enforcement, record management)

Growers would be responsible for all codling moth control costs (sprays, mating disruption). See Table 2 for costs of products and Table 3 for various combinations of control product applications.

Packinghouses are responsible for managing bin movement to prevent spread (re-introduction) of codling moth and to advise growers on proper rates and application of control products.

Table 2 lists the names and 2005 average retail costs of control products currently recommended for codling moth control in southern B.C.

Table 2. Costs of Codling Moth Control Products Applied at Label Rates (2005)

Product	Active Ingredient	Unit	Cost/ Unit	Field Rate(s)/ha	Product Cost/ha (/acre)	Residual Control (days)
Imidan	phosmet	2 kg	50.64	3.25 - 3.75 kg	82.30 – 94.95 (33.32 – 38.44)	10
Zolone	phosalone	5 L	167.10	2 L	66.84 (27.06)	10
Guthion (until Dec. 31/07)	azinphos-methyl	2.27 kg	69.30	1.4 - 2.2 kg	42.74 – 67.16 (17.30 – 27.20)	14
Assail	acetamiprid	340 g	200.82	240 g	141.75 (57.39)	12
Confirm	tebufenozide	4 L	263.80	1 L	65.95 (26.70)	10 - 14
Intrepid	methoxy-fenozide	4 L	364.30	1 L	91.00 (36.84)	10 - 14
Virosoft-CM	virus	1 L	600.00	227 mL	136.20 (55.14)	5 - 7
Isomate-C Plus	Codling moth pheromone	400 disp.	156.00	1000 dispensers	390.00 (157.90)	all season
Isomate-CM/LR	Codling moth and leafroller pheromones	400 disp.	~190.00	1000 dispensers	~475.00 (192.30)	all season
Sterile Insect Technique	Sterile codling moths	1 petri dish (800 moths)		1-2 petri dishes/week/acre	~315.00 (127.44) (includes release)	17 weeks

Growers can estimate their cost of controlling codling moth without sterile moths by adding the costs of each cover spray used to protect their crops over the season. Growers should also add the cost of application currently estimated to be \$ 84.00/ha (\$34.00/acre) for full rate mating disruption application and \$49.00/ha (\$20.00/ac) for each air-blast sprayer application. Table 3 lists examples of calculating various combinations of control products for season-long crop protection.

Table 3. Costs (product plus application) of various combinations of chemical control and mating disruption products for control of first and second generations of codling moth.

Control Program Option	Product	Cost /acre	First Brood-Number of applications	Cost /acre	Second Brood-Number of applications	Cost /acre	Total Cost /acre for season
1	Isomate-C	191.90	1	191.90	0	0	379.51
	Imidan	53.32	1	53.32	0	0	
	Assail	77.39	1	77.39	0	0	
	Intrepid	56.90	0	0	1	56.90	
2	Guthion	48.05	1	48.05	0	0	211.59
	Intrepid	56.90	1	56.90	0	0	
	Imidan	53.32	0	0	2	106.64	
3	Assail	77.39	1	77.39	0	0	134.29
	Intrepid	56.90	1	56.90	0	0	
4	Imidan	53.32	1	53.32	0	0	206.32
	Guthion	48.05	1	48.05	1	48.05	
	Intrepid	56.90	0	0	1	56.90	
5 Organic	Isomate-C	191.90	1	191.90	0	0	567.60
	Virosoft	75.14	3	225.42	2	150.28	
6	Assail	77.39	1	77.39	0	0	237.89
	Intrepid	56.90	1	56.90	1	56.90	
	Confirm	46.70	0	0	1	46.70	
Your Program Option 1							
Your Program Option 2							

It is important to protect the fruit as long as codling moth numbers are above recommended action thresholds. Growers should make every effort to control the first generation within their orchards. An effective first brood control program will reduce the need for cover sprays against the second generation of larvae. In some cases growers may only need to spray the orchard margins exposed to invading second-generation mated female codling moths.

5. Are there other benefits to area-wide management of codling moth?

There are direct and indirect benefits of area-wide codling moth management;

6. Every hectare of pome fruit production is monitored for codling moth and are growers informed of trapping results.
7. Records of moth captures make possible immediate and future assessment of program performance, identification of 'hot spots', risk assessment for orchards, identifying trap locations if required by importers.
8. All commercial pome fruit growers and host tree owners in buffer zones will be required to control outbreaks.
9. Elimination of organophosphate insecticide use (cover sprays) will allow development of biological control of leafrollers and other orchard pests.
10. An area under area-wide control program can achieve special status as Pest Free or Pest Control Zone under international standards that can create marketing opportunities.
11. Elimination of wild/unmanaged host trees reduces risk of foreign pests (e.g. apple maggot, plum curculio, Oriental fruit moth) from becoming established.
12. Elimination of wild/unmanaged host trees reduces sources of mated codling moth and other orchard pests.
13. Reducing the number of sprays will reduce the friction between growers and urban neighbors concerned about pesticides.
14. Successful area-wide control can eventually reduce total costs of codling moth and other pests as the need for control actions lessens.

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