

Apple Spray Materials Cost per Dose

Glen W. Koehler

Associate Scientist - New England Pest Management Center/IPM/APHIS

Revised March 2001

HOW COSTS WERE CALCULATED: Several pesticide dealers in Maine supplied apple pesticide prices as of February 2001. Prices per pound/gallon vary with package size. The average of the lowest bulk price available from each dealer was used to calculate costs.

Most doses are stated as amount per 100 gallons dilute. Reference doses are from labels and the *2000-2001 New England Apple Pest Management Guide*. Additional dose values are from *Pest Management Guidelines for Commercial Tree-Fruit Production 2000* (by Cornell, for some growth regulator rates), and *The ABC's of Spraying* by Loveland Industries, Inc. (for some of the adjuvant rates)

An "acre" is a two-dimensional unit of flat area that does not describe the three-dimensional target volume of an apple orchard. For most materials, the spray material cost per acre for a specific block depends on the volume of the target area in that block, which depends on the size of the trees and row spacing. The Tree Row Volume (TRV) method allows you to quickly and easily calculate the amount of material required to cover the foliage in a block.

To translate the "Cost per 100 gallons dilute mix" into a cost per acre, multiply the cost for 100 gallons dilute mix times the number of 100 Dilute Gallons per Acre (DGA) for that block. A simple formula for estimating the DGA is given in the *New England Apple Pest Management Guide*. DGA for current orchards ranges from an arbitrary minimum of 150 DGA (150 DGA minimum recommended because of low spray capture efficiency on very small trees) up to 400 DGA or more. At maturity, most recently set orchards on M26 or other semi-dwarf or dwarf rootstock will be less than 250 DGA.

Example: An orchard block requires 220 DGA.

The pesticide dose cost is \$10 per 100 gallons of dilute spray mix.

The dose cost per acre is:

$(220 / 100) \times \$10$

$= 2.2 \times \$10$

$= \$22 \text{ per acre.}$

TRV does not apply for some materials such as herbicides that are applied on a per acre basis regardless of tree size. For other materials such as adjuvants, dosage is set according to 100 gallons of finished tankmix, again regardless of how much foliage that spray is to cover. Another exception is the cost for phytophthora crown rot suppression treatment. Dose for some of the phytophthora treatment options are given on a "per tree" basis, so costs for the other options were converted to "per tree" to allow comparison. Necessary details are provided so that you can alter the assumptions used to recalculate cost per tree for your own orchard.

SYMBOLS and ABBREVIATIONS: Toxicity ratings of insecticide, miticide, and fungicides to the beneficial mite predator *T. pyri* are shown as an indicator for potential disruption to mite biocontrol.

The # symbol indicates high impact of over 70% *T. pyri* mortality in the 48 hours after application.

The @ symbol indicates moderate impact of 30–70% *T. pyri* mortality.

Materials with no symbol are expected to cause less than 30% *T. pyri* mortality.

A "?" is used when the effect of the material on *T. pyri* is not clear.

The formulation abbreviations are:

DG = dispersible granule

DF = dry flowable

DP = dry prill (little beads)

EC = emulsifiable concentrate

F = flowable

G = granule

L = liquid

SC = soluble concentrate

WBC = water based concentrate

WG or WDG = water dispersible granule

W or WP = wettable powder

WS = water soluble powder

WSB = water soluble bag

CAUTION: This information is primarily intended to help in budgeting production expenses, not as the basis for selecting among treatment options. It is not possible to simply compare dose costs of materials to see which is the more cost-effective option. A material that costs more per dose but gives better results, gives the same results with fewer applications, or has fewer negative potential consequences, may be less expensive in the long run. Materials may be preferred or avoided for other reasons that far outweigh differences in initial cost per dose.

ACKNOWLEDGEMENTS: This bulletin would not have been possible without the help of Brian McCleary (United Agri Products), Tom Kosch and Lauchlin Titus (Agway), and Dick Deans (Paris Farmers Union).

DISCLAIMER: Where brand names are mentioned, no endorsement is implied nor is discrimination intended against products with similar ingredients. Consult pesticide product labels for rates, application instructions, and safety precautions. The label is the law. Disregard any statements in this bulletin that appear to contradict label instructions. Users of pesticide products assume all associated risks.

INSECTICIDES	Dose per 100 gals. dilute spray mix	Estimated cost for 100 gallons dilute mix
---------------------	--	--

Organophosphates for multiple insect pests (plum curculio, Eur. apple sawfly, apple maggot etc.)

Azinphos-M 50WSB	8—10 ozs.	\$ 5.46—6.83
Guthion 50WSB	8—10 ozs.	\$ 5.69—7.11
Imidan 70WP	12—16 ozs.	\$ 6.08—8.10
Imidan 70WSB	12—16 ozs.	\$ 5.76—7.68
@Lorsban 50WP	8—16 ozs.	\$ 4.95—7.43
#Dimethoate 400 (L)	12—16 fl. ozs.	\$ 2.76—5.52
Diazinon 50WP	16 ozs.	\$ 6.04
Dzn AG600 (diazinon 56WDG)	0.8 pt.	\$ 4.20

Lorsban 4EC* 8—16 fl. ozs. \$ 2.95—5.90

**Lorsban 4EC for use at Half-inch green against San Jose scale, rosy apply aphid, and climbing cutworm. Cost shown is for Lorsban 4E alone, and does not include recommended combination with 2 gallons dormant oil per 100 gallons dilute tankmix.*

Supracide 1—3 lbs. \$ 7.91—23.73

For prebloom control of San Jose scale and rosy apple aphid.

Special case

Di-Syston 15G for aphid control on nonbearing trees @ 2.5 ounces per tree per inch of trunk diameter
2.5 ozs. \$ 0.36

Pyrethroids: *While initial cost is low, use of these materials is very detrimental to beneficial species that help keep mites and other pests under control. Using a pyrethroid may create need to use additional miticide or insecticide for other pests later. This detrimental effect increases with dosage and with later date of use.*

#Ambush 2EC	1.6—6.4 fl. ozs.	\$ 1.65—6.59
#Pounce 3.2EC	1.0—4.0 fl. ozs.	\$ 1.24—4.96
#Pounce 25WP	1.6—6.4 ozs.	\$ 1.18—4.73
#Asana 0.66EC	2.0—5.8 fl. ozs.	\$ 1.89—5.48
#Danitol 2.4EC	2.7—5.3 ozs.	\$ 3.77—7.40

Carbaryl

Carbaryl 4L	1—2 pints	\$ 4.20—8.41
Sevin 4EC XLR	1—2 pints	\$ 4.14—8.27
Sevin 80SP	2/3—1.33 lb.	\$ 4.03—8.05
Sevin 80WSP	11—21 ozs.	\$ 4.20—8.41

Other multiple pest insecticides

Avaunt 30DG 1.25—1.5 ozs. \$ 7.98—9.57
Actara - had not received EPA as of March 26, 2001

	Dose per 100 gals. dilute spray mix	Estimated cost for 100 gallons dilute mix
Surround 95WP	25 lbs.	\$ 19.75

Like every other pesticide, Surround has unique characteristics that define its niche in grower pest management programs. Surround is marketed primarily for organic production where conventional alternatives like Imidan are not available, and where the requirement for damage control is less stringent.

Surround acts as a barrier, not as a toxicant. For this reason, plum curculio damage prevention with Surround alone will require coverage for a longer period and require more applications than a conventional insecticide program. The Surround label recommends 25 lbs. per 100 gallons dilute spray mix. Concentration beyond 2X is not recommended as excellent coverage is **essential** for this material to perform.

A lower dose of Surround can be used once a barrier film has been established, but this might also require more frequent applications. Maintaining the particle barrier requires regular inspection of the trees to insure that the fruit and foliage have a visible white coating and reapplication as needed. The cost calculations shown here are based on two initial applications at a 7 day interval, followed by maintenance sprays at a 9 day interval.

To protect fruit through the 6-week plum curculio egg-laying period will require about 6 applications. This is based on starting at petal fall and making 5 applications to maintain protection at the intervals stated above through 6 weeks (42 days) after petal fall. One additional application is added to allow for one or more shortened spray intervals due to rain wash-off during that period. More than about 0.5–0.75 inch of rain is enough to wash off the barrier.

Material cost used is \$19.75 per 25 lb. bag. A lower price might be found for larger pallet-sized purchases.

The materials cost for this program would be **\$118 per 100 gallons dilute**. The Surround program materials cost per acre for a block of trees that requires 200 gallons per acre for a dilute application would be \$237.

Verbal recommendations and grower practice seems to involve lower rates of 19 lbs. per 100 gallons dilute for the first two sprays, and 13 lbs. per 100 gals. dilute for maintenance sprays. Under this regime, the total 6 spray program Surround cost would be **\$71 per 100 gallons dilute**, and \$142 per acre for trees that require 200 gallons per acre for a dilute application

The Surround program involves at least one, and perhaps two or more, additional spray trips than a conventional insecticide approach. As shown at end of this bulletin, per acre spray cost is estimated at \$10.21—21.08, but that range includes fixed as well as variable marginal costs.

The Surround program as stated would not provide protection against European apple sawfly. Depending on pest pressure and tolerance for damage, this program may also require supplementary measures against first-generation codling moth.

The cost for 2—3 full-block Imidan 70WSB doses to deliver equal or better plum curculio control would be **\$15–23 per 100 gals. dilute**. The Imidan program materials cost per acre for a block that requires 200 gallons per acre for a dilute application would be \$30–46.

A petal fall Imidan application prevents damage by European apple sawfly, an important apple pest in Maine. In addition, 2—3 Imidan applications has provided first generation codling moth control.

The point of this discussion, and this bulletin as a whole, is not to argue for or against any particular material. Those choices are driven by more than simple dollars-per-dose considerations. Nevertheless, running a profitable orchard business requires careful planning for likely cost scenarios.

Materials primarily used to control sap-feeding stage Leafminers (also effective against other pests)

	Dose per 100 gals. dilute spray mix	Estimated cost for 100 gallons dilute mix
Provado 1.6F	1—2 fl. ozs.	\$ 4.02— 8.04
@Agri-Mek 0.15EC	2.5 fl. ozs.	\$ 15.57
?Spintor 2SC	1—2.5 fl. ozs.	\$ 5.26—13.16
<i>Agri-Mek and SpinTor must be combined with oil or other penetrant. Costs shown do not include cost of penetrant added to final tankmix (see page 12 for adjuvant costs). Note that Agri-Mek also acts as a miticide.</i>		
#Lannate 90SP	2—4 ozs.	\$ 2.79— 5.59
#Lannate 2.4LV	6—12 fl. ozs.	\$ 2.81— 5.62
#Vydate 2L	8—16 fl. ozs.	\$ 4.36— 8.73

Chlorinated hydrocarbons for multiple insect pests

Endosulfan 3EC	21 fl. ozs.	\$ 5.67
Endosulfan 50WP	1 lb.	\$ 7.37
Thiodan 3EC	21 fl. ozs.	\$ 6.13
Thiodan 50WP	1 lb.	\$ 7.53
Thiodan 50WSB	1 lb.	\$ 8.23
Marlate 50WP	2—3 lbs.	\$ 10.52—15.77
Methoxychlor 2EC	2—3 qrts.	\$ 13.14—19.71

Bt (*Bacillus thuringiensis* toxin) to control Lepidopteran caterpillars (codling moth, oriental fruit moth etc.)

	Dose per 100 gals. dilute spray mix	Estimated cost for 100 gallons dilute mix
Agree WG	4—8 ozs.	\$ 3.11— 6.21
Biobit XL	1—1.8 pts.	\$ 4.04— 7.27
Dipel 2X 6.4WP	2—8 ozs.	\$ 2.03— 8.12
Dipel DF	2—8 ozs.	\$ 1.92— 7.67
Javelin WG	2—16 ozs.	\$ 1.53—12.24
MVP Bioinsecticide	0.5—2 pts.	\$ 1.63— 6.51
Xentari DF	2—8 ozs.	\$ 2.71—10.85

Bt products will require more frequent application throughout the period of egg hatch to provide protection comparable to that provided by organophosphate or other alternative materials.

Insect Growth Regulators, Botanical, Insecticidal Soap

to control Lepidopteran caterpillars (codling moth, oriental fruit moth etc.)

Confirm 2F	5 fl. ozs.	\$ 7.90
Esteem 0.86EC	2.5—4 fl. ozs.	no price found
Intrepid 2F	2—4 fl. ozs.	no price found
Neemix 4.5% EC	4—5 fl. ozs.	\$ 24.73—30.91
?M-Pede (insecticidal soap)	1—2 gals.*	\$ 17.56—35.12

** M-Pede rate is 1-2% vol./vol. in finished tankmix for control of rosy apple aphid, green aphid, and white leafhopper. Dose is fixed by tankmix amount, not TRV. Thus, cost does not multiply in same manner as doses per 100 gals. dilute.*

IGR products will require more frequent application throughout the period of egg hatch to provide protection comparable to that provided by organophosphate or other alternative materials.

MITICIDES

<u>Prebloom horticultural oil</u>	<u>Dose per 100 gallons dilute spray mix</u>	<u>Estimated cost for 100 gallons dilute mix</u>
?Damoil	1—3 gals.	\$ 5.43—16.28
?Oil 6EC	1—3 gals.	\$ 4.04—12.11

Post bloom oil and soap

@Damoil as summer oil	0.5—2 gals.*	\$ 2.71—10.85
@Ultra-Fine summer oil	0.5—2 gals.*	\$ 7.05—28.21

* Best used as a 3 spray preventive program. For summer mite suppression, recommendation is to use 1 gallon of oil labeled for summer use per 100 gallons finished tankmix. Spray as close to dilute as possible, use enough water per acre to thoroughly wet the trees. Cost per acre depends on volume of tankmix sprayed per acre.

?M-Pede (insecticidal soap)	1—2 gals.*	\$ 17.56—35.12
-----------------------------	------------	----------------

* M-Pede dose, like those for summer oils, is per 100 gallons finished tankmix, not per 100 gals. TRV dilute. I do not have data on efficacy of this material as compared to the other miticides listed. However, M-Pede is not recommended as a rescue treatment for an over-threshold mite population and is probably best suited for a 3-spray preventative program.

CHEMICAL MITICIDES

#Carzol 92SP	4—8 ozs.	\$ 10.49—20.99
--------------	----------	----------------

Carzol cannot be applied after petal fall, and requires special permit for use in Maine.

?Apollo 4SC	1—2 fl. ozs	\$ 12.34—24.67
-------------	-------------	----------------

Apollo @ 4 ozs./acre + 1 gal. Damoil = \$ **54.77 per acre**

Apollo label has fixed minimum of 4 fl. ozs. per acre. Except for the largest trees, the minimum acre rate replaces tree row volume.

?Savey 50WP	1—2 ozs.	\$ 16.56—33.12
-------------	----------	----------------

Savey @ 3 ozs./acre + 1 gal. Damoil = \$ **55.11 per acre**

Savey label has fixed minimum of 3 ozs. per acre. Except for the largest trees, the minimum acre rate replaces tree row volume.

@Agri-Mek 0.15EC	2.5 fl. ozs.	\$ 15.77
------------------	--------------	----------

Agri-Mek must be combined with penetrant. Cost shown does not include cost of adjuvant added to final tankmix. Reduced efficacy if used more than 2 weeks after petal fall.

@Kelthane 50WP	2 lbs.	\$ 22.86
----------------	--------	----------

@Pyramite 60WS	2.2 ozs.	\$ 23.53
----------------	----------	----------

Vendex 50WP	5—8 ozs.*	\$ 9.48—15.17
-------------	-----------	---------------

* Rate for paired Vendex treatments is 5—6 ozs./100 gals. dilute.

Rate for single Vendex application is 8 ozs./100 gallons dilute.

Insecticides with some miticide activity

#Danitol 2.4EC	4—5.3 fl. ozs.	\$ 5.58—7.40
----------------	----------------	--------------

I do not have data on Danitol's performance as a miticide relative to other materials listed.

#Vydate 2L	1—2 pts.	\$ 8.73—17.46
------------	----------	---------------

Vydate is considered a moderately effective mite population suppressant. It is not suitable for attempting to control a mite population that is well above threshold.

FUNGICIDES	Dose per 100 gallons dilute spray mix	Estimated cost for 100 gallons dilute mix
-------------------	--	--

Benzimidazoles (These rates are for use in combination with another fungicide.)

Benlate 50WP	2—3 ozs.	\$ 2.41—3.62
Topsin-M 70WSB	2—3 ozs.	\$ 2.41—3.61

Captan

Captan 50WP	1—2 lbs.	\$ 3.44—6.89
Captan 80WP	0.63—1.25 lbs.	\$ 3.05—6.10
Captec 4L	1—2 pints	\$ 3.50—6.99
Captec 4L*	0.75—1.5 pints *	\$ 2.62—5.24

* Some growers and researchers think that after the end of peak primary scab risk periods, the liquid formulation of captan can provide equivalent protection at 25% lower dosage than WP formulation.

Syllit and Vanguard (Early season oil-compatible scab fungicides.)

Syllit 65WP	6 ozs.	\$ 4.51
--------------------	--------	---------

Syllit can be used at 12 oz/100 gals. dilute rate is for attempting to suppress existing scab lesions.

Vanguard 75WG	1.25 ozs.	\$ 4.04
----------------------	-----------	---------

Sterol inhibitors (SI) SI fungicide should be combined with at least a half-rate of protectant fungicide.

Nova 40W	1.5—2 ozs.	<u>Nova alone</u>	<u>Nova + 1 lb. captan 50W</u>
		\$ 6.53—8.71	\$ 9.97—12.15
Rubigan 1EC	3—4 fl. ozs.	<u>Rubigan alone</u>	<u>Rubigan + 1 lb. captan 50W</u>
		\$ 6.52—8.70	\$ 9.96—12.14
Procure 50WS	3—4 fl. ozs.	<u>Procure alone</u>	<u>Procure + 1 lb. captan 50W</u>
		\$ 9.91—13.21	\$13.35—16.65

Strobilurins

Flint 50WDG	0.67 oz.—0.8 oz.	\$ 9.88—11.80
Sovran 50WG	1.33—1.6 ozs.	\$ 9.82—11.80

EBDC fungicides. The lower rates shown for EBDC fungicides are for use in combination with another fungicide. For use a stand-alone fungicide, the high end of the dose per 100 gallons dilute is required when scab infection pressure is moderate or high. At the higher dose, the Extended Application program 3 lbs. per acre per application limit will be exceeded for orchards that require over 150 gallons per acre for a dilute spray. However, it is common practice with certain pesticides, including EBDC fungicides, to take a 20% dosage reduction when making a concentrate spray (over 3X) application. With a 20% concentrate spray dosage reduction (i.e. 1.6 lbs. instead of 2 lbs./100 gals. dilute), an EBDC product can be used as a stand-alone fungicide, and still be within the Extended Application program limit for blocks that require up to 187 dilute gallons per acre. If the Extended Application program limit is exceeded by any application, no EBDC product can be used beyond bloom.

The EBDC fungicides have two ratings for detriment to T. pyri. The first symbol (@) applies for use through First Cover. The second symbol (#) is for summer applications made after First Cover.

EBDC FUNGICIDES	Dose per 100 gallons dilute spray mix	Estimated cost for 100 gallons dilute mix
MANCOZEB		
@#Manzate 200 DF	1—2 lbs.	\$ 2.41—4.82
@#Penncozeb 75DF	1—2 lbs.	\$ 2.61—5.22
@#Penncozeb 80WP	1—2 lbs.	\$ 2.92—5.84
METIRAM		
@#Polyram 80WP	1—2 lbs.	\$ 2.65—5.30
MANEB		
@#Manex 4L	0.8—1.6 qrts.	\$ 2.84—5.69

Dithiocarbamates

Even at the high-end rates, these materials are not as effective as the other fungicides listed on this and previous page for apple scab control. The lower rates are for use in combination with another fungicide.

?Ferbam Granuflo 76WP	1—2 lbs.	\$ 4.82—9.64
?Thiram 75 Granuflo	1.5—2 lbs.	\$ 5.31—7.08
@Ziram 76DF	1—1.5 lbs.	\$ 3.38—5.07

Sulfur

Sulfur Microfine 90WP	5.6 lbs.	\$ 1.60
Lime Sulfur Solution (29% Calcium polysulfide)	10—12 gals.	\$ 81.30—91.56 → This is not a typo!

COPPER products for early season fireblight inoculum suppression.

Early season copper use is also considered for nutrient benefit and as a scab fungicide. Note that only the Champ formulations labels list scab as a targeted pest.

Copper hydroxide rates are standardized to deliver 1—2 lbs KOH per 100 gallons dilute mix.

copper hydroxide formulations

Champ DP58%	1.7—3.4 lbs.	\$ 6.88—13.76
Champ 2F	1.7—3.5 lbs.	\$ 6.09—12.19
Kocide 2000 DF (54%)	1.9—3.7 lbs.	\$ 6.38—12.77
Kocide DF (61%)	1.6—3.3 lbs.	\$ 4.36— 8.72
Kocide LF (2.4)	3.3—6.7 pts.	\$ 6.45—12.91
Kocide 4.5LF	1.8—3.6 pts.	\$ 6.60—13.20

copper oxychloride sulfate

C-O-C-S WDG	2—4 lbs.	\$ 5.21—10.43
-------------	----------	---------------

BACTERICIDE for protection against fireblight infection during bloom

Agri-mycin 17WP	8 ozs.	\$ 12.74
Agri-mycin 17WP	4 ozs. + Regulaid 4 fl. ozs.	\$ 7.51

THINNERS	Dose per 100 gallons dilute spray mix	Estimated cost for 100 gallons dilute mix
Carbaryl 4L	0.5—1.5 pts.	\$ 2.10— 6.31
Sevin 4EC XLR Plus	0.5—1.5 pts.	\$ 2.07— 6.20
Sevin 80SP	0.3—0.9 lbs.	\$ 1.80— 5.41
Sevin 80WSP	0.3—0.9 lbs.	\$ 1.88— 5.65
Fruitone N (NAA)	2—6 ozs.	\$ 3.63—10.90
K Salt Fruit Fix 200 (NAA)	1.2—3.6 fl. ozs.	\$ 1.50— 4.49
Accel (dose for 35—65 ppm)	36—47 fl. ozs.	\$ 61.55—80.01
Ethephon 2 - late thinner	1—1.5 pts.	\$ 5.88— 8.82
Ethrel - late thinner	1—1.5 pts.	\$ 5.86— 8.79

other GROWTH REGULATORS

Shoot growth suppression

Apogee 6—12 ozs. \$ 35.84—71.67

Flower bud promotion

Ethephon 2 - nonbearing trees 1—1.5 pts. \$ 5.88— 8.82

Ethrel - nonbearing trees 1—1.5 pts. \$ 5.86— 8.79

Ethephon 2 - bearing trees 0.5 pt. \$ 2.94

Ethrel - bearing trees 0.5 pt. \$ 2.93

Red color and ripening promotion

Ethephon 2 4—16 fl. ozs. \$ 1.47—5.88

Ethrel 4—16 fl. ozs. \$ 1.46—5.86

<u>various growth effects</u>	Dose per 100 gallons dilute spray mix	Estimated cost for 100 gallons dilute mix
Promalin to promote typiness of Delicious fruit	1—2 pts.	\$ 19.07—38.14
Provide to suppress "physiological fruit russetting"	10—13 fl. ozs.	\$ 5.56—7.23
Promalin to promote branching on young trees 0.25—1 pt. to make 5 gallons mix. Cost per 5 gallons mix = \$ 4.77—19.07		

Harvest delay

Fruitone N as stop-drop 4—8 ozs. \$ 7.46—14.52

K Salt Fruit Fix 200 as stop-drop 2.4—4.8 fl. ozs. \$ 2.99— 5.98

ReTain - ethylene inhibitor at 200—333 grams **PER ACRE** costs \$132.15—215.09 **PER ACRE**

Note that ReTain rate is rate per acre, NOT per 100 gallons dilute mix.

PREHARVEST FOLIAR CALCIUM	Dose per 100 gallons dilute spray mix	Estimated cost for 100 gallons dilute mix
Calcium chloride 77%	2—3.3 lbs.	\$ 0.74— 1.22
Sorba-Spray Calcium	0.65—1.07 gallons	\$ 7.43—12.26
Sorba-Spray CaB	1.11—1.83 gallons	\$ 14.48—23.90

Doses for Sorba-Spray formulations set to deliver same amount elemental calcium as 2—3.3 lbs. calcium chloride 77%. Sorba-Spray CaB also provides nitrogen and boron.

OTHER NUTRIENT FOLIAR SPRAYS

Foliomag	1 qrt.	\$ 6.56
Solubor	1 lb.	\$ 0.97

HERBICIDES	Rate per treated acre	Herbicide cost per treated acre	Timing limitations
<u>Pre-emergent activity against grasses only</u>			
Devrinol 10G	40 lbs.	\$110.00	
Devrinol 50DF	8 lbs.	\$ 77.97	
Kerb 50WP	2—8 lbs.	\$ 76.64—306.56	dormant only, none in 1st year
Prowl 3.3EC	2.4—4.8 qrts.	\$ 13.77— 27.54	non-bearing only
Solicam DF	2.5—3.75 lbs.	\$ 55.28— 82.91	
Surflan 4AS	2—6 qrts.	\$ 44.20—132.59	

Pre-emergent activity against broadleaves only

Goal 2 XL	2—8 pints	\$ 27.59—110.37	dormant only before bud swell
-----------	-----------	-----------------	-------------------------------

Pre-emergent activity against both grasses and broadleaves

Casoron G	100—150 lbs.	\$222.00—333.00	dormant only
Direx 4L	0.8 gal.	\$ 20.47	not in 1 st year or on M9 rootstock
Diuron 80WDG	4 lbs.	\$ 20.28	not in 1 st year or on M9 rootstock
Karmex 80DF	4 lbs.	\$ 21.44	not in 1 st year or on M9 rootstock
Sinbar WP	2—4 lbs.	\$ 62.20—124.40	not until 4 th year
Princep Caliber 4L	2—4 qrts.	\$ 9.62— 19.24	not in 1 st year
Princep Caliber 90DF	2.2—4.4 lbs.	\$ 9.75— 19.49	not in 1 st year
Simazine 4L	2—4 qrts.	\$ 9.46— 18.91	not in 1 st year
Simazine 90WDG	2.2—4.4 lbs.	\$ 8.25— 16.50	not in 1 st year

Post-emergent activity against grasses only

Fusilade DX	1 pint	\$ 19.21	non-bearing only
Kerb 50WP	2—8 lbs.	\$ 76.64—306.56	dormant only, none in 1st year
Poast L	1.5—2.5 pints	\$ 16.14— 26.91	

Post-emergent activity against broadleaves only

Amine 4 (2,4-D)	3 pints	\$ 6.56	not in 1 st year
Saber (2,4-D)	3 pints	\$ 6.61	not in 1 st year
Weedar 64 (2,4-D)	3 pints	\$ 5.87	not in 1 st year

Post-emergent activity against both grasses and broadleaves

Gramoxone Extra L	2—3 pints	\$ 8.86— 13.28	
Rely L	3—5 qrts.	\$ 46.53—77.55	not in 1 st year
Glyfos 4L	1—5 qrts.	\$ 11.51—57.57	
Roundup 4L	1—5 qrts.	\$ 11.34—56.70	
Touchdown 5	0.31—6.4 pints	\$ 2.17—44.45	

NEMATOCIDES	Rate per treated acre	Nematicide cost per treated acre	Timing limitations
Nemacur 3SC soil application	1.66–2.5 gals.	\$174.08—262.18	72 day PHI
Vydate 2L pre-plant soil treatment	3–4 gals.	\$209.46—279.28	nonbearing
Vydate 2L post-plant foliar	3–4 pts. x 4 applications	\$104.73—279.28	nonbearing

TANKMIX ADJUVANTS	Amount per 100 gallons finished tankmix	Estimated cost
<u>Spreader and spreader/penetrants</u>		
Activator 90 spreader/penetrant	1—4 pts.	\$ 2.56—10.25
<u>Biosurf spreader</u>		
- insecti/fungi/miticide rate for liquid formulations	3—8 fl. ozs.	\$ 0.36— 0.95
- insecti/fungi/miticide rate for dry formulations	1—2 pts.	\$ 1.90— 3.81
- herbicide rate	1—3 pts.	\$ 1.90— 5.71
<u>Freeway organosilicone spreader/penetrant</u>		
- insecticide/fungicide/miticide rate	6—16 fl. ozs.	\$ 5.00—13.32
- herbicide rate	16—64 fl. ozs.	\$ 13.32—53.29
Patron B 1956 spreader/sticker	10—32 fl. ozs.	\$ 2.69— 8.61
<u>LI-700</u>		
- insecti/fungi/miticide/nutrient/growth regulator rate	0.5—2 pts.	\$ 1.68— 6.70
- herbicide rate	1—4 pts.	\$ 3.35—13.41
<u>Silwet 77 organosilicone spreader/penetrant</u>		
- insecticide/growth regulator rate	3—4 fl. ozs.	\$ 4.73— 6.31
- fungicide/miticide rate	4—6 fl. ozs.	\$ 6.31— 9.47
- herbicide rate	3—8 fl. ozs.	\$ 4.73—12.62
<u>Tactic organosilicone spreader/sticker</u>		
X77 spreader	8—16 fl. ozs.	\$ 4.51— 9.02
- insecticide/fungicide/miticide rate	4—8 fl. ozs.	\$ 0.73— 1.46
- herbicide rate	0.5—4 pts.	\$ 1.46—11.67
<u>Sticker and deposit enhancers</u>		
Bond sticker	1—2 pts.	\$ 4.88— 9.77
Chem-Trol antidrift/antirunoff agent	1—4 qrts.	\$ 4.06—16.25
Tactic organosilicone spreader/sticker	8—16 fl. ozs.	\$ 4.51— 9.02
<u>Other adjuvant activity</u>		
The Unfoamer antifoamer	1—3 fl. ozs.	\$ 0.52— 1.57
Unite compatibility agent for pesticide-liquid fertilizer mixes	0.5—3 pts.	\$ 2.31—13.86
UltraGard antidrift/defoamer/hard water conditioner	1—2 qrts.	\$ 13.75—27.50
Choice hard water conditioner for herbicides, Apogee	2—6 pts.	\$ 4.80—14.41
Incite piperonyl butoxide insecticide synergist	2 fl. ozs.	\$ 2.18

POSTHARVEST DRENCH MATERIALS	Dose to make 100 gallons Drench Solution	Dose Cost per Bushel *
No Scald DPA EC-283 31%	5 pints (for 100 gals. 2000 ppm solution)	\$ 0.91
No Scald DPA EC-283 31%	1.25 pints (for 100 gals. 500 ppm solution)	\$ 0.23
Mertect 340F	16 fl. ozs.	\$ 0.07
Captan 50WP	2.5 lbs.	\$ 0.017 (< 2 cents)
Captan 80WP	1.6 lbs.	\$ 0.017 (< 2 cents)
Captan 4L	2.5 pts.	\$ 0.017 (< 2 cents)
94% briner's Calcium	1.84—12 lbs.	\$ 0.002—0.01 (0.2 to 1 cent)
	<i>1.8 lbs. 94% CaCl₂ is equivalent elemental calcium as 1.35 gals. Stopit</i>	
Stopit Calcium Concentrate	1.35 gals.	price not found
TOTAL cost 2000 ppm DPA+Mertect+captan+1.8 lbs. briner's Ca		\$ 1.00 per bushel
TOTAL cost 500 ppm DPA+ Mertect+captan+1.8 lbs. briner's Ca		\$ 0.32 per bushel

* Dose Cost per Bushel based on assumption that drench is replaced after 30 bins (450 bushels).

RODENTICIDES	Rate per treated acre	Rodenticide cost per treated acre
zinc phosphide pellets	hand baiting 2—3 lbs.	\$ 2.41—3.62
	broadcast 6—10 lbs.	\$ 7.23—12.05
zinc phosphide coated oats	hand baiting 2—3 lbs.	\$ 1.54—2.31
	broadcast 6—10 lbs.	\$ 4.62—7.70
Ramik Green	10—20 lbs.	
	(For New England, SLN label only in VT as of 11/99)	
Rozol	10—20 lbs.	
	(For New England, SLN label only in VT as of 11/99)	

DEER REPELLANT

Hinder @ 3—5 lbs. per 100 gals. tankmix applied per acre. \$67.20—112.00 per acre per application

Repellant is not an effective alternative for fencing when deer pressure is high. Hinder label recommends reapplication every 10-14 days as long as protection is needed. In other words, get a fence if you want to protect small apple trees from deer depredation

SPRAY APPLICATION COSTS

(Labor, tractor and sprayer depreciation, interest, fuel, insurance, and shelter)

These estimates are only for application, not spray materials. They are extrapolated from a study done in Ohio apple orchards in 1988 (R.C. Funt, M.A. Ellis, and Madden L.V., Plant Disease 74:638-642)

Inflation adjustment: The 1988 cost estimates were adjusted for 36% inflation in the U.S. Bureau of Labor Statistics Farm Machinery and Mist Sprayers Producer Price indexes between May 1988 and January 2001. It was not possible to separate out the labor and fuel cost components to adjust these by their own inflation factor, so the 2001 estimates reflect the same inflation ratio applied to all component costs.

Cost per spray trip: The 1988 cost estimates were stated as per acre per season. In order to get a cost per sprayed acre, costs were spread over 11 spray trips per year. Each farm is unique and the assumptions used to make these estimates may not apply to your operation, but overall the assumptions seemed reasonably accurate for a rough estimate of orchard spraying costs in Maine. The cost per acre varies with farm size because equipment costs are depreciated over a greater number of acres for larger orchards.

For a 20 acre orchard, the estimate is **\$21.08** per acre per application.

For a 40 acre orchard the estimate is **\$13.99** per acre per application.

For an 80 acre orchard the estimate is **\$10.21** per acre per application.

Scouting Costs:

The major expense in this rough estimate is \$10 an hour labor cost. The \$10 per hour figure is an arbitrary choice made so that it would be easy for you to adjust the estimate according to the hourly labor cost appropriate for your operation. The labor is used to check each block once a week for 18 weeks from late April (to set traps) to early September. The scout is assumed to cover 10–15 acres of orchard per hour. This would allow a reasonable scouting intensity for one, two or three pests over that area. A higher "acres per hour" ratio might be achieved in larger blocks if the scouting intensity or number of pests scouted is decreased. Scouting every block every week for 18 weeks is probably more intensive than many growers would find necessary to get the information needed to guide pest management decisions. The estimate does not cost for traps or expenses and time to travel to blocks in different locations. Trap cost per acre is relatively small given that a few traps can service many acres, not every block needs a full complement of traps, and some traps can be reused year after year.

With these assumptions, the rough estimate for a full season scouting program is \$14.40 per acre. At \$20 per hour for scout wage and benefits, the cost per acre would be \$28.80 per acre per season.

Scouting may help reduce pesticide and/or application costs. More importantly, it can help improve crop yield or quality by noticing problems early on and by improving the timing of management actions. Looking at the relative costs of crop damage, pesticides, application, and scouting; scouting is a good investment from which benefits and savings will far exceed costs.