



JAN 8 1954

A continuation of the
BULLETIN OF POPULAR INFORMATION
of the Arnold Arboretum, Harvard University

VOLUME 13

DECEMBER 25, 1953

NUMBERS 11-12

THE ARNOLD ARBORETUM SPRAY SCHEDULE

New Spray Materials

THE discovery of the insecticidal properties of DDT and its use during World War II initiated sweeping changes in our methods and materials used for controlling insects and diseases attacking plants. DDT (dichlorodiphenyl trichloroethane) was soon followed with related hydrocarbons such as chlordane, BHC (benzene hexachloride) and its derivative lindane. The organic phosphates soon appeared in the form of TEPP (tetraethyl pyrophosphate), parathion and related compounds. The discovery and development of the miticides has aided our battle against the mites and red spiders. The carbamate compounds such as ferbam, a few of the mercury compounds, and the dinitro compounds have headed the parade of new fungicides used to control plant diseases. Often the numerous new materials have come into usage so fast that experts on spray materials have had difficulty in keeping abreast of developments.

We still do not have any one all-purpose spray material. DDT is effective against most chewing insects and through its paralyzing action against some crawling insects, but it does not work well against aphids, lacebugs and the mites. Benzene hexachloride (BHC) and lindane are effective against aphids, lacebugs, and some leaf mining insects. The organic phosphates are rather toxic to man, hence must be used with care. This is especially true with parathion. Anyone using this material should use at least a respirator with a cannister to filter out the organic phosphates; a suitable gas mask and waterproof outer clothing are preferred. Parathion is useful where it can be used safely, as it will kill a wide variety of insect pests.

A new development, the material malathion, which is much more toxic to insects than to mammals, looks as though it would be a big help. Although it is effective against many of the insects that parathion controls, it is much safer for

man to use. So it is with the compounds for controlling plant diseases; ferbam is useful as a preventive spray for many fungus diseases, certain other diseases are controlled best by some of the mercuric compounds. We now have over four thousand spray formulations to choose from; some are multi-purpose while others serve only one purpose; none are all-purpose.

A distinct advantage in using DDT, lindane, dieldrin, and some of the other new spray materials, is their residual action; however, this does not eliminate the need for the proper timing of spray applications. DDT, especially if the emulsifiable form is used, may be effective for a month to six weeks after application. Lindane not only has a residual effect, but also will kill some insects inside of tree leaves such as young birch leaf miners when they are in the leaves. One of the advantages of dieldrin is its long residual action. Although this residual action helps us in some cases, we must still time our sprays correctly, not only to get the most benefit from the chemicals used, but also to be able to protect all of the plant, especially in the growing season when growth produces new, and unusually tender, areas for the plant pest to attack. It is especially important in disease control to protect these expanding surfaces since we still must rely mainly on preventing the entrance of the disease organism into the plant tissues to control plant diseases by spraying. For this reason, disease control spray applications must be repeated every week or two in the spring.

The chemistry of these newer organic spray materials is rather complicated for the layman. It would be difficult for most of us to remember the chemical name or make up of these substances so the manufacturers and others concerned have adopted standard or generic names for many. In this manner the chemical: 1, 2, 3, 4, 5, 6, 7, 8, 8 octachloro -4, 7-methano -3a, 4, 7, 7a-tetrahydroindane has become chlordane; the gamma isomer of benzene hexachloride of at least 99% purity has become lindane. The names: parathion, ferbam, malathion, and many others have each come to mean a definite substance so that we may rely on them. A few of the first materials still keep their initial names as DDT, or TEPP. Any one of these substances may be available on the market in various forms and may be sold under brand names. For example, lindane is commonly available as a 25% lindane wettable powder or a 20% lindane emulsifiable concentrate.

Anyone handling spray materials must remember that they are our ammunition, used in most cases, to kill the pests of our plants. Most of them are poisonous in one way or another. They must be handled with care to protect the user and the public; but, by choosing the correct compound and applying it properly, we can push forward the battle-line in our never-ending war on injurious insects and plant diseases.

Paralleling this development of new materials, there has been the development of mist spraying where low volumes containing relatively high concentrations of spray material are carried to the plant by an air stream. This method of spraying has its limitations, but when feasible, it has given excellent results especially

in control of leaf-eating insects, at greatly reduced operating costs. The problem of spray application with these new machines is important in that the right amount must be applied to the plant in the correct manner. With mist spray methods, the amount of material which is applied to a tree is set by the size of the mist particles, concentration used and the amount (i.e. the length of time) the tree is sprayed. With the hydraulic spray formulae, the amount of material applied is governed by the spray concentration and the amount which will stay on the plant without running off. Inasmuch as any excess applied with a hydraulic sprayer will merely run off without harming the plant, this is probably the safer spraying method.

The Arnold Arboretum Spray Schedule

With over 6000 kinds of woody plants growing in close proximity in the Arnold Arboretum, it is no wonder that the problem of keeping all these plants free of pests is acute. In the old days, it seems, this was a fairly simple procedure, but now, with all the many insects and disease pests which abound, and with the hundreds of remedies offered by various commercial chemical producers to combat these pests, pest control here has become complicated indeed.

Only a few years ago, we would merely spray for scale insects, cankerworms, the larch case bearer and the elm leaf beetle. Admittedly some of the collections may have been infested with disease or insect pests, but they did not seem serious at the time. This year, the grounds force had to spray on 24 different days, from April 1 to September 29, and each time the spraying was necessary to control some pest or disease that was disfiguring some of the specimens here on the grounds. However, because of this extensive spray program, the plants in the Arboretum have been growing vigorously and the results of disease and insect depredations are hard to find.

Most of our spraying is considered to be on an experimental basis, since we find it expedient to change our sprays from time to time as new and possibly better ones become available. However, it was thought that readers of *Arnoldia* and others interested in the Arnold Arboretum would be interested in knowing exactly what we have used in our spray program this year. We offer it here, merely as a guide to those who are interested in similar problems, but with emphasis on the fact that these control methods are definitely not the only ones, nor are they possibly the "best" ones. Everyone familiar with pest control knows that there are frequently several effective controls for one pest, as well as many different kinds of chemicals which can be used, some basically the same but with different trade names.

The Arnold Arboretum does not take any credit for the formulae here presented as pest controls, since the best recommendations are scanned from the various experimental stations (and modified, if we think necessary) to suit our particular conditions. Consequently our program should be considered as experi-

mental only, but, it is only fair to add, it resulted in pest free plants during the growing season of 1953.

A few years ago, before the advent of DDT, all the spraying here was done with the old-fashioned hydraulic sprayer. Then, when newer materials became available and mist spraying appeared, we tried to do a major part of the spraying with a large mist blower, since it obviously cost less to operate such a machine, when two men do the work instead of five or six. However, more recently, we have come to the conclusion that there is a very definite place for both types of spraying, when complete coverage and pest control is the main need, for certain sprays can be more effectively applied by the mist blower, and others need to be applied by the hydraulic high pressure sprayer in order to give effective coverage.

In order to make the following chart usable for individuals who may not have a mist blower, we have included a column for the equivalent spray to be used in the hydraulic sprayer. We have used all the mist sprays and most of the hydraulic sprays, but a few of these latter have been added untried, but taken from reliable sources.

The dates of application vary some from year to year, even in the Arboretum. Insect and disease pests should be hit when they are most vulnerable, and no hard and fast dates can be given for this. It is always best to know exactly what the spray is expected to control, and find whether the pest is in the desired form before the spray is applied. Too often spraying is done about the home grounds merely because some one else has done it or it is "about" time the plants were attended to. To be truly effective, the application must be timed properly.

ARNOLD ARBORETUM SPRAY SCHEDULE — 1953

Date	Insect	Host Plants	Treatments (Mist Spray)	Treatments Hydraulic Per 100 Gal. Water	Notes
Dormant	Scales:				
March 1	Euonymus	Celastrus, Dirca, Euonymus	D N - slurry (Elgetol or Krenite) 1 gal. to 10 gal. water	D N - slurry (Elgetol or Krenite) 1 gal.	Will discolor paint, etc. Spray before buds start to open
April 20	Oyster Shell	Fraxinus, Populus, Syringa			Hydraulic treatment preferable. Mist spray unsatisfactory
	Scurfy	Chaenomeles, Malus			
	San Jose	Prunus, Pyrus			
	Cedar-apple Rust	Crataegus, Juniper, Malus, esp. M. soulandi	"	"	Will discolor paint, etc. Spray before buds start to open
	Golden Oak Scale	Quercus	Dormant Superior oil 1 part, water 7 parts; plus blood al- bumen $\frac{1}{4}$ lb. for every 2 gal. of oil used	2-3 gal. Superior oil plus $\frac{1}{2}$ lb. blood albumen	Warm weather, before buds have broken
	Beech Bark Louse	Fagus	Liquid lime sulphur (undiluted)	5 gal. liquid lime sulphur or 20 lbs. dry lime sulphur	Will discolor paint, etc. Direct spray to trunk and underside of branches
	Larch Case Bearer	Larix			
	Spruce Gall Aphid	Picea, esp. P. abies, P. pungens vars.	"	2 $\frac{1}{2}$ gal. liquid lime sulphur	Warm weather before buds have broken
April 15-30	Elm Bark Beetle (Dutch Elm Disease)	Ulmus	25% DDT emulsifiable con- centrate (1 part and 1 part water) plus Aramite 25% emulsifiable concentrate 1 qt. to 20 gal. (heavy application)	8 gal. 25% DDT emulsifi- able concentrate plus 1 pt. Aramite 25% emulsifiable concentrate	As late as possible before buds open
May 1-10	Ash and Lilac Borer	Fraxinus, Syringa	_____	4 lbs. 50% DDT wettable powder or 2 qts. 25% DDT emulsifiable concentrate	Repeat in two weeks
	White Pine Weevil	Pinus strobus	_____	"	"
	Locust Borer	Robinia	_____	"	Check in timing—ap- ply just before buds break

Date	Insect	Host Plants	Treatments (Mist Spray)	Treatment Hydraulic per 100 Gal. Water	Notes
May 1-10	Bacterial Blight	Syringa	Puratized apple spray 1 pt. to 20 gal. water	$\frac{1}{2}$ pt. Puratized apple spray	Repeat once a week especially during wet weather
	Anthracnose	Platanus, Quercus	"	"	"
	Tent Caterpillar	Prunus, Malus, etc.	25% DDT emulsifiable concentrate 1 part, water 2 parts	2 lbs. 50% DDT wettable powder	If not too abundant, prune out nests
May 15-25	Ash and Lilac Borer	Fraxinus, Syringa	_____	4 lbs. 50% DDT wettable powder, or 2 qts. 25% DDT emulsifiable concentrate	Apply to stems until saturated
	White Pine Weevil	Pinus strobus	_____	"	Repeat in two weeks
	Bacterial Blight	Syringa	Puratized apple spray 1 pt. to 20 gal. water	Puratized apple spray $\frac{1}{2}$ pt.	Repeat once a week especially during wet weather
	Anthracnose	Platanus, Quercus	"	"	
	Kalmia Leaf Spot	Kalmia	_____	_____	Dust with dusting sulfur
	Cankerworm	Acer, Carya, Catalpa, Fraxinus, Juglans, Prunus, Quercus, Syringa, Tilia, Ulmus	25% DDT emulsifiable concentrate 1 part, water 2 parts, plus Aramite 25% emulsifiable concentrate 1 qt. to 20 gal.	2 lbs. 50% DDT wettable powder, 1 pt. Aramite 25% emulsifiable concentrate, or 4 lbs. lead arsenate and sticker	As lilacs come into full bloom
	Elm Leaf Beetle	Ulmus	"	"	"
	Elm Leaf Miner	Ulmus	"	"	"
	Willow Leaf Beetle	Salix	"	"	"
	Boxwood Leaf Miner	Buxus	"	2 lbs. 50% DDT wettable powder, 1 pt. Aramite 25% emulsifiable concentrate; or 1 qt. 25% DDT emulsifiable concentrate, and 1 pt. Aramite 25% emulsifiable concentrate	When Weigela is in bloom, and first adult flies are seen

Holly Leaf Miner	Ilex, esp. I. opaca	25% DDT emulsifiable concentrate 1 part, water 2 parts plus Aramite 25% emulsifiable concentrate 1 qt. to 20 gal.	2 lbs. 50% DDT wettable powder, 1 pt. Aramite 25% emulsifiable concentrate; or 1 qt. 25% DDT emulsifiable concentrate, 1 pt. Aramite 25% emulsifiable concentrate	Repeat in 10 days; slightly later than Boxwood Leaf Miner
Birch Leaf Miner	Betula	20% Lindane emulsifiable concentrate 1 qt. to 20 gal. plus 1 qt. Aramite 25% emulsifiable concentrate per 20 gal.	1 lb. 25% Lindane wettable powder, 1 pt. Aramite 25% emulsifiable concentrate	When adult flies are abundant and minute miners can be found
Lacebug	Amelanchier, Azalea, Rhododendron, Kalmia, Pieris, etc.	"	"	Repeat in 10 days, especially on underside of leaves
Pine Bark Aphid	Pinus, esp. P. strobus	"	"	Apply to trunk and underside of branches
Hawthorn Leaf Miner	Crataegus	"	"	
May 25 to June 5	Euonymus Scale	25% DDT emulsifiable concentrate 1 part, water 2 parts, plus Aramite 25% emulsifiable concentrate 1 qt. per 20 gal.	2 lbs. 50% DDT wettable powder, 1 pt. Aramite 25% emulsifiable concentrate	Repeat in 10 days
June 1-10	Flat-headed Apple tree Borer	Malus, Rosa, esp. R. rugosa, Sorbus, etc.	4 lbs. 50% DDT wettable powder; or 2 qts. 25% DDT emulsifiable concentrate	Especially on stems near ground—repeat in two weeks
Holly Leaf Miner	Ilex opaca	25% DDT emulsifiable concentrate 1 part, water 2 parts, 1 qt. Aramite 25% emulsifiable concentrate per 20 gal.	2 lbs. 50% wettable DDT, 1 pt. Aramite, 25% emulsifiable concentrate; or 1 qt. 25% emulsifiable concentrate DDT, 1 pt. Aramite 25% emulsifiable concentrate	
Lacebug	Amelanchier, Azalea, Cotoneaster, Crataegus, Kalmia, Pieris, Rhododendron, Sorbus	20% Lindane emulsifiable concentrate 1 qt. to 20 gal. water plus 1 qt. Aramite 25% emulsifiable concentrate per 20 gal.	1 lb. 25% Lindane wettable powder, 1 pt. Aramite 25% emulsifiable concentrate	Repeat in 10 days on Crataegus and on Sorbus

<i>Date</i>	<i>Insect</i>	<i>Host Plants</i>	<i>Treatments (Mist Spray)</i>	<i>Treatments Hydraulic per 100 Gal. Water</i>	<i>Notes</i>
June 15-25	Black Vine Weevil	Taxus	_____	_____	10% DDT Dust when adults found under trash on soil. Heavy coat on low branches and ground surface dusted on by hand
June 25 to July 5	Lacebug	Amelanchier, Azalea, Cotoneaster, Crataegus, Kalmia, Pieris, Rhododendron, Sorbus	20% Lindane emulsifiable concentrate 1 qt. to 20 gal. water plus Aramite 25% emulsifiable concentrate 1 qt. to 20 gal.	1 lb. 25% Lindane wettable powder plus miticide Aramex 1 pt.	
	Flat-headed Apple-tree Borer	Malus, Sorbus, Rosa, etc.	_____	4 lbs. 50% wettable powder; or 2 qts. 25% DDT emulsifiable concentrate	Especially on stems near ground
	Euonymus Scale	Celastrus, Dirca, Euonymus, Pachistima, Pachysandra, etc.	25% DDT emulsifiable concentrate 1 part; water 2 parts	2 lbs. 50% DDT wettable powder	Ten days after previous spray
	European Pine Shoot Moth	Pinus, esp. P. mugo, P. nigra, P. resinosa, P. sylvestris	"	"	Thoroughly wet bases of new needles—when larvae are boring into buds
	Elm Bark Beetle (Dutch Elm Disease)	Ulmus	25% DDT emulsifiable concentrate 1 part, water 1 part, plus 1 qt. Aramite 25% emulsifiable concentrate to 20 gal.	4 lbs. 50% DDT wettable powder, 1 pt. Aramite 25% emulsifiable concentrate	Thorough application
July 10-15	Birch Leaf Miner	Betula	20% Lindane emulsifiable concentrate 1 qt. to 20 gal. water plus 1 qt. Aramite 25% emulsifiable concentrate	1 lb 25% Lindane wettable powder plus 1 pt. Aramite 25% emulsifiable concentrate	When flies are abundant—for second generation of miners
	Peach tree Borer	Prunus, esp. P. persica	_____	4 lbs. 50% DDT wettable powder or 2 qts. 25% DDT emulsifiable concentrate	Repeat in two weeks Apply to stems near ground
	Japanese Beetle	Ampelopsis, Aesculus, Hydrangea, Metasequoia, Sassa-	25% DDT emulsifiable concentrate 1 part, water 2 parts, plus 1 quart Aramite 25%	2 lbs. 50% DDT wettable powder plus 1 pt. Aramite 25% emulsifiable concen-	Repeat in two weeks on a warm bright day to hit the beetle

fras, Tilia, Vitis, etc. emulsifiable concentrate to 20 gal.

trate; or 1 qt. 25% DDT emulsifiable concentrate plus 1 pt. Aramite 25% emulsifiable concentrate

July 20-25	Peach tree Borer	Prunus, esp. P. persica	_____	4 lbs. 50% DDT wettable powder or 2 qts. 25% DDT emulsifiable concentrate	Apply to stems near ground
	Japanese Beetle	Aesculus, Ampelopsis, Hydrangea, Metasequoia, Rosa, Sassafras, Tilia, Vitis, etc.	25% DDT emulsifiable concentrate 1 part to water 2 parts, plus 1 qt. Aramite 25% emulsifiable concentrate to 20 gal.	2 lbs. 50% DDT wettable powder; or 1 qt. 25% DDT emulsifiable concentrate plus 1 pt. Aramite 25% emulsifiable concentrate	If beetles are numerous
Aug. 15-25	Euonymus Scale	Celastrus, Dirca, Euonymus, Pachistima, Pachysandra, etc.	25% DDT emulsifiable concentrate 1 part, water 2 parts	2 lbs. 50% DDT wettable powder	When crawlers have hatched
Sept. 25	Mottled Willow Borer	Salix, esp. shrub types	_____	25% Dieldrin 1 gal.	250 lbs. pressure with tree gun along stems and low portions
Sept. 15 to Oct. 30	Juniper Scale	Junipers	_____	15% Parathion wettable powder 1½ lbs.	Use with CAUTION Parathion is very toxic to all animals including man

(Note: Applied at this time rather than late May because of less danger to visitors.)

PESTS FREQUENTLY DESTRUCTIVE IN THE ARNOLD ARBORETUM

Pest	Host	Spray Date
Anthraxnose	Platanus, Quercus	May 1-10; May 15-25
Ash and Lilac Borer	Fraxinus, Syringa	May 1-10; May 15-25
Bacterial Blight	Syringa	May 1-10; May 15-25
Beech Bark Louse	Fagus	Mar. 1-Apr. 20
Birch Leaf Miner	Betula	May 15-25; July 10-15
Black Vine Weevil	Taxus	June 15-25
Boxwood Leaf Miner	Buxus, esp. B. micro- phylla, B. sempervirens	May 15-25
Cankerworm	Acer, Carya, Catalpa, Fraxinus, Juglans, Prunus, Quercus, Syringa, Tilia, Ulmus	May 15-25
Cedar-apple Rust	Malus, esp. M. soulardi, Crataegus, Juniperus	Mar. 1-Apr. 20
Elm Bark Beetle	Ulmus	Apr. 15-30; June 25-July 5
Elm Leaf Beetle	Ulmus	May 15-25
Elm Leaf Miner	Ulmus	May 15-25
Euonymus Scale	Celastrus, Dirca, Euonymus	Mar. 1-Apr. 20; May 25-June 5 June 25-July 5; Aug. 15-25.
“ “	Pachistima and Pachysandra	May 25-June 5; June 25-July 5; Aug. 15-25
European Pine Shoot Moth	Pinus, esp. P. mugo, P. nigra, P. resinosa, P. sylvestris	June 25-July 5
Flat-headed Apple tree Borer	Rosa, Sorbus, esp. R. rugosa, Malus, etc.	June 1-10; June 25-July 5
Golden Oak Scale	Quercus	Mar. 1-Apr. 20
Hawthorn Leaf Miner	Crataegus	May 15-25
Holly Leaf Miner	Ilex, esp. I. opaca	May 15-25; June 1-10
Japanese Beetle	Aesculus, Ampelopsis, Hydrangea, Metasequoia, Rosa, Sassafras, Tilia, Vitis	July 10-15; July 20-25

Pest	Host	Spray Date
Juniper Scale	Juniperus	Sept. 15-Oct. 30
Kalmia Leaf Spot	Kalmia	May 15-25
Lacebugs	Amelanchier, Azalea, Crataegus, Cotoneaster, Kalmia, Pieris, Rhodo- dendron, Sorbus	May 15-25; June 1-10; June 25-July 5
Larch Case Bearer	Larix	Mar. 1-Apr. 20
Locust Borer	Robinia	May 1-10
Mottled Willow Borer	Salix, esp. shrub types	Sept. 25
Oyster Shell Scale	Celastrus, Fraxinus, Populus, Syringa, etc.	Mar. 1-Apr. 20
Peach Tree Borer	Prunus persica	July 10-15; July 20-25
Pine Bark Aphid	Pinus, esp. P. strobus	May 15-25
San José Scale	Chaenomeles, Malus, Prunus, Pyrus, etc.	Mar. 1-Apr. 20
Scurfy Scale	Chaenomeles, Malus	Mar. 1-Apr. 20
Spruce Gall Aphid	Picea, esp. P. abies, P. pungens vars.	Mar. 1-Apr. 20
Tent Caterpillar	Malus, Prunus, etc.	May 1-10
White Pine Weevil	Pinus strobus	May 1-10; May 15-25
Willow Leaf Beetle	Salix	May 15-25

**GENERA FREQUENTLY PLAGUED WITH PESTS IN THE
ARNOLD ARBORETUM**

Genus	Pest	Spray Date
Acer	Cankerworm	May 15-25
Aesculus	Japanese Beetle	July 10-15; July 20-25
Amelanchier	Lacebug	May 15-25; June 1-10; June 25-July 5
Ampelopsis	Japanese Beetle	July 10-15; July 20-25
Azaleas	Lacebug	May 15-25; June 1-10; June 25-July 5
Betula	Birch Leaf Miner	May 15-25; July 10-15
Buxus	Boxwood Leaf Miner	May 15-25
Carya	Cankerworm	May 15-25
Catalpa	Cankerworm	May 15-25
Celastrus	Euonymus Scale	May 25-June 5; June 25-July 5; Aug. 15-25
“	Oyster Shell Scale	Mar. 1-Apr. 20
Chaenomeles	Scurfy and Jan José Scale	Mar. 1-Apr. 20
Cotoneaster	Lacebug	June 25-July 5
Crataegus	Cedar-apple Rust	Mar. 1-Apr. 20
“	Hawthorn Leaf Miner	May 15-25
“	Lacebug	June 1-10; June 25-July 5
Dirca	Euonymus Scale	Mar. 1-Apr. 20; May 25-June 5; June 25-July 5; Aug. 15-25
Euonymus	Euonymus Scale	Mar. 1-Apr. 20; May 25-June 5; June 25-July 5; Aug. 15-25
Fagus	Beech Bark Louse	Mar. 1-Apr. 20
Fraxinus	Oyster Shell Scale	Mar. 1-Apr. 20
“	Ash and Lilac Borer	May 1-10; May 15-25
“	Cankerworm	May 15-25
Hydrangea	Japanese Beetle	July 10-15; July 20-25
Ilex	Holly Leaf Miner	May 15-25; June 1-10
Juglans	Cankerworm	May 15-25

Genus	Pest	Spray Date
Juniperus	Cedar-apple Rust	Mar. 1-April 20
“	Juniper Scale	Sept. 15-Oct. 30
Kalmia	Kalmia Leaf Spot and Lacebug	May 15-25
“	Lacebug	June 1-10; June 25-July 5
Larix	Larch Case Bearer	Mar. 1-Apr. 20
Malus	San José and Scurfy Scale, Cedar apple Rust	Mar. 1-Apr. 20
“	Tent Caterpillar	May 1-10
“	Flat-headed Apple tree Borer	June 1-10; June 25-July 5
Metasequoia	Japanese Beetle	July 10-15; July 20-25
Pachistima	Euonymus Scale	May 25-June 5; June 25-July 5; Aug. 15-25
Pachysandra	Euonymus Scale	May 25-June 5; June 25-July 5; Aug. 15-25
Picea, esp. P. abies and P. pungens	Spruce Gall Aphid	Mar. 1-Apr. 20
Pieris	Lacebug	May 15-25; June 1-10; June 25-July 5
Pinus strobus	White Pine Weevil	May 1-10
Pinus, esp. P. strobus	White Pine Weevil, Pine Bark Aphid	May 15-25
Pinus, esp. P. mugo, P. nigra, P. resinosa, P. sylvestris	European Pine Shoot Moth	June 25-July 5
Platanus	Anthracnose	May 1-10; May 15-25
Populus	Oyster Shell Scale	Mar. 1-Apr. 20
Prunus	San José Scale	Mar. 1-Apr. 20
“	Tent Caterpillar	May 1-10
“	Cankerworm	May 15-25
Prunus persica	Peach tree Borer	July 10-15; July 20-25
Pyrus	San José Scale	Mar. 1-Apr. 20

Genus	Pest	Spray Date
Quercus	Golden Oak Scale	Mar. 1-Apr. 20
“	Anthrachnose	May 1-10; May 15-25
“	Cankerworm	May 15-25
Rhododendron	Lacebug	May 15-25; June 1-10; June 25-July 5
Robinia	Locust Borer	May 1-10
Rosa, esp. R. rugosa	Flat-headed Apple tree Borer	June 1-10; June 25-July 5
“ “	Japanese Beetle	July 10-15; July 20-25
Salix	Willow Leaf Beetle	May 15-25
Salix, esp. shrub types	Mottled Willow Borer	Sept. 25
Sassafras	Japanese Beetle	July 10-15; July 20-25
Sorbus	Flat-headed Apple tree Borer and Lacebug	June 1-10; June 25-July 5
Syringa	Oyster Shell Scale	Mar. 1-Apr. 20
“	Ash and Lilac Borer and Bacterial Blight	May 1-10; May 15-25
“	Ash and Lilac Borer, Bacterial Blight and Cankerworm	May 15-25
Taxus	Black Vine Weevil	June 15-25
Tilia	Cankerworm	May 15-25
“	Japanese Beetle	July 10-15; July 20-25
Ulmus	Elm Bark Beetle	Apr. 15-30
“	Cankerworm, Elm Leaf Beetle and Elm Leaf Miner	May 15-25
“	Elm Bark Beetle	June 25-July 5
Vitis	Japanese Beetle	July 10-15; July 20-25

A FEW DEFINITIONS

- Aramite:** 25% emulsifiable concentrate — a miticide containing 25% aramite in a form which will mix with water. Used to control red spider or mites on ornamental plants.
- Blood Albumen:** An emulsifier used especially with dormant oil to make it mix more easily with water.
- DDT:** A chlorinated hydrocarbon (dichlorodiphenyl trichloroethane) It is both a stomach and a contact insecticide, helpful in controlling many chewing insects including elm bark beetles, cankerworms, gypsy moth and Japanese beetles. As it kills many predators, a build-up of mite population and to some extent aphids and some scale insect populations may follow its use.
- 25% DDT Concentrate:** A liquid, containing one fourth of its weight as DDT, formulated so it will form an emulsion in water.
- 50% DDT Wettable Powder:** A dry powder, containing one half its weight as DDT, formulated so it will make a suspension in water.
- Dieldrin:** A chlorinated hydrocarbon insecticide. Useful for control of wireworms, other soil insects and some ants. As a foliage spray it will kill young miners in their mines.
- DN or Dinitro:** Compounds are derivatives of phenol and cresol. As a dormant spray it will kill aphid eggs, some scales such as euonymus, scurfy and oyster shell. Also it will kill some overwintering fungi at dormant spray strength.
- DN—Slurry:** A watery mixture of the above dinitro compounds principally : Elgetol (19% sodium dinitro ortho-cresolate); and Krenite (19% sodium dinitro-ortho-cresol). Will discolor painted surfaces or stone.
- Fungicide:** A material which will kill a fungus, especially when it can contact the fungus outside the plant tissues.
- Lead Arsenate:** The chemical compound containing the two stomach poisons lead and arsenic. A poison for chewing insects such as bagworms, cankerworms, and many beetles. It has been to a great extent superseded by the newer insecticides, especially DDT.
- or Arsenate of Lead:**

- Lime Sulfur:** A combination of lime and sulfur used as a contact insecticide and fungicide, available as a liquid or in a dry (powdered) form. As a dormant spray it will control San José, pine needle and other scales as well as many aphids. Will discolor painted surfaces.
- Lindane:** A purified form containing at least 99% of the gamma isomer of benzene hexachloride (BHC). Useful to control some aphids, leaf miners, lacebugs and some soil insects.
- Miticide:** A compound especially adapted to the control of mites and red spiders. Three of these newer compounds are "Aramite," "Di-mite" and "Ovotran."
- Parathion:** An organic phosphate insecticide, very toxic to insects but also very toxic to humans unless used with proper precautions. Carefully used, it will control aphids, mites, mealy bugs, some scale, nematodes, and some chewing insects.
- Puratized Apple Spray:** A mercuric fungicide used to control, and often help eradicate, fungi. For anthracnose of sycamore and oak. Puratized Agricultural Spray is quite similar but is used at about twice the amount as the Apple Spray.
- Sulfur, Dusting:** A very finely ground form of this elemental chemical used primarily as a fungicide to control powdery mildews, rusts, and leaf spots. It will also help keep down mite populations. Do not apply in very hot weather as it may injure any plant under these conditions.
- Sticker:** A material added to the spray to make it adhere to the leaf surfaces. Calcium caseinate, wheat flour or powdered skim milk are examples.

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Williams, Robert G. and Fordham, Alfred J. 1953. "The Arnold Arboretum Spray Schedule." *Arnoldia* 13(11-12), 69-84.

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