

Effect of Insecticidal Soap Used in the Gypsy Moth Control Program in Kitsilano on Insects and Vegetation

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Canadian Forestry Service / Pacific Forest Research Centre
Victoria, B.C., BC-X-218, March, 1981

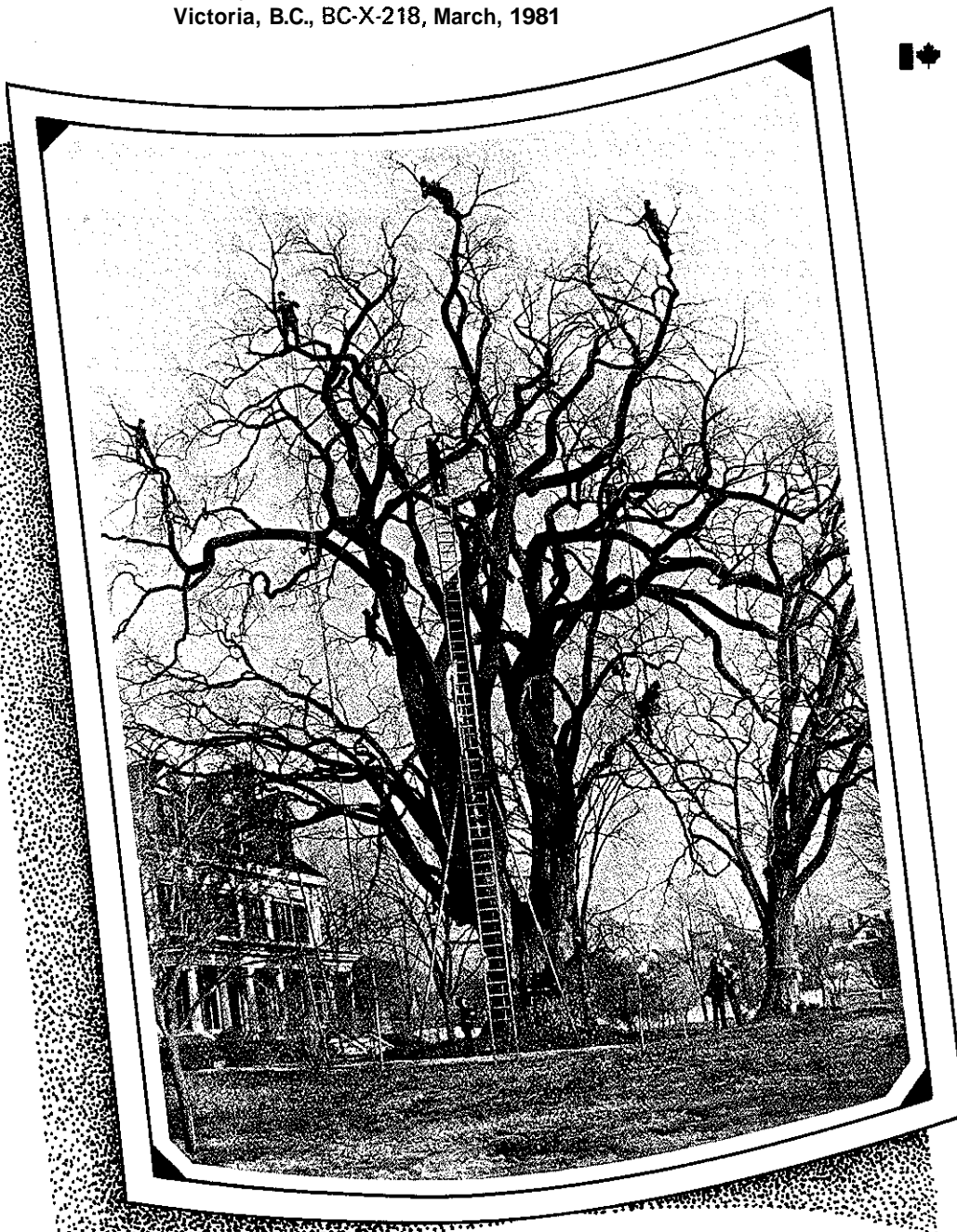


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United States Department of Agriculture crew in 1891 physically removing gypsy moth egg clusters from an elm in Malden, Massachusetts. (Taken from Forbush, E.H., and C.H. Fernald. 1896. *The Gypsy Moth*. Wright and Potter Printing Co. Boston, pp. 495.).

ABSTRACT

In 1978 a spray program was undertaken to eradicate the gypsy moth (*Lymantria dispar* L.) from the Kitsilano area of Vancouver, B.C. This report deals primarily with the effects of the commercial Insecticidal Soap (IS) used in the program on vegetation and insects in the treated properties. It also presents the role of the City of Vancouver in the Spray Program by providing the City Manager's Report on the history and treatment of gypsy moth in Kitsilano.

Out of a total of 218 plant species assessed for spray damage only 2 had positive symptoms of phytotoxicity resulting from IS while 13 species had possible damage. Extremely low numbers of gypsy moth in the treated area made it impossible to draw conclusions on the effectiveness of IS in controlling the insect. However, no live gypsy moth larvae were discovered in the IS treated properties. Due to the many desirable features of IS as a pesticide it was recommended that efficacy tests be undertaken on gypsy moth.

RÉSUMÉ

Un programme de pulvérisation fut entrepris en 1978 pour enrayer la Spongieuse (*Lymantria dispar* L.) du secteur Kitsilano de Vancouver (Colombie-Britannique). Ce rapport traite principalement des effets de l'insecticide commercial au savon (IS) utilisé dans le programme, sur la végétation et les insectes dans les propriétés traitées. Il montre aussi le rôle que la ville de Vancouver a joué dans le programme de vaporisation, en fournissant le rapport de son gérant sur l'histoire et le traitement de la Spongieuse à Kitsilano.

Sur un total de 218 espèces de plantes dont on a évalué les dégâts causés par la vaporisation, 2 seulement présentaient des signes positifs de la phytotoxicité résultant de l'insecticide IS alors que 13 espèces étaient peut-être endommagées. A cause du nombre extrêmement faible des Spongieuses dans la région traitée, il a été impossible de tirer des conclusions sur l'efficacité de l'insecticide IS pour réprimer l'insecte. Cependant, aucune larve vivante de Spongieuse ne fut découverte sur les propriétés vaporisées. A cause des nombreuses caractéristiques favorables de cet insecticide, il fut recommandé d'entreprendre des tests d'efficacité du produit contre la Spongieuse.

INTRODUCTION

During 1978, Agriculture Canada established plans to treat an outbreak of gypsy moth (*Lymtria dispar* L.) that had been detected in the Kitsilano district of Vancouver. Since the insect was unique to B.C. and localized in the Kitsilano area, it was felt that intensive application of an appropriate chemical pesticide could completely eradicate the insect. Agriculture Canada initially selected dimilin for the eradication program in 1979 but subsequently switched to carbaryl upon learning that there was some question as to the mutagenic properties of dimilin. Prior to the application of carbaryl, both Agriculture Canada and the City of Vancouver ran into stiff opposition from environmentalists organized by the conservation group, Greenpeace. Greenpeace was adamantly against carbaryl treatment, feeling that it posed a danger to the health of the people of Kitsilano and local wildlife and used civil disobedience to prevent the application. Greenpeace recommended the use of Insecticidal Soap as an alternative to carbaryl and proceeded to purchase the compound and spray certain properties in the area.

Commercial Insecticidal Soap (IS) is a formulation of specific fatty acid potassium salts. It is not a cleansing agent, but a blend of particular fatty acid compounds which have been tested and registered as pesticidal under the Plant Products Division of Agriculture Canada. The development of this product emanated from research at the Pacific Forest Research Centre laboratories of Environment Canada (Puritch and Talmon de l'Armee 1974, Puritch 1975 1978). IS had never been thoroughly

tested against gypsy moth, although it was very effective against various species of sucking insects. Preliminary tests on a limited number of gypsy moth larvae by Dr. B. Fraser, Agriculture Canada in Vancouver, had established that a 1% IS solution had no effect on 1st instar larvae but caused 100% mortality of older larvae. Only very small numbers of gypsy moth larvae were used in these tests and the original population was weakened by virus.

Despite the lack of knowledge of the effect of IS on the gypsy moth, Greenpeace continued to advocate its use and oppose the use of carbaryl. Finally, after several meetings between the provincial and federal governments, Greenpeace, citizens' groups and Vancouver City, it was agreed that spraying with carbaryl could take place if residents were given the choice of carbaryl or IS. Details of Vancouver City's role in these negotiations and the final agreement with Greenpeace are included in Appendix 1, Vancouver City Manager's report on the gypsy moth in Kitsilano. Residents were subsequently polled (Appendix 2) and spraying took place during the first two weeks in June 1979.

In order to obtain more information about the effects of IS in the gypsy moth spray program, the office of the Regional Director General, Pacific and Yukon, Environment Canada, made funds available to the City of Vancouver. These funds were to be matched by other federal and provincial government agencies, and would be used in part to cover the costs of a student to evaluate the sprayed properties. This report provides the details of these investigations.

Table 1. Number of properties in the Kitsilano district of Vancouver receiving insecticidal treatment.

Insecticide	No. of Properties sprayed	% of Total
Safer's Insecticidal Soap	70	32
Carbaryl	115	52
Insecticidal Soap + Carbaryl	13	6
Untreated	22	10
	<u>220</u>	<u>100</u>

Table 2. Weather conditions¹ prevailing on the dates of Safer's Insecticidal Soap application at Kitsilano, Vancouver.

Date	Summary	°C. Max.	°C. Min.	Daily Mean	Hrs. Bright Sunshine	Pptn.
June 1	Sunny and warm	22.4	9.7	15.6	14.4	—
June 7	Sunny	16.7	8.0	12.4	13.3	—
June 8	Sunny with cloudy periods	19.3	8.3	13.8	12.9	—
June 11	Cloudy, clearing by 1900 hrs.	19.3	11.0	15.2	6.6	tr.

¹ Weather records taken from the monthly Meteorological Summary at Vancouver International Airport.

METHODS AND MATERIALS

The Insecticidal Soap application approved by Vancouver City (Appendix 1) was carried out from June 1 to 11, 1979, in a 16 square block area of Kitsilano District of Vancouver, B.C. Only properties where the resident had requested the IS solution were treated, other properties were either treated with carbaryl or left untreated. The IS treated properties were scattered throughout the infested area (Appendix 1c) and included ones containing identified gypsy moth. A total of 70 properties (32% of those treated) received the IS treatment (Table 1). Safer's Insecticidal Soap, a product of Safer Agro-Chem Ltd. was applied at 1.0% concentration by a commercial pest control agency using a high pressure pump system. All plants within each property were thoroughly treated to the drip point. Weather during the spray period was mild with a few cloudy periods with only a trace of precipitation on June 11, the last day of spraying (Table 2).

Beginning June 15 and proceeding to July 13, 1979, each property sprayed with IS was individually inspected. Major plant species growing on each property were identified on site. Plants not immediately identifiable in the field were retained for later identification by Mr. David Tarrant, U.B.C. Botanical Gardens or Mr. Gerald Straley, Vancouver City Van Dusen Gardens. The vigor of each species was visually assessed and if any pathological symptoms remained

unexplained after considering insects, cultural conditions, or diseases, then a phytotoxic reaction was recorded. A possible phytotoxic reaction was noted when symptoms could not be categorized with certainty. In addition to plant phytotoxicity, the presence or absence of insects, and particularly of the gypsy moth, were recorded for each property. Larvae and pupae found on some plants were reared to their adult state for easier identification.

RESULTS AND DISCUSSION

A. Phytotoxicity

Phytotoxic susceptibility is summarized in Table 3. The majority of the species listed showed no phytotoxic reaction to the IS spray. Horse chestnut, *Aesculus hippocastanum*, and Mountain ash, *Sorbus americana*, both showed consistent reactions. *A. hippocastanum* produced large (≤ 1.0 cm dia) brown holonecrotic lesions which were surrounded by a chlorotic zone. Only the smaller shade leaves in the canopy were affected. *S. americana* leaves throughout the canopy developed numerous small (≤ 0.4 cm dia) brown holonecrotic lesions, but usually with no associated chlorosis. Frequently margin necrosis occurred on the water draining side of the leaf. *S. americana* was also affected by carbaryl treatment. Four of thirteen carbaryl sprayed trees exhibited phytotoxic damage over the entire crown

and two of these exhibited damage on the adventitious leaves at ground level. One of 23 *S. americana* trees observed in Kitsilano properties that had never been sprayed had symptoms similar to phytotoxic damage, and three trees exhibited damage on their adventitious leaves at ground level, due to other causes.

The list of plants that are possibly susceptible to phytotoxic damage includes those with symptoms which could not with reasonable certainty be classified as either cultural-pathological or a phytotoxic reaction. Time and weather conditions at the time of spraying, as well as the variation in the completeness of spray coverage, have probably caused some of the variation in symptom expression.

All flowering organs observed were either healthy, or appeared to be undergoing natural senescence following anthesis. This finding could be misleading due to the long time period between spray application and observation (mean = 21 days, s = 5.6 days). *Malus pumila* Mill. was placed in the no phytotoxic listing because the damaged trees on two properties were old and of very poor vigor. Trees of good vigor examined showed no phytotoxicity. *Iberis pectinata* did show phytotoxic damage on one property, but it occurred after the owner sprayed an unidentified compound on his roses. *I. pectinata* growing more than one m from the roses were not damaged. *Tro-*

paeolum majus that had phytotoxic symptoms were later found to have grown new foliage which eliminated all evidence of earlier damage.

Crataegus phytotoxicity may have been confused with hawthorn leaf blight, caused by *Fabraea theumenii*, which causes premature leaf drop and the formation of small angular spots. Tip necrosis of ≤ 0.5 cm with no associated chlorosis was found on four of eleven *Prunus avium* trees. One sweet cherry tree, growing on the property line separating an IS sprayed property from a carbaryl sprayed property, only had tip necrosis on the IS side.

B. Effect on Insects

Due to the time span between spraying and assessment it was not possible to definitely ascertain the degree of control of insect species. No live gypsy moth larvae were found in any of the IS treated property and recognizable dead larvae were found on a cherry tree within one of the yards. It was evident that the IS application did cause very high mortality to a variety of Aphididae species and a Coccid, holly scale, but had little or no effect on the Coccinellidae and Tortricidae. Similar patterns of toxicity have been found in laboratory tests (Puritch, unpublished data).

Table 3. List of Kitsilano plant species exposed to 1% solution of Safer's Insecticidal Soap

(+, phytotoxic or spray damage; +, possible phytotoxic or spray damage; -, no evidence of phytotoxicity). Numerals refer to the number of household or apartment properties visited which contained the listed plant species.

LATIN NOMENCLATURE	COMMON NAME	+	+	-
A. Phytotoxic Response				
<i>Aesculus hippocastanum</i>	Horse chestnut	4	1	1
<i>Sorbus americana</i>	Mountain ash	19	0	4
B. Possible Phytotoxic Response				
<i>Acer palmatum</i>	Japanese maples	0	2	2
<i>Adiantum pedatum aleuticum</i>	Maidenhair fern	1	1	2
<i>Crataegus</i> spp.	Hawthorn	2	0	2
<i>Dicentra formosa</i>	Bleeding heart	2	8	2
<i>Lathyrus odoratus</i>	Sweet pea	1	0	2
<i>Heuchera sanguinea</i>	Coralbells	1	0	0
<i>Hybiscus syriacus</i>	Shrubalthea	0	1	0
<i>Pisum sativum</i>	Garden pea	1	0	3
<i>Prunus avium</i>	Mazzard cherry	1	3	7
<i>Quercus garryana</i>	Garry oak	1	0	1
<i>Ribes sanguineum</i>	Water currant	0	1	1
<i>Tropaeolum majus</i>	Nasturtium	2	1	7
<i>Viola</i> spp.	Violets	1	0	0
C. No Phytotoxic Response				
<i>Abies grandis</i>	Grand fir	0	0	2
<i>Abutilon striatum</i>	Red vein Abutilon	0	0	1
<i>Acer circinatum</i>	Vine maple	0	0	2
<i>Acer glabrum</i>	Douglas maple	0	0	2
<i>Acer macrophyllum</i>	Bigleaf maple	0	0	11
<i>Acer negundo</i>	Manitoba maple	0	0	1
<i>Acer palmatum</i> var. <i>disectum</i>	Cutleaf maple	0	0	2
<i>Acer platanoides</i>	Norway maple	0	0	1
<i>Achillea millefolium</i>	Yarrow	0	0	2
<i>Aegopodium podagraria</i>	Gouweed	0	0	3
<i>Allium schoenoprasum</i>	Chives	0	0	4

LATIN NOMENCLATURE	COMMON NAME	+	±	-
C. No Phytotoxic Response (continued)				
<i>Allium cepa</i>	Onion	0	0	2
<i>Alnus rubra</i>	Red alder	0	0	3
<i>Althaea rosea</i>	Hollyhock	0	0	1
<i>Alyssum maritimum</i>	Elephant's eyes	0	0	5
<i>Alyssum saxatile</i>	Goldentuft alyssum	0	0	1
<i>Amelanchier</i> spp.	Service berry	0	0	1
<i>Antirrhinum majus</i>	Snap dragon	0	0	10
<i>Araucaria araucana</i>	Monkey puzzle tree	0	0	1
<i>Aquilegia</i> spp.	Columbine	0	0	1
<i>Aquilegia formosa</i>	Sitka columbine	0	0	1
<i>Arbutus menziesii</i>	Arbutus	0	0	1
<i>Aruncus sylvester</i>	Sylvan Goatsbeard	0	1	7
<i>Asparagus plumosus</i>	Asparagus fern	0	0	2
<i>Astilbe</i> spp.	Astilbe	0	0	3
<i>Aucuba japonica</i>	Japanese aucuba	0	0	6
<i>Azalea</i> spp.	Azalea	0	0	9
<i>Bambusa</i> spp.	Bamboo	0	0	11
<i>Begonia</i> spp.	Begonia	0	0	6
<i>Bellis perennis</i>	English daisy	0	0	1
<i>Berberis</i> spp.	Oregon grape	0	0	2
<i>Berberis</i> spp.	Barberry	0	0	2
<i>Bergenia cordiflora</i>	Heartleaf bergenia	0	0	8
<i>Beta vulgaris</i>	Beet	0	0	4
<i>Betula</i> spp.	Birch	0	0	10
<i>Brassica oleracea acephala</i>	Kale	0	0	1
<i>Brassica oleracea capitata</i>	Cabbage	0	0	1
<i>Brassica oleracea botrytis</i>	Cauliflower	0	0	12
<i>Calendula tagetes</i>	Marigold	0	0	7
<i>Calluna vulgaris</i>	Heather	0	0	8
<i>Calluna vulgaris v. alba</i>	Whitemoss heather	0	0	3
<i>Camellia japonica</i>	Common camellia	0	0	13
<i>Campanula bellidifolia</i>	Violet bellflower	0	0	8
<i>Campanula persicifolia</i>	Peachleaf bellflower	0	0	2
<i>Campanula rotundifolia</i>	Bluebell	0	0	1
<i>Cannabis sativa</i>	Hemp	0	0	1
<i>Centaurea</i> spp.	Knapweed	0	0	4
<i>Cheiranthus cheiri</i>	Wallflower	0	0	6
<i>Chrysanthemum</i> spp.	Chrysanthemum	0	0	1
<i>Chrysanthemum frutescens</i>	Marguerites	0	1	15

LATIN NOMENCLATURE	COMMON NAME	+	+	-
C. No Phytotoxic Response (continued)				
Chrysanthemum leucanthemum	Oxeye daisy	0	0	1
Clematis spp.	Clematis	0	0	10
Colutea arborescens	Bladder senna	0	0	1
Convallaria majalis	Lily of the Valley	0	0	10
Convolvulus sepium	Hedge glorybind	0	0	10
Cornus nutalli	Dogwood	0	0	6
Cornus stolonifera	Red-osier dogwood	0	0	1
Cortinus spp.	Smoke bush	0	0	1
Cotoneaster spp.	cotoneaster	0	0	1
Cucumis sativus	Cucumber	0	1	3
Cydonia japonica	Japanese quince	0	0	4
Cytisus xoparius	Broom	0	0	9
Dahlia spp.	Dahlia	0	0	1
Daphne spp.	Daphne	0	0	1
Daphne caucasica	Caucasian daphne	0	0	1
Daucus carota sativa	Carrot	0	0	1
Dianthus spp.	Pink	0	1	6
Dianthus barbatus	Sweet William	0	0	1
Dianthus caryophyllus	Carnation	0	0	13
Digitalis purpurea	Foxglove	0	0	25
Eonyrains spp.	Silverqueen	0	0	3
Epilobium angustifolium	Fireweed	0	0	4
Erodium cicutarium	Corsican heron ill	0	0	6
Erodium muschatum	Musk storkbill	0	0	4
Erythronium oreganum	Easter lily	0	0	9
Forsythia spectabilis	Forsythia	0	0	18
Fuchsia hybrida	Common fuchsia	0	0	3
Fragaria ananassa	Strawberries	0	0	2
Gardenia sp.	Gardenia	0	0	1
Gaultheria shallon	Salal	0	0	1
Geranium spp.	Geranium	0	0	10
Gleditsia triacanthos	Honey locust	0	0	3
Goblin gailardia	Goblin	0	0	2
Grandiflorus mariesii		0	0	1
Hebe spp.	Hebe	0	0	2
Hedera spp.	Ivy	0	0	15

LATIN NOMENCLATURE	COMMON NAME	±	+	-
C. No Phytotoxic Response (continued)				
<i>Helianthus annuus</i>	Sunflower	0	1	4
<i>Heracleum lanatum</i>	Cow parsley	0	0	2
<i>Hydrangea</i> spp.	Hydrangea	0	0	25
<i>Hydrangea petiolaris</i>	Climbing hydrangea	0	0	2
<i>Hypericum calycinum</i>	Aarons beard/St. Johns wort	0	0	3
<i>Iberis pectinata</i>	Candytuft	1	0	9
<i>Iberis perennia</i>	Perennial Candytuft	0	0	4
<i>Ilex aquifolium</i>	Holly	0	0	26
<i>Impatiens</i> spp.	Snapweed	0	0	2
<i>Iris missouriensis</i>	Western blue iris	0	0	16
<i>Juglans</i> spp.	Walnut	0	0	2
<i>Kerria japonica</i>	Japanese kerrie	0	0	1
<i>Laburnum alpinum</i>	Laburnum	0	0	7
<i>Lactuca sativa</i>	Lettuce	0	0	4
<i>Larix laricina</i>	Larch	0	0	1
<i>Lavandula</i> spp.	Lavender	0	0	1
<i>Lilium parviflorum</i>	Wild tiger lily	0	0	5
<i>Linaria cymbalaria</i>	Ivy leaved toad flax	0	0	2
<i>Linaria purpurea</i>	Purple toad flax	0	0	7
<i>Lobelia kalmi</i>	Kalm's lobelia	0	0	2
<i>Lonicera</i> spp.	Red honeysuckle	0	0	1
<i>Lonicera utahensis</i>	Utah honeysuckle	0	0	2
<i>Lunaria annua</i>	Dollarplant	0	0	5
<i>Lupinus</i> spp.	Lupin	0	0	1
<i>Lycopersicon esculentum</i>	Tomato	0	0	16
<i>Lysimachia vulgaris</i>	Golden loosestrife	0	0	1
<i>Lysimachia nummularia</i>	Moneywort	0	0	2
<i>Lythrum salicaria</i>	Lythrum	0	0	1
<i>Magnolia acuminata</i>	Cucumber tree	0	0	1
<i>Malus diversifolia</i>	Pacific crab apple	0	0	4
<i>Malus pumila</i>	Apple	0	2	9
<i>Mathiola incana</i>	10 week stock	0	0	2
<i>Matricaria chamomilla</i>	Wild chamomile	0	0	4
<i>Matricaria maritima</i>	Scentless chamomile	0	0	1
<i>Meconopsis</i> spp.	Annual poppy	0	0	10
<i>Meconopsis cambrica</i>	Welsh poppy	0	1	4

LATIN NOMENCLATURE	COMMON NAME	+	±	-
C. No Phytotoxic Response (continued)				
<i>Mentha piperita</i>	Mint	0	0	9
<i>Micraciam avantiacum</i>		0	0	3
<i>Nymphaea</i> spp.	Water lily	0	0	1
<i>Oenothera</i> spp.	Primrose	0	0	15
<i>Oenothera biennis</i>	Evening primrose	0	0	1
<i>Oxalis corniculata</i>	Oxalis	0	0	1
<i>Pavaver orientale</i>	Oriental poppy	0	0	11
<i>Peonia</i> spp.	Peony	0	0	29
<i>Petunia hybrida</i>	Petunia	0	0	2
<i>Phaseolus coccineus</i>	Beans	0	0	2
<i>Philadelphus godonianus</i>	Mock Orange	0	0	7
<i>Phlox longifolia</i>	Longleaf phlox	0	0	12
<i>Physocarpus capitatus</i>	Ninebark	0	0	1
<i>Picea</i> spp.	Spruce	0	0	10
<i>Pieris japonica</i>		0	0	11
<i>Pinus</i> spp.	Hard pine	0	0	11
<i>Polystichum munitum</i>	Sword fern	0	0	4
<i>Populus trichocarpa</i>	California poplar	0	0	2
<i>Prunus armeniaca</i>	Apricot	0	0	2
<i>Prunus domestica</i>	Garden plum	0	0	4
<i>Prunus emarginata</i>	Bitter cherry	0	0	6
<i>Prunus laurocerasus</i>	Laurel	0	0	14
<i>Prunus persica</i>	Peach	0	0	3
<i>Prunus salicina</i>	Purple plum	0	0	4
<i>Prunus serrulata</i>	Oriental flowering cherry	0	0	2
<i>Prunus virginiana</i>	Chokecherry	0	0	4
<i>Pseudotsuga menziesii</i>	Douglas-fir	0	0	6
<i>Pteridium aquilinum pubescens</i>	Bracken	0	0	17
<i>Pyrus communis</i>	Pear	0	0	6
<i>Ranunculus repens</i>	Creeping buttercup	0	0	10
<i>Raphanus sativus</i>	Garden radish	0	0	5
<i>Reynoutria japonica</i>	Japanese knot weed	0	0	8
<i>Rheum rhaponticum</i>	Rhubarb	0	0	6
<i>Rhododendron</i> spp.	Dwarf rhododendron	0	0	6
<i>Rhododendron</i> spp.	Rhododendron	0	0	23
<i>Rhus typhina</i>	Staghorn sumac	0	0	1
<i>Rhus glabra</i>	Sumac	0	0	2

LATIN NOMENCLATURE	COMMON NAME	+	+	-
C. No Phytotoxic Response (continued)				
Ribes spp.	Gooseberries	0	0	2
Ribes nigrum	Black currant	0	0	2
Ribes rubrum	Red currant	0	0	3
Rosa spp.	Rose	0	0	41
Rubus idaeus	Raspberry	0	0	13
Rubus parviflorus	Thimbleberry	0	0	3
Rubus ursinus	Trailing blackberry	0	0	2
Rubus spectabilis	Salmonberry	0	0	5
Salix spp.	Willow	0	0	5
Salix babylonica	Weeping willow	0	0	1
Sambucus racemosa var. arborescens	Red berry elder	0	0	1
Saponaria albiflora	Soapwort	0	0	1
Saxifraga spp.	Saxifrage	0	0	1
Saxifraga megasiflora	Saxifrage	0	0	1
Scabiosa caucasica	Caucasian scabious	0	0	1
Scilla campanulata	Wood hyacinth	0	0	12
Sedum spp.	Stonecrop	0	0	4
Senecio maritima	Dusty Miller	0	0	1
Sisymbrium officinale	Hedge mustard	0	0	2
Solanum tuberosum	Potato	0	0	2
Spirea douglasi	Hardhack	0	0	7
Stellaria media	Chickweed	0	0	2
Styrax sp.	Snowbell	0	0	1
Symphytum officinale	Comfrey	0	0	6
Syringia spp.	Lilac	0	0	11
Syringia sweginzowi	Chengtu lilac	0	0	3
Taxus brevifolia	Yew	0	0	12
Thuja plicata	Western red cedar	0	0	34
Tilia americana	Linden	0	0	1
Tilia tomentosa	White lime	0	0	1
Tradescantia fluminensis	Wanderingjew	0	0	1
Tradescantia virginiana	Virginia spiderwort	0	0	1
Tsuga heterophylla	Western hemlock	0	0	6
Vaccinium parvifolium	Huckleberry	0	0	1
Vicia sativa	Vetch	0	0	2
Vinca major var. variegata	Mottled bigleaf periwinkle	0	0	2
Vinca minor	Periwinkle	0	0	1

LATIN NOMENCLATURE	COMMON NAME	+	+	-
C. No Phytotoxic Response (continued)				
<i>Viola tricolor</i> var. <i>hortensis</i>	Pansy	0	1	14
<i>Vitis</i> spp.	Grape	0	0	1
<i>Weigela</i> spp.	Weigela	0	0	9
<i>Wistaria</i> spp.	Wistaria	0	0	4
<i>Yucca</i> spp.	Yucca	0	0	4
<i>Zea mays</i>	Corn	0	0	1

CONCLUSIONS

Of a total of 218 different plant species receiving the Insecticidal Soap treatment in Kitsilano properties only 2 showed definite symptoms of phytotoxicity while 13 others showed possible effects. Phytotoxicity was expressed primarily as leaf necrosis and no plants died as a result of treatment. These results show that 1.0% IS can be applied to the drip point on common garden and vegetable plants without risk or damage.

No conclusions can be drawn regarding the effect of IS on the gypsy moth larvae due to the very low numbers present, the occurrence of the virus in the population and the time interval between treatment and assessment. IS has many beneficial attributes as a pesticide. It is made from fatty acids that occur naturally in all living cells and compose a major part of our normal diet. It is quickly biodegraded and used as a food substrate by microorganisms. It does not have deleterious effects at the concentrations applied on beneficial insects such as honeybees and ladybird beetles. It also has public acceptance as evidenced by the reaction of people in the Kitsilano area. These attributes suggest it may be worthwhile

to properly assess the effectiveness of IS as a contact pesticide for a gypsy moth either by itself or in combination with methoxychlor. This latter mixture has been found to interact synergistically with IS in controlling wintermoth, *Operophtera brumata* (L.) (Puritch, unpublished research).

The gypsy moth spray program in Kitsilano developed into a highly charged, controversial issue in which information and facts on the infestation tended to get altered so that the public was confused as to the true state of affairs. It is likely that any pesti- cidal spray program in a highly populated area would encounter similar difficulties. These problems could be minimized by a well organized public relations campaign with specialists trained in both the pest and the chemicals used to treat it. The public should be informed of the problem well in advance of any proposed treatment and should be able to respond to the government agencies by public forums. Communication to the media should be handled by selected, knowledgeable individuals to prevent the possibility of conflicting statements.

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ACKNOWLEDGMENTS

The authors wish to thank Mr. L. A. Smithers, Regional Director General, Pacific and Yukon Region, Environment Canada for making funds available for this work and Messrs. K. F. Dobell, Deputy City Manager and D. A. Morgan, Director of Environmental Health, City of Vancouver for their excellent cooperation and assistance.

APPENDIX 1

CITY MANAGER'S REPORT ON THE HISTORY AND TREATMENT OF GYPSY MOTH IN KITSILANO

HISTORY

Eggs of the gypsy moth were inadvertently introduced into Kitsilano area in December 1977 and escaped detection. Following the summer of 1978, when male adult gypsy moths were found in insect traps, a detailed egg search of the Kitsilano district located 35 egg masses.

The Vancouver Health Department was notified by the Federal Department of Agriculture towards the end of 1978 by telephone that a gypsy moth infestation had been found in Kitsilano and the Department of Agriculture was currently discussing an abatement program for the area. They stated that they were considering an aerial spray program of the area bounded by English Bay and Broadway, Arbutus to Trutch, but had no firm plans. The Health Department requested that when plans were finalized the City of Vancouver were to be given adequate advance notice to assess both the pesticide to be used and the method of application.

In February 1979, a daily newspaper carried a story claiming a large area of Kitsilano was to be sprayed with Dimilin from the air. An immediate outcry arose from the residents of Kitsilano and also from those of other neighbourhoods in the City. On February 15, 1979, the Federal Department of Agriculture withdrew their application for a permit to apply Dimilin from the Pesticide Committee, Ministry of Agriculture, B.C. Agriculture Canada planned to replace the Dimilin program with a mandatory carbaryl spray program to all properties within a 44-block area (English Bay to 4th Avenue and Arbutus to Bayswater inclusive.)

Following this announcement, City Council became involved in an extensive series of meetings, with participation by the public and Federal and Provincial officials. A task force was created under the City Manager, including representatives of the community, environmental groups, and the three levels of government. This group proposed an action program, which was approved by Council. However, when the spray program began, the spray trucks were obstructed and unable to work. Following staff negotiations with Greenpeace representatives, Council

subsequently approved a program which was acceptable to Greenpeace. More detailed history (Appendix 1a) and the staff-Greenpeace working document (Appendix 1b) are attached.

A combined carbaryl and Insecticidal Soap spray program was successfully carried out by Agriculture Canada and the City between June 1 and June 14, in blocks 1 - 13 and blocks 23 - 26, as per attached map (Appendix 1c). Blocks 7 and 8, Insecticidal Soap only).

PRESENT STATUS

During the summer, no male gypsy moths were found in the pheromone traps and the Gypsy Moth Action Plan is now being followed. (This Plan is attached - Appendix 1d). We can be hopeful that the problem arising out of this infestation has been dealt with.

The Subcommittee of the B.C. Plant Protection Advisory Council has invited a City representative to attend its future meetings on this matter. Mr. C. Man. Park Board, and Mr. D. Morgan, Health, will attend these meetings to represent the City of Vancouver.

An egg search will be carried out in the area sprayed and in the spring a larvae search will be carried out by the Department of Agriculture. The City of Vancouver will be asked to provide a special trash pickup this fall and again next spring. A new film has been prepared on the habits of the gypsy moth and it is planned that this will be shown to the public next spring.

COSTS TO THE CITY

The majority of the cost involved regular staff time from Health, Park Board, and Police, and amount to \$15,000 - \$20,000 on inspection, surveys, Police involvement, special refuse pickup, etc. Specific out-of-pocket costs paid by the City include IS spray charges, and some nominal printing and signing costs totalling in the order of \$5,500.

RECOVERIES

- 1) Agriculture Canada is prepared to pay the following towards the City's cost of the gypsy moth program:

50% respecting signage and printing, 5165 and \$50 respectively, and the full cost of the resident survey listed as 51,470, for a total of 51,685.

- 2) Environment Canada contributed \$4,350 towards the City of Vancouver cost of the Insecticidal Soap program; 51,859 to be spent to pay for a student attached to the Health Department to assess the results of the Insecticidal Soap program and report to Environment Canada; and \$2,490 towards the cost of the materials for the program.
- 3) The Provincial Ministry of Agriculture to date

has not contributed to the City of Vancouver's costs incurred in the gypsy 'moth program.

At this point, the City will be out of pocket only some 51,400 relative to the program. However, the routine programs of the Environmental Health Division suffered measurably due to the great deal of time spent by inspectors and administration personnel on the gypsy moth spraying program.

It is fair to say that without the extensive mediating and moderating role of City Council and the related efforts of City and Park Board staff, it would not have been possible to carry out any spray program without major confrontations between citizens and government.

The City Manager submits the foregoing report for the INFORMATION of Council.

APPENDIX 1a

In response to citizen fears and objections, City Council requested reports from City officials regarding the safety of carbaryl. and on the evening of March 8, 1979, a public information meeting was held at Kitsilano High School and an information package distributed and film shown,

As a result of continuing opposition from residents and environmental groups to the proposed mandatory carbaryl program, City Council on May 2, 1979 heard submissions from a number of City and Federal officials, and delegations of concerned citizens and environmental groups, and, as a result, passed the following motions:

1. That the Federal Government authorities be urged to cancel the proposed gypsy moth program.
2. That a Task Force be appointed comprising representatives of the three levels of government, representatives of the Kitsilano community and environmental groups to examine alternative approaches to deal with the problem of gypsy moth and submit recommendations.

On May 15, Council approved a \$5,000 allocation to match Environment Canada's donation to the task force and requested from B.C. Ministry of Agriculture:

- i) a \$5,000 matching grant;
- ii) reopening of information trailer at Kitsilano Park.

Council also deferred a final decision on the carbaryl spray program pending a further meeting on May 22 and instructed the City Manager to take any interim measures necessary to control the moth.

At the May 22nd Council meeting, the City Manager reported on proposed action to be taken, based on discussions with all agencies. Council approved this action program, after hearing several delegations. The Mayor instructed the City Manager to investigate and implement a coordinated carbaryl and IS spray program, if possible.

Following Council's decision, Agriculture Canada began spraying on May 24th. On May 25th.

demonstrators blocked the spray truck's access. City staff met immediately with Greenpeace representatives and following lengthy discussions established a working agreement on the interpretation of Council's resolution to date. This included:

- a) City staff were to determine residents' wishes for gypsy moth control and the survey should be in an area no larger than 25 blocks.
- b) The City to set up notification systems for residents in areas to be sprayed.
- c) The City would offer Insecticidal Soap spray to residents who requested carbaryl not be used on their property.

The City of Vancouver and Greenpeace

working document is included in this report (Appendix 1c).

Council, at its meeting of May 29, 1979, passed the following motions unanimously, which was acceptable to Greenpeace:

That the 2500 and 2600 blocks West 1st Avenue which are the blocks infested with Gypsy Moths be sprayed on a voluntary basis in accordance with the wishes of the residents.

Further that the blocks adjacent to the infested area be treated on the basis that if 60% of the residents of each block wish their properties sprayed with carbaryl it be used on the consenting properties and the remainder of the residences be sprayed with Insecticidal Soap.

APPENDIX 1b

May 28, 1979

GREENPEACE FOUNDATION AND CITY OF VANCOUVER WORKING DOCUMENT ON GYPSY MOTH PROBLEM

The following guidelines for implementation of the Council report approving procedures for a voluntary spray program were reviewed and are considered acceptable by City staff and Greenpeace representatives.

SURVEY

A new survey shall be conducted on a block by block basis in an area at least no larger than the 25 blocks cited by the Report.

- survey to be conducted by personnel on the staff of the City of Vancouver and not connected with the Department of Agriculture, the B.C. Ministry of Agriculture, the Vancouver Board of Parks or the Greenpeace Foundation. (These groups hereinafter referred to as "all parties").
- that the person or person conducting this survey or their immediate supervisor be made known to all parties before the survey is carried out.
- that the survey be conducted on a standard questionnaire and information form in keeping with the spirit of Section 3(c) of the Report and that this form be known and agreed to by Greenpeace Foundation before its use.
- the survey should be listed and determined for purposes of spraying on a Block Survey Form which should contain:
 - a) the name of the resident printed legibly
 - b) the signature of the resident
 - c) the address of the resident.
- that in multi-residence houses or in apartment buildings each suite in such a house or apartment shall be deemed a residence for the purpose of this survey.
- that there be one vote per residence.

- that if a resident is not found at home during the first pass of the survey then the surveyor shall so indicate on the Form next to the address of the residence and then return to that residence until a resident is found at home or for a maximum of two additional visits, whichever comes first.
- the first pass of the survey is to be conducted between 6:00 p.m. and 9:00p.m. on any evening considered suitable by the City and any additional visits if required to be made at a time which will be in the discretion of the City Manager's Office to insure that a maximum possible number of residents likely to be affected are surveyed.
- completed survey forms for each block surveyed are to be made available to all parties.
- In the event that not less than 80% of the residents surveyed in any one block agree to the use of carbaryl on the property on which they are resident, the City Manager will advise Agriculture Canada that in accordance with Council's resolution carbaryl may be sprayed on the following properties only within that block in accordance with Council's program.
 - a) where a resident property owner has consented to the spray
 - b) where the property owner is not resident and has not been surveyed, the consent of the resident tenants or in the case of multi-resident properties, a majority of tenants shall be deemed to be sufficient consent to the spray
 - c) on public boulevards immediately adjacent to any consenting property.
- all residents within that block are to be notified at least 24 hours in advance and not longer than 72 hours before spraying begins that they are within the boundaries of an 80% consenting block, such notification to be in the form of:
 - a) leafletting through the mail slots of all residences
 - b) posting signs on telephone poles or street lamps at each corner of the block
 - c) notification with one half hour prior to the spray.

FORM OF NOTIFICATION

- should contain all instructions for public safety as found on the registered label of carbaryl.

PRECAUTIONS DURING SPRAYING

- good spraying practice for protection of residents and workers employed in the spraying will be used in accordance with instructions found on the registered label for carbaryl.
- pedestrian and vehicular traffic be restricted in any one street in a manner deemed acceptable by Police officials while the spray truck is operating in that street.
- immediately after spraying in any street is completed warning signs are to be placed at the points formerly occupied by the notification signs.

AND FURTHER

- that the City undertake to make available funds to meet the cost of application of insecticidal Soap to those residents requesting it as follows:
 - a) free to any residence within a one block radius of any block where infestation is actually discovered
 - b) free to any residence **not** consenting to carbaryl application but inside an 80% consenting block.

If council amends the 80% requirement stated above this Section will change accordingly; however, Greenpeace foundation may withdraw its agreement.

NOTIFICATION

Where a block is deemed to be an 80% consenting block, then notification as follows shall be provided before the commencement of carbaryl application:

- that the City of Vancouver pay to the Greenpeace Foundation the sum of \$2,010.00 when in receipt of invoices for Insecticidal Soap previously sprayed by the Foundation to date.
- that the perimeter where application of carbaryl is to be considered be set out for both private and public land and no extension of the surveyed area is to be considered without further consultation.
- that the previous survey undertaken by the B.C. Ministry of Agriculture not be taken into account or have any effect in the compilation of the survey to be undertaken by the City.

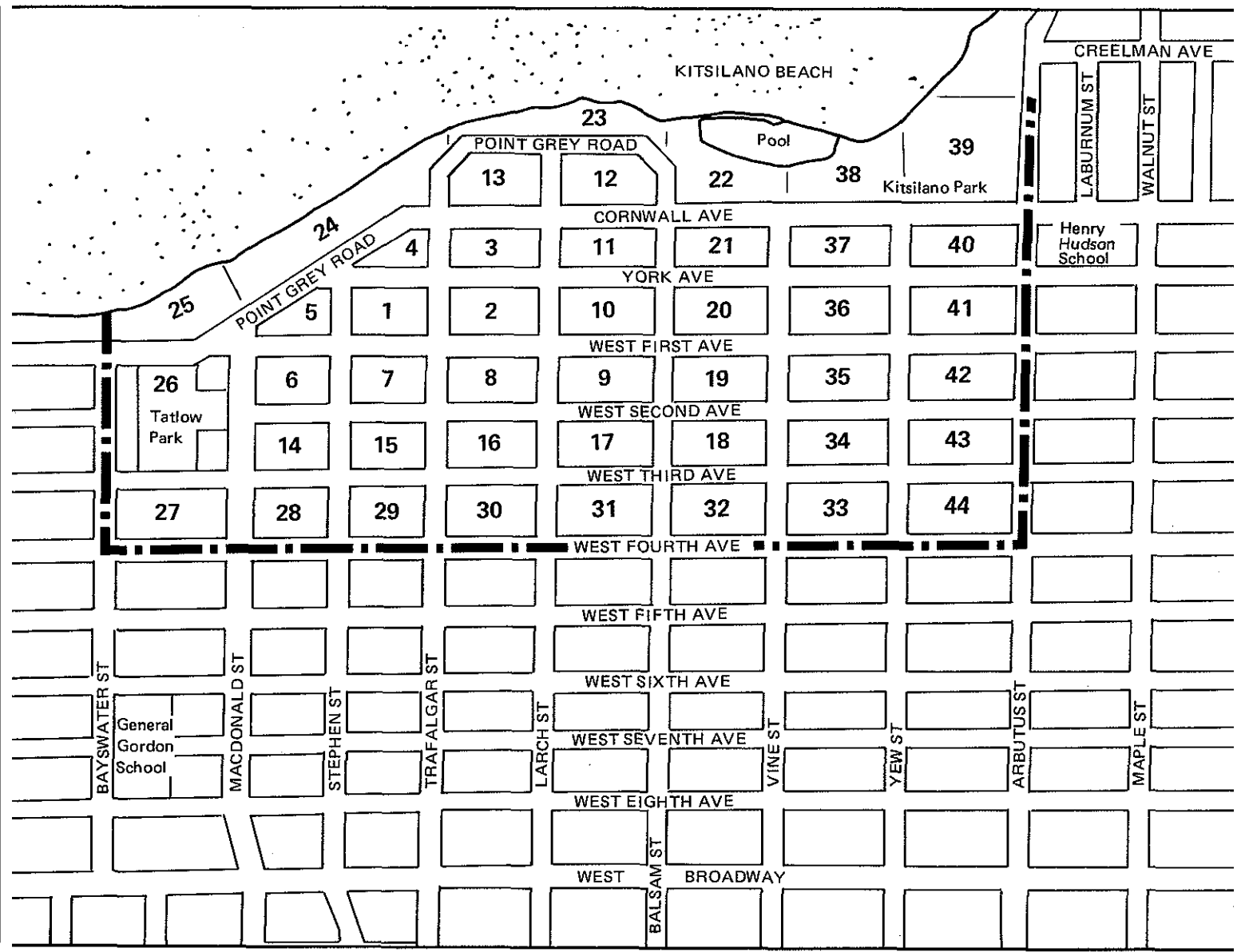
The Greenpeace Foundation will announce publicly that an agreement has been reached on a City managed survey and that we will not promote the obstruction of spraying vehicles operating on the properties of consenting residents in a block where 80% of the residents have consented to the application of carbaryl in accordance with the terms of this understanding.

(Noting again that Council **may** change the 80% restriction and this clause will be modified accordingly, subject to Greenpeace withdrawal of its agreement.)

APPENDIX 1c

CITY BLOCKS IN KITSILANO TREATED WITH PESTICIDES
FOR GYPSY MOTH CONTROL

Numbers in blocks indicate priority of treatment application.



APPENDIX 1d

GYPSY MOTH ACTION PLAN

This plan is drafted for use in the event that no male gypsy moths are trapped in Vancouver in the summer of 1979. It may require little change if one or two moths are found, but another plan will be required if evidence of a continuing infestation is found. Details of the plan will be revised on a continuing basis as required by relevant developments.

SEPTEMBER /OCTOBER

- The pheromone traps are picked up in the area outside Vancouver commencing the last week of September. The pick-up in Vancouver will take place in early October.
- The gypsy moth information trailer remains open through the end of September, and is closed at that point.
- A letter to homeowners in the Kitsilano area is prepared. The letter will report the trap findings, outline plans for the coming year and request continuing co-operation. It will include information on the gypsy moth centre phone number, which will be answered by Agriculture Canada Plant Quarantine personnel. It will be a joint Agriculture Canada IBCMAI City of Vancouver letter.
- The City of Vancouver will be contacted, asked for general co-operation based on a draft plan, and asked to provide a fall - 1979 and spring - 1980 garden trash pickup in and around the area of last year's infestation.
- A press release is prepared by Agriculture Canada, aimed at October release, reporting on the trapping situation, conclusions regarding the status of the infestation, and plans for the medium term future. It will stress continuing vigilance on the part of governments and area residents. It will be released by Agriculture Canada after consultation with provincial officials.
- Ralph Houghton (Vancouver, 666-1771) is designated primary gypsy moth media contact for Agriculture Canada. Other staff of Food Production and Inspection Branch will also deal with media enquiries at his delegation, but he will provide appropriate direction.
- Jack Arrand (Victoria, 387-5121) is designated primary gypsy moth media contact for the B.C. Ministry of Agriculture.
- Communication among appropriate officials of the different levels of government is maintained.
- The gypsy moth sub-committee of the B.C. Plant Protection Advisory Council met 20 September and recommended an action plan to its Executive Committee. The sub-committee decided to invite a City of Vancouver representative to attend subsequent meetings.

NOVEMBER TO FEBRUARY

- Letters to homeowners are delivered door to door in the Kitsilano area by Agriculture Canada.
- A detailed search for egg masses will be conducted in the area of known previous infestation. It will be conducted mainly by Agriculture Canada staff with some help from provincial staff. Homeowners will be informed of the search of their properties by the personnel who carry out the search.
- The City of Vancouver will conduct a fall plant material and refuse removal in the immediate vicinity of last year's infestation. Homeowner co-operation will be sought, and advice provided on how the material should be prepared for pickup. Collection and disposal will be done carefully to guard against any accidental spill that could spread any moth eggs.
- Agriculture Canada will arrange to obtain pheromone traps to be set out in late June, with assistance from staff of Canadian Forestry Service. There will be sufficient traps for another intensive trapping program in Kitsilano in 1980.

- A second letter to homeowners may be sent in February, asking for continued co-operation in looking for egg masses and reporting them so that provincial or federal staff may destroy them. The letter would also provide information on the spring refuse pickup.
- Agriculture Canada (Plant Products, Ottawa) will keep sufficiently abreast of research and regulatory developments on potential moth-fighting chemicals so that they can quickly provide advice if discovery of egg masses means that a spray program must be considered.
- The film on gypsy moths that is currently being finalized by Agriculture Canada will be made available for public viewing.
- Agriculture Canada Information Services personnel will brief those Agriculture Canada staff who may handle press and public queries.

MARCH / APRIL

- The spring refuse collection takes place
- A showing of the information film takes place, at an information meeting(s) to which to public is invited, and to interested groups. Citizen involvement in maintaining vigilance by reporting eggs and larvae will be encouraged.
- Egg mass search carried out if any evidence of continuing infestation is uncovered.

MAY / JUNE

- A larvae patrol of federal and provincial officials will check the area of last year's infestation.
- A press release is issued near the end of June, reporting on the situation and pointing out that an intensive pheromone trapping program is about to start again.
- In late June, the pheromone traps are set out on a similar basis as in 1979, by Agriculture Canada, BCMA and CFS staff.

APPENDIX 2

CONSENT FORM

RE: GYPSY MOTH PROGRAM

- 1. Are you in favor of the application of the insecticide Carbaryl to trees and shrubs on this property?

YES

NO

- 2. If you are not in favor of the application of Carbaryl, would you consent to the application of organic insecticidal soap to this property free of charge?

YES

NO

- 3. Do you prefer to have neither Carbaryl or soap sprayed on this property?

YES

NO

- 4. Will you allow the Federal Department of Agriculture to monitor this property to determine the status of the gypsy moth infestation?

YES

NO

NAME: _____

ADDRESS: _____

APT. NO.: _____

RESIDENT _____ PROPERTY OWNER _____

SIGNATURE: _____

DATE: _____

MAY 28, 1979
CITY OF VANCOUVER HEALTH DEPARTMENT

736-2033

**Environment Canada
Canadian Forestry Service
Pacific Forest Research Centre
Victoria, B.C.. Canada V8Z 1M5
BC-X-218. March, 1981**