Ornamentals / Plantes ornementales

Crop / Culture: Geranium

Location/Emplacement: British Columbia

Title / Titre: Xanthomonas bacterial blight of geranium in British Columbia

Name and Agency / Nom et Organisation:
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METHODS: Zonal and ivy geranium, (Pelargonium x hortorum Bailey and P. peltatum L.) submitted to the provincial plant diagnostic lab were tested for bacterial blight (Xanthomonas campestris pv. pelargonii) in view of widespread outbreaks the previous year. Bacterial identification was based on symptoms and the presence of bacterial streaming from petiole and stem vascular tissue, isolation of yellow, mucoid, convex colonies with entire margins on nutrient agar and yeast dextrose calcium carbonate agar, negative gram reaction and oxidase reaction, lack of fluorescence on King's B medium, hypersensitive reaction on tobacco cv. White Burley and positive reaction on reinoculation into **p.** x hortorum cv. Yours Truly.

RESULTS AND DISCUSSION: Geranium growers submitted samples of imported cuttings and their own stock to check for Xanthomonas bacterial blight infection. Six out of 14 greenhouses in 1988 had Xanthomonas bacterial blight which was traced to the use of infected, imported cuttings or the carry over of old, infected mother stock. There has been **some** reduction in the incidence of Xanthomonas bacterial blight which occurred in 10/27 greenhouses in 1987 and 4/6 greenhouses in 1986. An educational program involving newsletters, surveys, field calls and a special geranium seminar (November, 1987) alerted growers to the problem and its control through strict sanitation and the use of disease-free stock.

Crop / Culture: Greenhouse crops

Location/ Emplacement: Manitoba

Title / Titre: Incidence of plant diseases in greenhouse crops in Manitoba in 1988.

Name and Agency / Nom et Organisation:
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METHODS: Results based on samples of greenhouse crops submitted to the Plant Pathology Laboratory and field examinations.

RESULTS: Root rot caused by Pythium spp. and Fusarium spp. was diagnosed in several greenhouses that produce geraniums + begonias. Fusarium spp. was found to be causing a problem in hydroponically-produced lettuce. A greenhouse in Winnipeg submitted impatiens plants showing a ring-spot symptom. This was identified by the Agriculture Canada Research Station in Vancouver as Tomato ring spot virus. About 5% of the plants were affected. Botrytis cinerea was found to be a problem on fuchsia cuttings in one greenhouse in April, 1988. Phyllosticta (Phyllosticta sp.) leaf spot was detected on dracaena plants.

Crop / Culture: Ornamentals

Location/Emplacement: British Columbia

Name and Agency / Nomet Organisation:
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Title / Titre: DIAGNOSTIC LAB REPORT FOR DISEASES OF NURSERY CROPS IN B.C. DURING 1988

METHODS: Diseased ornamentals were submitted to the Cloverdale diagnostic lab by growers, extension personnel and sales representatives. Fungal diseases were identified by observation in plant tissue or from pure cultures of isolations. Pathogenicity and biochemical tests were used to identify bacterial pathogens (Lelliott and Stead, 1987). Dr. R. Stace-Smith identified carnation latent virus by sap inoculation to indicator plants and ELISA. Only noteworthy diseases are described.

RESULTS AND COMMENTS: See Table 1. Most Andromeda in Fraser Valley nurseries was infected with red leaf spot caused by Exobasidium vaccinii. Kabatina infected 100% of the Chamaecyparis pisifera 'Cyanoviridis' and Thuja occidentalis 'Reingold' at one nurseries, and several T. occidentalis at another. Cheiranthus (wallflower) 'Orange Bedder' seedlings, infected with Xanthomonas campestris, exhibited wilt, leaf yellowing and collapse. Cheiranthus 'Primrose Monarch' adjacent to C. 'Orange Bedder' and other cvs. appeared healthy. Carnation latent virus was detected in red flowering perennial Dianthus spp. having symptoms of white flower break and purple-black leaf streaks and spots in two nurseries. Symptoms had been observed for two years. Phomopsis sp. dieback of Juniperus spp. occurred in two nurseries. Junipers died within two weeks of symptom expression at one nursery with a resultant crop loss of 30% through the summer. Thelephora sp. smothered 10 cm tall Pinus mugo mughus seedlings grown in a shady, damp location.

REFERENCES: Lelliott, R.A. and D.E. Stead. 1987. Methods in Plant Pathology Volume 2. Methods for the Diagnosis of Bacterial Diseases of Plants. Blackwell Scientific Publication, Palo Alto, U.S.A.

TABLE 1. Significant nursery crop diseases diagnosed in B.C. during 1988

CROP	DISEASE	CROP LOSS
Andromeda polifolia (Bog Rosemary)	Exobasidium vaccinii	$4000+
Azalea (Rhododendron sp.)	Crown gall symptoms	several plants
Chamaecyparis pisifera 'Cyanoviridis;	Kabatina sp. dieback	n.a.
Cheiranthus (Wallflower) cv 'Orange Bedder'	Xanthomonas campestris wilt	1400 of 2000 plants
Cornus mas 'Elegantissima' and C. stolonifera	Pseudomonas syringae leaf spot and stem canker	n.a.
Cotoneaster dammeri	Erwinia amylovora Phomopsis sp. dieback	20% 100% of one block
Dianthus plumarius and D. caesius (Red cvs.)	Carnation latent virus	n.a.
Juniperus spp.	Phomopsis sp. dieback	30% at one nursery
Pinus mugo mughus	Smothering by Thelephora sp.	n.a.
Thuja occidentalis	Kabatina sp. dieback	n.a.

n.a. = not available

Crop/Culture: Greenhouse Ornamentals

Location/Emplacement: British Columbia

Title/Titre: NOTEWORTHY DISEASES OF GREENHOUSE ORNAMENTALS DIAGNOSED IN B.C. DURING 1988

Name and Agency / Nom et Organisation:

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METHODS: Diseased ornamentals were submitted to the Cloverdale diagnostic lab by growers, sales representatives, and extension personnel. Fungi were identified in pure culture from isolations and Phytophthora spp. were confirmed by reaction with a polyclonal antibody developed by Dr. H. Pepin, Agriculture Canada Vancouver Research Station. Bacteria were identified from pure cultures by various biochemical and pathological tests (Lelliott and Stead, 1987). Viral diseases were identified by Dr. R. Stace-Smith, Agriculture Canada Vancouver Research Station, through sap inoculation onto indicator plants and election microscopy. Herbicide residue was detected by the B.C. Ministry of Environment and Parks Environmental Laboratory, 3650 Westbrook Mall, Vancouver, B.C. V6S 2L2.

RESULTS AND COMMENTS: The following table includes some diseases which caused significant damage to B.C. growers. Geranium diseases and infections caused by tomato spotted wilt virus are discussed elsewhere within this commodity area.

Carnation mottle virus (CarMV) caused flower breaking of carnations grown during February and March in two Fraser Valley greenhouses. Both infections appeared to originate in the red cv. 'Jack' which had been purchased from the same supplier. It is believed the cooler temperatures, due to time of year and latitude, promoted symptom development because CarMV infections are usually not serious (Baker et. al., 1985). CarMV quickly spread by cutting knives and one grower lost his entire crop. White flowers of 'Starlight' developed pink patches as a result of infection; discoloured tissue in both cvs. was leathery in texture, and eventually collapsed.

Phytophthora heart rot of Cymbidium propagated by tissue culture was restricted to plants grown in 10-inch pots or smaller. Most infected plants were 10 years old and more recently-developed cultivars seemed to be more susceptible to heart rot.

Dinoseb top-killer applied to potatoes adjacent to a rose greenhouse burned rose foliage and young tissues when drift entered through the ventilation fans. Yellow line patterns also developed on some leaves. The cvs. 'Scarlett O'Hara' and 'Oragami' were most sensitive to dinoseb spray drift. Plants recovered after two weeks.

TABLE 1. Noteworthy diseases of B.C. greenhouse ornamentals during 1988.

CROP	DISEASE	CROP LOSS	NO. OF GREENHOUSES
Anemone	Phytophthora crown rot	10% +	1
Carnation cvs. Winsome and Juanita	Fusarium wilt	20%	1
Carnation cv. Jack	Carnation mottle virus	90%*	2
cv. Starlight			1
Cyclamen (4" pots)	Erwinia soft rot	500 plants	2
Cymbidium 10 years old	Phytophthora heart rot	10%	2
Rose	Dinoseb burn	2 weeks' production	1

* Damage in one greenhouse, no figures for other greenhouse.

REFERENCES: Baker, R.R., P.E. Nelson, and R.H. Lawson. 1985. Carnation. pp. 554–563 in: Chapter 16, Diseases of Floral Crops Vol. 1. D.L. Strider, ed. Praeger. Toronto. 638 pp.

Lelliott, R.A. and D.E. Stead. 1987. Methods in Plant Pathology. Vol. 2. Methods for the Diagnosis of Bacterial Diseases of Plants. Blackwell Scientific Publications, Palo Alto, U.S.A.

Crop / Culture: Greenhouse Ornamentals

Location / Emplacement: South Coastal British Columbia

Title / Titre: INCIDENCE OF TOMATO SPOTTED WILT VIRUS IN BRITISH COLUMBIA

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METHODS: The tomato spotted wilt virus (TSWV) was identified in greenhouse ornamentals on the bases of visual symptoms on specimens and on inoculated indicator plants, by particle characteristics observed in the electron microscope, and by ELISA. With umbrella tree, the causal relationship was confirmed by thrips-transmission of the virus to healthy plants of the species. Greenhouse ornamentals in the Lower Mainland of British Columbia were surveyed to determine the incidence of TSWV. Virus methodology has been reported (Allen and Broadbent 1986; Allen and Matteoni 1988).

RESULTS AND COMMENTS: TSWV was first detected in British Columbia in April 1987 in florist's chrysanthemum cv. Polaris. In May 1988, TSWV was detected in a new host, Brassaia actinophylla (Schefflera actinophylla, Araliaceae), in which severe concentric ring patterns were induced. TSWV-infected cyclamen and begonia were found in the same greenhouse. Subsequently, TSWV was found in 11 of 14 other greenhouses in the Lower Mainland, in a total of 8 ornamental crops (Table 1), suggesting that the virus had been present in B.C. for at least several years prior to 1987. The origin of the virus was not determined with certainty for any of the greenhouses due to extensive movement of plant material from areas known to have the virus. The earliest record of the predominant vector, the western flower thrips (Frankliniella occidentalis), in B.C. greenhouses was 1983. Losses from the TSWV, in many cases, have been attributed to other causes due to difficulty in isolating and identifying the virus (Allen and Matteoni 1988).

REFERENCES:
Allen, W.R. and A.B. Broadbent. 1986. Transmission of tomato spotted wilt virus in Ontario greenhouses by Frankliniella occidentalis. Can. J. Plant Pathol. 8:33-38.

Allen, W.R., and J.A. Matteoni. 1988. Cyclamen ringspot: Epidemics in Ontario greenhouses caused by the tomato spotted wilt virus. Can. J. Plant Pathol. 10:41-46.

Table 1. Greenhouse ornamentals infected with tomato spotted wilt virus in British Columbia in 1987 and 1988.

Crop	No. of Greenhouses	Diagnostic Criteria**
Cyclamen *Cyclamen persicum*	7	Visual, IP, ELISA
Kieger begonia *Begonia X hiemalis*	3	IP, ELISA
Umbrella tree *Brassaia actinophylla*	2	IP, EM, TT, ELISA
Tree schefflera *Schefflera arboricola*	1	Visual, ELISA
Florist's chrysanthemum *Chrysanthemum X morifolium*	1	IP, EM, ELISA
Gloxinia *Sinningia speciosa*	1	Visual
New Guinea Impatiens *Impatiens wallerana*	1	Visual, IP, ELISA
Ornamental pepper *Capsicum* sp.	1	ELISA, IP
Purple velvet plant *Gynura aurantiaca* 'Sarmentosa'	1	IP, ELISA

* Based on a total of 14 greenhouses surveyed in the Lower Mainland. ** Diagnostic criteria: symptoms on specimens (visual) and on indicator plants (IP); electron microscopy (EM); thrips transmission (TT); and ELISA.

Crop / Culture: Ornamentals

Location / Emplacement: Manitoba

Title / Titre: INCIDENCE OF PLANT DISEASES IN ORNAMENTALS IN MANITOBA IN *1988*

Name and Agency / Nom et Organisation:

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METHODS: Results based on *846* samples of ornamentals submitted to the Plant Pathology Laboratory and field examinations.

RESULTS: The Plant Pathology Laboratory analysed *846* samples of ornamentals in *1988.* Cytospora canker (Cytospora spp.) was found on dogwood, cotoneaster, willow and mountain ash. Fireblight (Erwinia amylovora) was detected on cotoneaster. Powdery mildew (Microsphaera penicillata), was found on lilac; zinnia, (Erysiphe cichoracearum); virginia creeper, (Uncinula necator). Aster yellows was present in marigold, but to a lesser extent than normal. Marginal leaf scorch caused by low soil moisture and, in some cases, high soil salt level was a common problem for many ornamental shrubs and trees including willow, mountain ash, apple, elm, Manitoba maple and dogwood. A leaf spot (Septoria caraganae) was observed on several samples of caragana. Needle browning, beginning in mid September, was present on most of the ornamental white cedar in Winnipeg and other places in southern Manitoba. A large amount of the browning was just normal old - needle senescence, but it appeared to be more pronounced in *1988* because of the effect of the prolonged spring and summer drought. Black spot of roses (Diplocarpon rosae) was less severe than normal because of the dry weather. Root knot nematodes, (Meloidogyne spp.) were found to be a problem on a sample of French marigold.

Crop/Culture: Ornamentals

Location/Emplacement: Ontario

Name and Agency/ Nom et Organisation:
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Title/Titre: DISEASES OF ORNAMENTALS: DIAGNOSTIC SUMMARY, VINELAND RESEARCH STATION

METHODS: Diseased plant samples were sent to the Research Station, particularly when the plant or disease related to ongoing research programs, or when diagnosis required either virus identification or complicated isolation and identification. In 1988, 67 (61% of 110 samples total) came from extension personnel, 26 samples (24%) came directly from growers, 13 samples (12%) came from allied industry personnel, 3 samples (<3%) came from other Agriculture Canada branches, and 2 samples (<2%) came from other diagnostic labs. Four of the samples came from British Columbia, and the remainder were from Ontario. There were 92 samples (84%) from floricultural crops, 15 (14%) from nursery crops, and three from related vegetables. Most samples (79 plants, 72%) were from production stages; 20 samples (11 floricultural and 9 nursery, 18%) were from propagation stages: and 11 samples (10%, all floricultural samples) were from stock plants. Of the floricultural samples, 34 (37%) were potted plants, 32 (35%) were bedding plants (including geraniums), 21 (23%) were cut flowers, and 5 (5%) were foliage plants. Of the nursery samples, 11 were woody plants and 5 were herbaceous perennials.

Bacterial diagnoses followed standard practices (Schaad 1980). Bacteria were identified to species or pathovar only when necessary. Virus identification involved one or more of the following: immunosorbent transmission electron microscopy, indicator plants, ELISA, or transmission by the western flower thrips (Frankliniella occidentalis). Specific procedures were followed for identification of tomato spotted wilt virus (TSWV) (Allen and Matteoni 1988). Abiotic disorders were diagnosed on the bases of symptoms, and the plant history which was supplied with each sample.

RESULTS AND COMMENTS: The most common diagnosis was tomato spotted wilt virus (21 positive identifications) in a variety of potted, cut, foliage, and bedding plants (Table 1); and from one greenhouse tomato crop. This represents continuing spread of TSWV in floricultural crops since 1903 (Matteoni 1988). The other two vegetable samples were field tomato plants, one with early blight and the other with herbicide injury. TSWV has not been detected recently in field tomatoes from Ontario.

Botrytis cinerea was frequently isolated fran a variety of crops, and was a common secondary invader in lesions caused by TSWV. The number of samples with botrytis blight was low because it can be readily diagnosed in the field. Xanthomonas campestris pv. pelargonii remained a serious problem on florist's geranium. There were few large economic losses, because of early detection and eradication of infected plants. Diseases caused by Fusarium spp. were numerous, and affected a wide range of floricultural hosts as well as nursery crops. There were no samples of powdery mildew on rose, although it is still one of the most important problems in commercial cut rose production.

The number of nursery samples was low (Table 2), and consisted primarily of junipers with phomopsis blight. Samples with phomopsis blight were from field specimens as well as from propagation beds.

References: Allen, W.R. and J.A. Matteoni. 1988. Cyclamen ring-spot: epidemics in Ontario greenhouses caused by the tomato spotted wilt virus. Can. J. Pl. Pathol. 10:41-46.

Matteoni, J.A. 1988. Diseases of florist's chrysanthemum in Ontario from 1983-1987. Can. Pl. Dis. Survey 68:85-86.

Schaad, N.W. 1980. Laboratory guide for the identification of plant pathogenic bacteria. Amer. Phytopathol. Soc. St. Paul, MN. 72 pp.

Table 1. Disease diagnoses of floricultural crops, including greenhouse ornamentals, foliage plants, and field ornamentals grown for cut flowers -- Vineland Station 1988.

Number of samples	Plant species	Diagnoses	
		Pathogens*	Frequency
21	Florist's geranium Pelargonium X hortorum L.H. Bailey	Abiotic Xanthomonas campestris Botrytis cinerea Virus** Pythium sp.	7 7 3 2 1
16	Florist's chrysanthemum Chrysanthemum X morifolium Ramat.	Tomato spotted wilt virus Fusarium solani Abiotic (pesticide) MLO *** Pythium sp. Erisiphe cichoracearum Fusarium oxysporum Pseudomonas cichorii Rhizoctonia solani	4 3 2 2 2 1 1 1 1
7	Impatiens Impatiens wallerana Hook.f.	Tomato spotted wilt virus Botrytis cinerea	4 1
6	Cyclamen Cyclamen persicum Mill.	Botrytis a Tomato spotted wilt virus Erwinia Sp. Gloeosporium cyclaminis Fusarium oxysporium	3 3 1 1 1
4	Carnation Dianthus caryophyllus L.	Carnation mottle virus Fusarium roseum Fusarium solani Rhizoctonia solani	2 1 1 1
4	Gloxinia Sinningia speciosa (Lodd.) Hiern.	Tomato spotted wilt virus Phytophthora sp.	3 1
3	Gerbera Gerbera ames ni H. Bolus e Hook.f.	Fusarium solani Tomato s wi vi	2 1
3	Ka1anchoe Kalanchoe blossfeldiana Poelln.	Myrothecium roridum Oidium sp.	2 1

Table 1. Disease diagnoses of floricultural crops, including greenhouse Ornamentals, foliage plants, and field ornamentals grown €or cut flowers -- Vineland Station 1988. (cont'd)

Number of samples	Plant species	Diagnoses	
		Pathogens*	Frequency
3	Poinsettia Poinsettia pulcherrima Willd. ex Klotzsch	Abiotic (high temperature) Erwinia sp. Pythium sp.	1 1 1
2	Christmas cactus Schlumberga Lem. sp.	Fusarium sp.	2
2	Florist's azalea Rhododendron obtusum (Lindl.) Planch.	Pestalotia macrotricha Cylindrocladium sp.	1 1
2	Fuschia Fuschia X hybrida Hort. ex Vilm.	Tomato spotted wilt virus	2
2	Bells-of-Ireland Moluccella laevis L.	Virus (Nepo group) ***	2
2	Regal geranium Pelargonium X domesticum L.H. Bailey	Botrytis cinerea	2
2	Rieger begonia Begonia X hiemalis Fotsch.	Tomato spotted wilt virus Cylindrocladium sp. Xanthomonas campestris	2 1 1
2	Rose, cuttings Rosa odorata (Andr.) Sweet	Cylindrocladium sp. Pythium sp. Fusarium solani	1 1 1
2	Tree Schefflera Brassaia actinophylla Endl.	Tomato spotted wilt virus Abiotic	1 1
1	Cinerea Senecio X hybridus (Willd.) Regel.	Alternaria senescionis Botrytis cinerea	1 1
1	Daffodil Narcissus pseudonarcissus L.	Botrytis sp. Fusarium oxysporum Penicillium sp.	1 1 1

Table 1. Disease diagnoses of floricultural crops, including greenhouse ornamentals, foliage plants, and field ornamentals grown for cut flowers -- Vineland Station 1988. (cont'd)

Number of samples	Plant species	Diagnoses	
		Pathogens*	Frequency
1	Dieffenbachia Dieffenbachia maculata (Lodd.) G. Don.	Fusarium solani	1
1	Exacum, Persian violet Exacum affine Balf.f.	Botrytis cinerea	1
1	Freesia Freesia X hybrida L.H. Bailey	Fusarium roseum	1
1	Gynura, purple velvet Gynura aurantiaca (Blume) DC.	Tomato spotted wilt virus	1
1	Ivy geranium Pelargonium peltatum (L.) L'Her. ex Ait	Abiotic (oedema), thrips	1
1	Lipstick plant Aeschynanthus pulcher (Blume) G. Don.	Normal cultivar colouring	1
1	Yucca, cane Yucca elephantipes Regel.	Abiotic (cold temperature) Fusarium solani	1 1

* More than one pathogen was isolated from many samples, particularly when many plants were included in the sample. Secondary pathogens or invaders are not reported.
** The virus was not specifically identified, but was visualized by electron microscopy, and was demonstrated through symptoms on inoculated indicator plants.
*** Mycoplasmalike organisms determined as the cause on the bases of symptoms and by the lack of other pathogens isolated.

Table 2. Disease diagnoses for nursery crops, and herbaceous perennials -- Vineland Station 1988.

Number of samples	Plant species	Diagnoses	
		Pathogens*	Frequency
7	Juniper *Juniperus chinensis* L.	*Phomopsis juniperova*	7
2	Euonymous *Euonymous fortunei* (Turcz.) Hand.-Mazz.	*Gloeosporium* sp.	2
1	Apple *Malus sylvestris* Mill.	Abiotic (drought)	1
1	Forthysia *Forsythia* X *intermedia* Zab.	Abiotic (drought)	1
1	Garden chrysanthemum *Chrysanthemum* X *morifolium* Ramat.	Abiotic	1
1	Hollyhock *Alcea rosea* L.	*Puccinia malvacearum*	1
1	Strawberry *Fragaria* X *ananassa* Duchesne	*Phytophthora* sp. *Fusarium* sp.	1 1
1	Yew (cuttings) *Taxus cuspidata* 'Hicksii' Siebold. & zucc.	*Fusarium solani*	1

* More than one pathogen was isolated from many samples, particularly when many plants were included in the sample. Secondary pathogens or invaders are not reported.