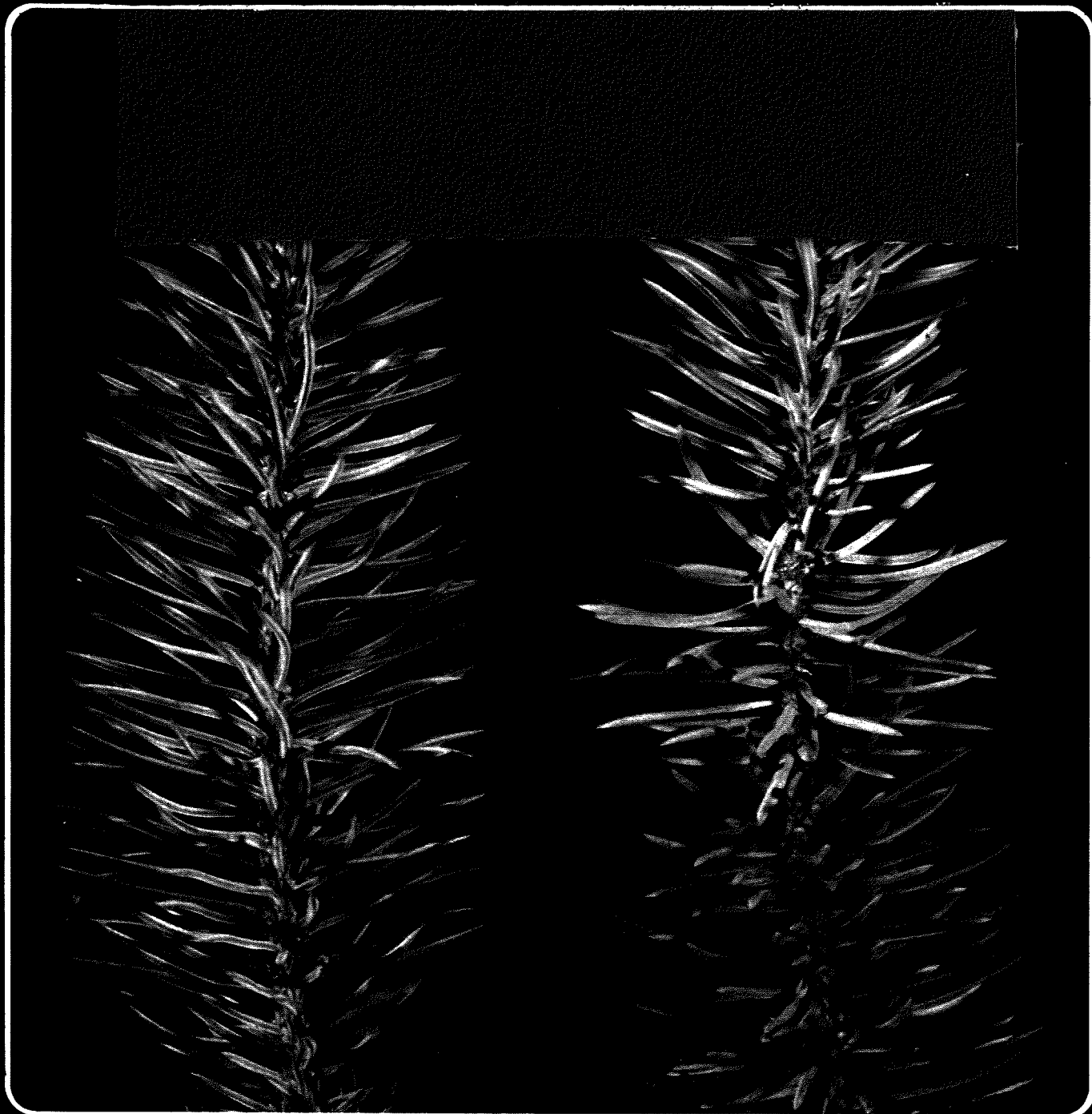


The Spruce Spider Mite

in the prairie provinces



L.O.T. Peterson & V. Hildahl



Frontispiece – Contrasting appearance of uninfested and infested Colorado spruce foliage.

November 1969

Although this brochure contains the latest technical information available, application of the chemical recommendations is at the user's risk and subject to any law that may apply.



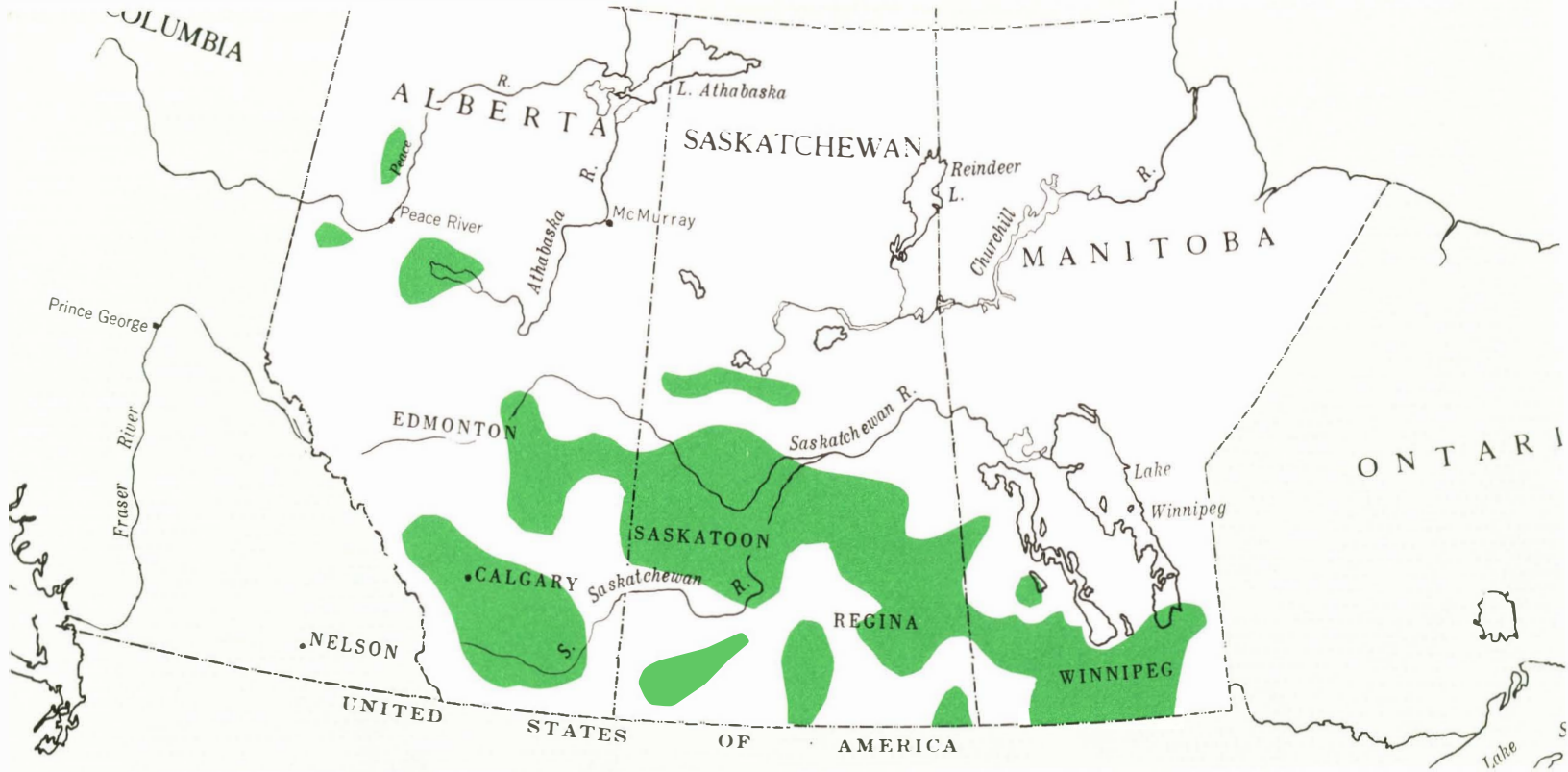
introduction

The spruce spider mite¹ is an important pest of coniferous trees throughout the North Temperate Zone. The mite was first identified in 1905 from specimens taken from spruce trees in Germany, and since then has been commonly recorded throughout Europe wherever native spruce grows; even north of the polar circle.

In North America, the pest is also widely distributed and extends from the Atlantic coast to British Columbia and the western United States. In the Prairie Provinces, occurrence and damage were first observed about 1927, although the pest undoubtedly had been present much earlier. Since then, infestations of varying intensity have been recorded annually in Alberta, Saskatchewan and Manitoba; primarily in the parkland zone.

The spruce spider mite is usually a serious problem only on planted conifers. Severe infestations occasionally develop in natural forest areas, especially in stands where DDT and other insecticides have been used repeatedly to control defoliating insects. The persistent use of insecticides with long residual activity tends to reduce the abundance of natural predators, which is believed to be a contributing factor in allowing the rapid buildup of extremely high mite population levels. These severe outbreaks in the forests, however, are generally short-lived and cause little permanent injury. On the other hand, infestations tend to persist year after year in plantings, reducing tree vigor and ultimately resulting in death.

¹*Oligonychus ununguis* (Jac.), *Acarina: Oligonychidae*



Distribution of moderate to severe infestations, 1927-1969

host trees

The most common hosts of the spruce spider mite are: white and Colorado spruce, and to a lesser extent: black, Black Hills, Koster's blue and Engelmann spruces, and Siberian larch. Other species occasionally recorded as hosts are: balsam fir, Douglas-fir, eastern white cedar, hemlock, juniper, Sitka spruce, Norway spruce, and some species of pines.

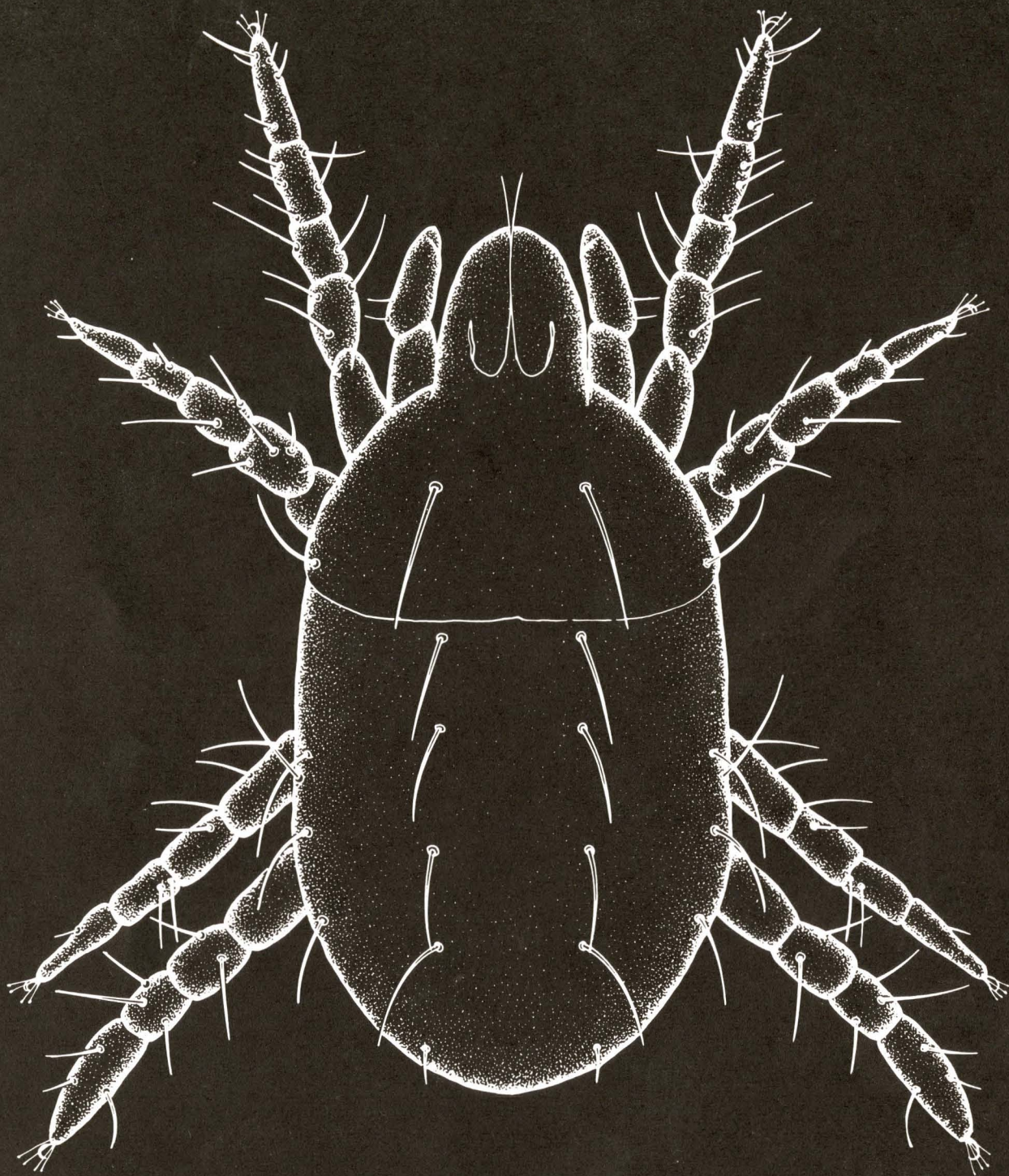
description of life stages

EGG – The egg is needle-point (about 0.1 millimeter) in size, globular and somewhat flattened. A short, slightly curved, pointed stalk arises from the top of each egg. In summer, eggs are pale yellow while those laid in the fall are dark yellow or reddish brown.

LARVA – Upon hatching, the larva is mottled pink and gradually changes to green once feeding commences. At this time each larva has three pair of legs.

NYMPH – The nymph has four pair of legs and gradually changes from light to dark green between the first and second stage. An increase in body size occurs at this time.

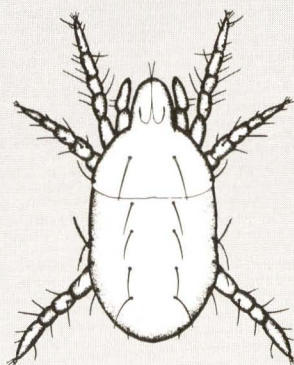
ADULT – The adult varies from dark green to dark brown and has four pair of legs. The female is larger (approximately 0.5 millimeter) and more oval-shaped. In contrast, the male has a more pointed abdomen and longer legs.



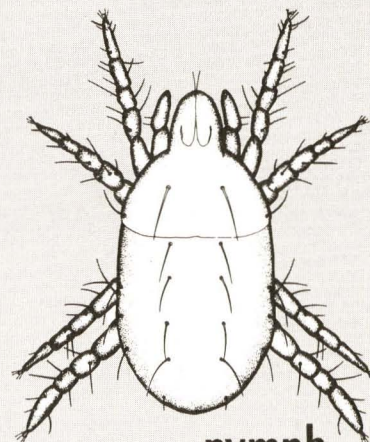
adult



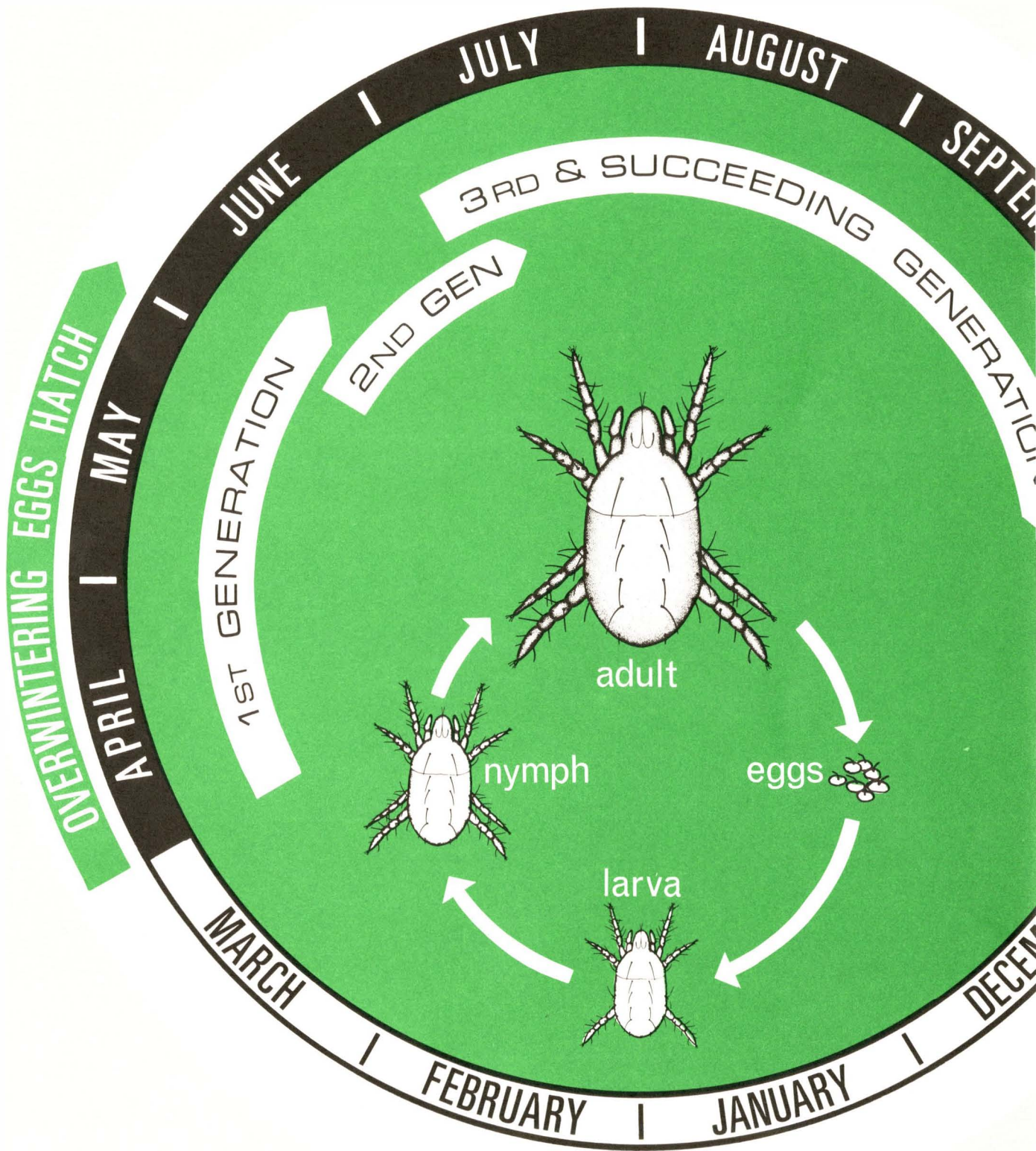
egg



larva



nymph



life history



The spruce spider mite overwinters in the egg stage under bud scales, in the axils of needles, or under webbing on the stems of branches. Overwintering eggs hatch during May following a thirteen to sixteen day incubation period. During a warm dry season, hatching begins in early May. However, if the weather is cool and wet, hatching can be delayed until late May.

Development of the larvae and nymphs requires about three and six days respectively. Nymphs develop into adults by early June and under favorable conditions may live for a period of 30 days. By mid-June the female will lay 40 to 50 eggs which will give rise (following a seven day incubation period) to a second generation of adult mites by late June. A third and as many as six succeeding generations are produced at intervals of two to three weeks during the remainder of the summer and early autumn. The overwintering eggs are laid from September to the onset of severe frost.

This exceptional reproductive capacity and short life cycle account for the rapidity with which a light infestation can develop to severe proportions.

All active forms of the spruce spider mite feed on the needles and to some extent on the tender twigs. The larvae and first stage nymphs do little wandering and feed on the basal parts of needles. The second stage nymphs and adults move about freely and feed on all needle parts.

The mites spin an abundance of fine webbing during their active feeding period. In early or light infestations the thread strands are sparse and occur close to the stems of the twigs. In severe and prolonged infestations the webbing forms a dense mass between the needles, which is readily seen when the branches are examined from the underside.

Spruce spider mite is readily dispersed by wind and may also be spread to new locations through the distribution of infested nursery stock.



Close-up showing the accumulation of webbing characteristic of infestations of the spruce spider mite.

injury

The spruce spider mite injures trees by piercing the needles and tender twigs with its slender mouth-parts and sucking out the cell sap, causing a mottled discoloration and subsequent drying of the needles. Severely infested foliage becomes dingy yellow or brownish and many of the needles dry-out and drop off. The injury usually commences on the lower branches and progresses upwards. Dust particles and shed needles in the webbing add to the unhealthy appearance of the trees.

The mites are more destructive during hot, dry seasons than in years when summer temperatures are moderate and rainfall is plentiful; heavy rains tend to wash many mites from infested trees.

In severe outbreaks, defoliation may become so severe that tree mortality occurs. In other situations, when trees have been weakened by spider mite infestations they may suffer competition from grass and weeds or weather stresses (for example, short periods of drought) not normally injurious to healthy trees. Occasionally, infestations of the pine needle scale² occur simultaneously with the spruce spider mite, thus further weakening the infested trees.

²*Phenacaspis pinifoliae* (Fitch)

control

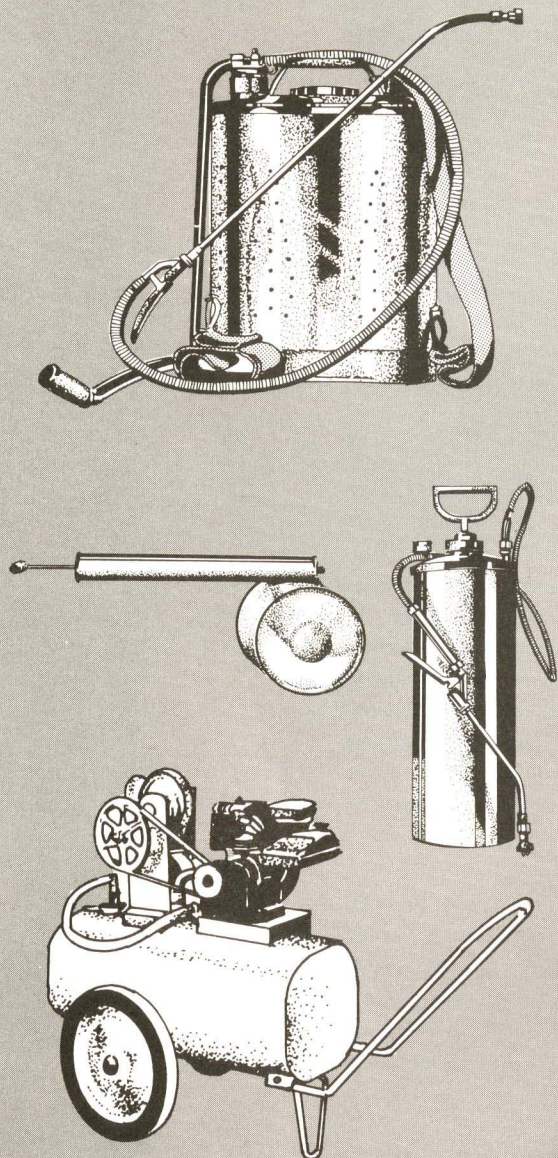
Extreme temperatures, strong winds accompanied by heavy rains, and prolonged high humidity appear to be the most important natural control factors. When these fail, applied control may be necessary to prevent serious damage to infested trees.

Washing infested trees thoroughly at weekly intervals during the spring and summer with a strong stream of water under pressure is beneficial. The force of the water breaks up and carries away webbing and dirt particles, and destroys many of the feeding mites. This technique is especially useful for trees in ornamental plantings, but is less practicable if large numbers of trees require treatment. In this latter instance trees can be treated with a miticide.

Many miticides will give good results but some possess qualities lacking in others. The chemicals recommended for use against the spruce spider mite are Kelthane and Malathion. Because of their ease of handling, liquid formulations of emulsifiable concentrates are preferred to wettable powders for use in most types of spray equipment.

As Malathion may be destructive to predators of the spruce spider mite it is not recommended for large scale control operations. It should only be used if the more efficient miticide Kelthane is not available, and then only as an emergency measure.

There are several types of spray equipment (ranging from power-driven machines to hand-operated pump sprayers) on the market today. The selection of the type and size of equipment will depend on infestation conditions, and importance and size of the trees to be treated.



Small hydraulic sprayers

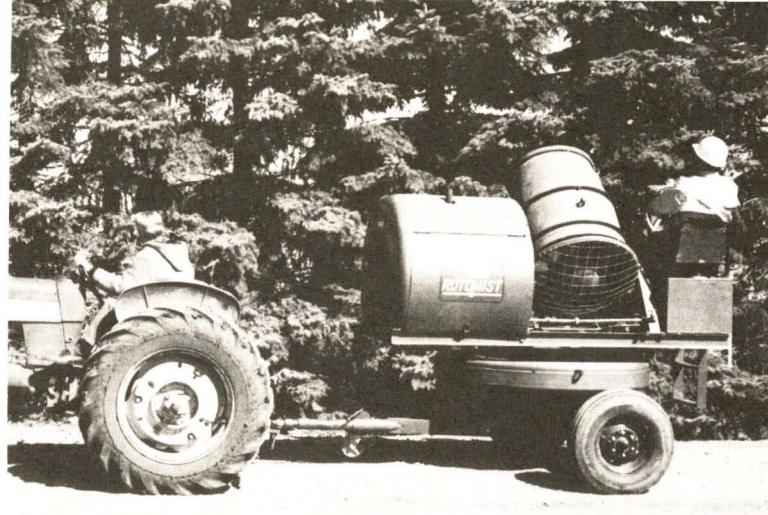
RECOMMENDED AMOUNTS OF CHEMICALS

MITICIDE	TRUCK OR TRAILER MOUNTED		PORTABLE KNAPSACK TYPE		OTHER TYPES
	HIGH-PRESSURE SPRAYER (PER 40 GAL. WATER)	MIST BLOWER (PER GAL. WATER)	HIGH-PRESSURE SPRAYER (PER GAL. WATER)	MIST BLOWER (PER 40 GAL. WATER)	HAND-PUMP SPRAYER (PER GAL. WATER)
KELTHANE E.C. (1.78 LB. ACTUAL/GAL.)	1 PT.	3 QT.	1 TBS.	6 TBS.	1 TBS.
MALATHION E.C. (50% ACTUAL)	—	—	1 TBS.	6 TBS.	1 TBS.

Note: Above rates given as Imperial liquid measure where: 1 pint — 20 fl. oz.;
1 gallon — 160 fl. oz.



Hi-volume, high-pressure sprayer.



Lo-volume mist blower.

In a severe or extreme outbreak, or for large trees, tractor or truck operated high-pressure sprayers and mist blowers are more practical than other types. The most common sprayer used is the high-pressure type equipped with a hose and spray-gun. With this equipment, enough spray mixture should be used to wet the trees thoroughly without drenching, and it should be applied at a nozzle pressure of 300 pounds per square inch or greater in order to penetrate and break up the webbing formed by the mites.

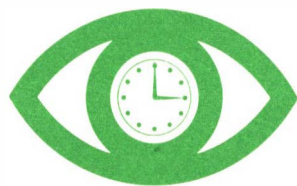
Mist blowers deliver a very fine spray in a fast moving air stream, and thus require a much smaller quantity of spray mixture but at a higher insecticide concentration. If this equipment is used, a sufficient quantity of the concentrated spray should be applied to moisten the foliage well without dripping. Wettable powders should not be used for mist blower applications as it may cause clogging of the spray jets.

In young amenity plantings and for small ornamentals, a knapsack-type power-driven sprayer or high-pressure hand operated pump sprayer is usually adequate. Direct the spray down into the trees and up from below wherever feasible to ensure good coverage of the foliage and adequate penetration of the webbing. Wettable powders are less suited than the liquid formulations for application with many hand-operated pump sprayers because of small nozzle openings that easily become plugged.

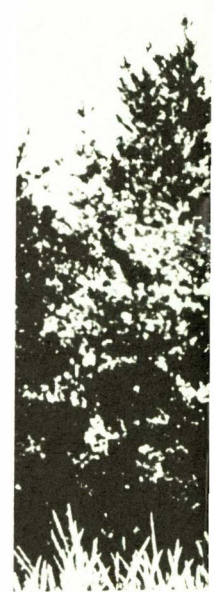
Timing of the spray operation is important for good results. Usually two applications of spray are required per season for effective control. Apply the first spray during the third week in May before egg-laying begins and the second application in late June or early July. If treating in May is not possible, spray in early June and again about mid-July.

Chemicals recommended for use against spruce spider mite infestations are poisonous to humans and other animals, and also to fish. Always read carefully and follow the safety precautions given on the manufacturers label. Avoid inhaling the sprays, and if the concentrated insecticides come in contact with exposed skin, wash immediately with soap and warm water.

TAKE TIME



**OBSERVE LABEL
DIRECTIONS**



acknowledgment

Information on the biology of the spruce spider mite is based on research conducted by Mr. K.E. Stewart, formerly entomologist at Indian Head, Saskatchewan.

selected reading

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Additional information or copies of this report may be obtained from:

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