DISTORTION OF YOUNG CEDARS BY AN ERIOPHYID MITE, TIRSETAEUS CUPRESSI (K.)

L. C. KUITERT

Entomologist

Florida Agricultural Experiment Station

Gainesville

During the summer of 1959, Mr. Louis Neiland, Extension Forester, Agricultural Extension Service, brought in several small southern red cedars, *Juniperus virginiana* var. *glauca*, to be examined for insects. Mr. Neiland reported that the plants were several years old and none of the plants had as yet developed a "leader." He stated that he had observed this condition frequently for a number of years.

Dr. A. N. Tissot, Entomologist, Florida Agricultural Experiment Station, examined the plants and reported that he had observed a similar condition on cedars in 1953 and at that time had found the cedars infested with thrips.

Mr. Neiland reported that this condition caused a considerable loss of stand in seed beds and in addition many plants remained but several inches in height for months and even years. An examination of the plants failed to reveal any insects. The plants were placed in a greenhouse and observed periodically. Several months later the appearance of the plants suggested that the causal agent was active and microscopic examination revealed the presence of Eriophyid mites. These tiny, wormlike, plant feeding mites measuring less than 0.2 mm. in length were feeding deep in the tissue between the needle and stem. Specimens of the mite were forwarded to the Entomology Section, Division of Plant Industry, for identification. Mr. H. A. Denmark identified the mite as *Tirsetaeus cupressi* (K.). The Eriophyid mites are variously known as gall mites, blister mites, bud mites and rust mites.

Nature and Extent of Damage.—The distortion of young cedars, caused by the Eriophyid mite, *T. cupressi* (K.), is striking and consistently can be readily recognized. The mites are always found on the new growth and apparently do not live on the old tissue. Feeding by this mite prevents the young cedar from developing a "leader" and assuming upright growth. Infested young cedars are more or less spherical in shape, bushy and severely stunted (Figure 1). Individual needles have the typical stippled condition on the upper

Figure 1.—Treated (left) and untreated plants. Note how treated plant has assumed upright growth; lengthened internodes. Check plant continues to have "cabbage head" appearance.

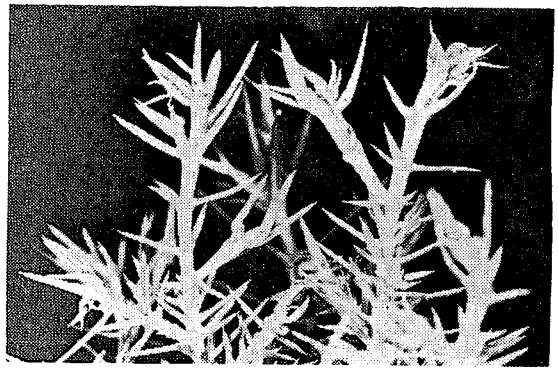

Figure 2.—Cedar terminals showing distortion of needles caused by an Eriophyid mite. Terminal needles are twisted, shortened and thickened.

surface resulting from mite feeding. Needles also are shortened and thickened considerably at the base (Figure 2). In severe infestations the needles gradually turn brown from the tip toward the base, and become very hard and sharp. Eventually the seriously affected leaves die. The mite population varies from 10 to more than 50 per bud. During certain periods of the year, all the buds examined were infested.

In addition to the stunting and distortion of the leaves, there is an appreciable shortening of the internodes and distortion of the stem. Feeding by the mites causes an abrupt cessation of normal elongation and eventually death. New terminals develop behind the old infested ones and in turn become infested as they force their way out of the abnormal area. Eventually the new terminal becomes seriously affected and dies. Other effects are the formation of rosettes or witches broom on severely affected twigs. Under conditions of severe and long infestation the plant assumes a bushy "cabbage head" shape due to the absence of a leader. When the new terminals develop during periods of low mite activity, there is some increase in plant size.

Plant Species Affected by Distortion.—Distortion has been observed on many junipers although there is considerable variation in the severity of the damage between the varieties. The mite causes the greatest amount of damage to seedling plants and undoubtedly actually kills many young plants growing under natural conditions. The native cedar or southern red cedar, *Juniperus virginiana* var. *glauca*, appears to be the most susceptible host. We have also found Arizona cypress, *Cypressus arizonica*, and Mexican cypress, *C. lusilanica*, severely injured by this mite.

Materials, Methods and Results.—Tests were initiated to evaluate a number of miticides for effectiveness.

The miticides evaluated included emulsifiable concentrates of 46 percent dimethoate, 25 percent tetradifon[1] and 46 percent ethion used at the rate of 1 pint per 100 gallons. Two other treatments, used at the rate of 1 quart per 100 gallons, were emulsifiable concentrates of 25 percent carbophenothion[2] and a combination of 13 percent dimethoate plus 5 percent tetradifon.

Treatments were applied with a 3 gallon compressed air sprayer to each of four plants 8 to 15 inches in height growing in gallon containers. The sprays were applied thoroughly at pressures of 35 to 40 pounds and it was felt that above average coverage was obtained.

Observations were made at frequent intervals following treatment for six months. No evidence of phytotoxicity was observed at any time during the test.

Actual counts of mites present before and after treatment were not made as this seemed impractical and would provide inconclusive data. This mite is translucent and so small that counts made would not be reliable. In addition it is necessary to pull the leaf away from the stem to observe all of the mites and this could have an injurious effect on the population. Also, there was no known way of establishing that the mite population was relatively uniform from terminal to terminal. For these reasons, it was decided that effectiveness of the treatments would be based on plant response following treatment.

Three weeks following application the treated plants appeared somewhat improved when compared with the appearance of the untreated plants. Six weeks after application considerable new growth was beginning to appear on most of the treated plants although there was no obvious difference between treatments. The combination treatment of dimethoate plus tetradifon was favored because all four plants showed improvement while one or two plants in each of the other treatments showed little improvement. There was little or no change in the appearance of the untreated plants during this time.

Four months following application the plants which received the dimethoate plus tetradifon and carbophenothion treatments appeared most improved. All treatments showed considerable new growth; while little new growth was present on the untreated plants. Six months after application, the treated plants showed an appreciable increase in length of the internodes over the untreated plants. The length of 10 internodes measured a short distance below the terminal averaged 97.5 mm. in the dimethoate plus tetradifon treatment with the length varying from 83 mm. to 119 mm. Measurements made of 10 internodes of twig in the other treatments gave very similar results. The length of 10 internodes measured a short distance behind the terminal averaged 53 mm. in the check plants with the length varying from 33 mm. to 59 mm. The "leader" or main stem was well defined at this time in most of the treated plants while being poorly defined in the untreated plants.

Summary.—Distortion, severe stunting and deformation of young cedars caused by an Eriophyid

[1]Approved common name for Tedion.
[2]Approved common name for Trithion.

mite is common in the Gainesville area. The symptoms are quite striking; affected leaves are shorter and much thicker at the base and are misshapen and the length of the internodes is considerably reduced. Growth of young plants virtually ceases during certain periods of the year when infested with these mites. Severe infestations, combined with poor growing conditions, may bring about death of young plants. The mites are always found on the new growth feeding in the tissue between the base of the leaf and the stem with the deformed leaves affording them considerable protection. They are most active during periods when the plant is producing new growth. Several miticidal treatments were evaluated for effectiveness in controlling the mite. Carbophenothion and a combination of dimethoate plus tetradifon provided the best results.

REFERENCE

Baker, E. W. and G. W. Wharton, Intro. to Acarology. MacMillan, 1952.

ROSA FORTUNEANA COMPARED WITH OTHER ROSE ROOTSTOCKS GROWN IN FLORIDA

S. E. McFADDEN, JR.

Agricultural Experiment Station

Gainesville

In subtropical regions such as Florida, *Rosa* x *fortuneana* Lindley, also known as the Double White Cherokee or the Evergreen Cherokee Rose, has proved an exceptionally good rootstock for many varieties established on a wide range of soil types. This rose was found growing in China and was sent to the Chiswick garden of the Horticultural Society of London by Robert Fortune in 1850. He considered it to be one of the most beautiful climbing roses in the gardens around Ningpo and Shanghai. It was named in his honor by the English botanist Lindley in 1851.

Confusion in the proper specific name for this rose began during the last century. This was partly resolved by the publication of Willmott's monograph of the genus Rosa (7). She clarified the distinction between 2 roses introduced from China by Robert Fortune, both of which had been named in his honor. An original spelling error was later corrected by Rehder whose revision of *Rosa* classification has been adopted by the American Rose Society (6). The confusion is currently resolved in favor of the name used here.

Rosa x *fortuneana* is thought to be a first generation hybrid of *R. banksiae* x *R. laevigata* (Lady Banks Rose x Cherokee Rose). Like both of the supposed parent species it has a rampant climbing growth habit; mature plants produce many canes 15 feet or longer. In cultivation, 8 feet or wider spacing between plants trained on a fence or trellis is suggested; closer spacing (4 to 6 feet) is suggested for plants kept pruned to form a hedge. Double white flowers are produced during one season only—February and March in Florida. Like the Lady Banks Rose it is relatively resistant to the fungus causing blackspot, but regular application of an effective fungicide are needed to obtain optimal growth and to insure healthy condition of canes cut for propagation.

The susceptibility of *R. fortuneana* to crown gall is being investigated by plant pathologists at the Florida Agricultural Experiment Station. Infection of wounds on stem parts with the bacteria causing crown gall results in the same kind of tumerous growth as on other roses. Infection of wounds on root parts with this organism has not produced tumors at the inoculated root wound site.

One endoparasitic species of nematode, *Pratylenchus penetrans*, reduced the flower yield of roses on *R. fortuneana* rootstock (5). Other parasitic nematode species have been found associated with the roots of this rose, but amount of injury to the host plant caused by these organisms has not been determined.

This rose has been used as rootstock in the commercial production of rose bushes in southern France, warmer parts of Australia and in southeastern United States. The plant was introduced into the latter area by Fruitland Nurseries at Augusta, Georgia, and from there to the Glen St. Mary Nursery at Glen Saint Mary, Florida. Its adaptation in warmer climates is well established. In colder climates, such as the northern parts of the United States, its use is limited because of susceptibility to winter injury.

The superior vigor of *R. fortuneana* rootstock for Noisette, Tea and Hybrid Tea roses as com-