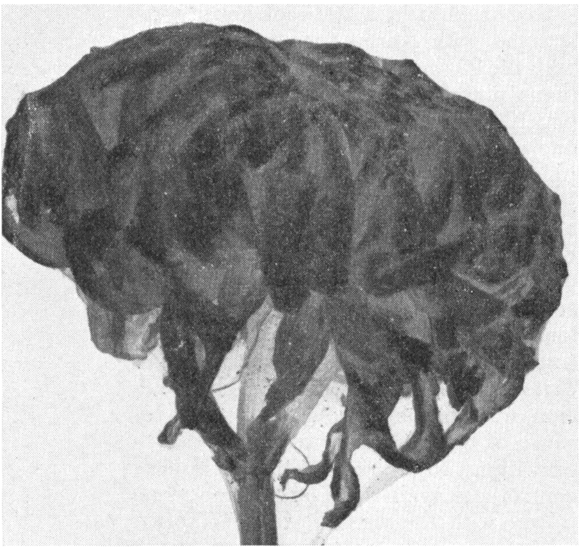

On chrysanthemums, the primary damage of spider mites is to the leaves. Under cloth-house conditions, however, the mites sometimes build up in such tremendous numbers that their webbing envelops the flowers.

Chrysanthemum Pests

new chemicals promising against two-spotted spider mite and aphids

A. Earl Pritchard and R. H. Sciaroni

The two-spotted spider mite is a constant threat to chrysanthemums—especially under cloth-house conditions in San Mateo and Santa Clara counties where nearly two millon dollars worth are grown annually.

During recent years, parathion has been used to a considerable extent for control of this mite, but injury in the form of necrotic leaf spots has occurred on such important varieties as Good News, Detroit News, and Silver Sheen. TEPP has caused similar injury to these varieties, and it is necessary to use frequently repeated applications of this material to hold the mite populations in check. Sodium selenate has not been used extensively in California, because stunting has often resulted from test trials made by the growers.

88R

A new material—88R—has given excellent control of the two-spotted spider mite in experimental plots during 1949 and 1950. The original product has been given the trade name Aramite, and it is now commercially available.

The formulations on the market consist of a 15% wettable powder and a 2% or 3% dust. The wettable powder spray—usually preferred by growers—is used at a rate of one pound per 100 gallons of water. From four to five ounces—eight ounces for roses—of B-1956 or Spreader-Sticker were added in tests to give thorough wetting of the leaves and an even deposit of the powdery residue. The dusts are reported to be as effective as the spray, and possibly more harmless to plants.

The new chemical—88R—is an organic sulfite compound. One of its main advantages is that it is relatively nontoxic to human beings, and it is also relatively nontoxic to a great many plants at the recommended dosage.

No injury whatsoever was noted to chrysanthemums under any of the experimental conditions. Numerous tender cuttings in rooting beds were sprayed—including the varieties Indianapolis White, Yellow Mefo, White Monument, Good News, J. W. Prince, Garnet King, White Fuji, and Tsukushi Yellow. Young transplants of some of these varieties were also sprayed.

About three acres of chrysanthemums, small plants to mature plants in bloom, were included in the experimental work. Most of the chrysanthemums tested received two applications. The varieties included those sprayed as cuttings as well as Lemon Ishida, Kimota White, Buckingham, and Bright Rose. The varieties Tsukushi Yellow, Lemon Ishida, Kimota White, and Bright Rose are particularly susceptible to injury by the two-spotted spider mite.

The plant tolerance of 88R is further indicated by extensive tests on tender crops such as greenhouse gardenias and roses where no injury was noted except for a mottling of tender new growth, in some cases, and the leaves tend to grow out of this condition. Among the varieties of roses which showed no leaf drop nor burn from 88R treatment were Red Delight, Pink Delight, Eclipse, Elf, Dame Edith Helen, Yellow Talisman, and Rome Glory.

The acaricide 88R must contact the spider mites and their eggs to produce killing action. For this reason, thorough coverage of the underside of the leaves is necessary. Virtually 100% control of the two-spotted spider mite was obtained in experimental plots when the spray was thoroughly applied. In general, cloth-house chrysanthemums needed monthly treatment with 88R for spider mite control during 1950, whereas outdoor chrysanthemums needed less frequent spraying.

On greenhouse crops, 88R has been particularly important for spider mite control where the mites have apparently developed resistance to liquified gas aerosols of parathion, TEPP, and Dithion, and where excessive leaf drop or burn has resulted from the use of these materials.

In a heavily infested, experimental greenhouse of gardenias that was treated with 88R, no spider mites were found until four months later. Commercial applications to greenhouse crops, however, usually were necessary at about three-month intervals.

The new material, 88R, is of no value for the control of other pests, and—for this reason—it is used in combination sprays for chrysanthemum pest control. It may be combined with benzene hexachloride for the control of thrips and aphids, as well as for the chrysanthemum midge, plant bugs, and leafhoppers.

DDD may be used with Aramite when the leaf-rolling caterpillars of the orange tortrix are prevalent, and this material is also effective for thrips, plant bugs and leafhoppers.

Other well-known materials may be used in combination with 88R for the constant fight against aphids on chrysanthemums. DDT, chlordane, or toxaphene are compatible with 88R when certain of the less frequent pests are encountered.

When sulfur is on the plant, 88R should not be used until further information is available. The two chemicals are reported to be incompatible.

OMPA

OMPA is one of the remarkable, new chemicals that is systemic in action—absorbed by the plant and transferred, principally, to the new growth. Certain pests that feed on the treated plants are controlled. The two-spotted spider mite and various species of aphids are readily killed by feeding on the poisoned plant tissues.

OMPA is an abbreviation of the chemical name octamethyl pyrophosphoramide. It bears the trade name Pestox-3, but it is not yet available commercially in California.

Although OMPA is soluble in water, experimental work in the San Francisco Bay Area has been with a formulation containing one pound of active ingredient per quart. From two to three pints of this formulation were generally used per 100 gallons of water, and it was applied as a spray to obtain top coverage of the leaves of the plants.

OMPA is very poisonous to humans,

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VIRUS

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The aphid populations differed markedly among the different localities. The cowpea aphid, *Aphis medicaginis* Koch was the most common aphid in the desert and San Joaquin Valley areas, and became progressively less common as the coast was approached. The green citrus aphid, *Aphis spiraecola* Patch, which made up the bulk of the citrus aphid populations in most of southern California, was not found on the desert and in the San Joaquin Valley. The black citrus aphid, *Toxoptera aurantii*—Fonsc—was primarily a coastal species.

The melon aphid was found most abundantly in the intermediate area this year. This area includes the localities in which quick decline has spread most rapidly. It also includes the Ventura County area in which the quick decline disease has appeared recently.

The interior area showed much lower melon aphid populations. If this aphid is the only vector of quick decline virus, and if citrus aphid populations in other years show the same distribution, the quick decline should spread slowly in the interior districts. It should spread even more slowly in the desert and in the San Joaquin Valley.

Estimates of Aphid Populations on Citrus Trees in Various California Citrus Areas in the Spring of 1950

Aphid species	Per cent of populations				
	Coastal	Intermediate	Interior	Desert	San Joaquin Valley
Melon aphid	6.3	13.6	3.5	0	0.5
Green citrus aphid	58.3	78.4	80.7	0	0
Cowpea aphid	0.1	0.8	2.3	70.7	94.7
Green peach aphid	4.3	2.6	11.7	29.3	1.2
Potato aphid	0	0.2	1.7	0	3.4
Foxglove aphid	0	0.04	0.1	0	0.1
Black citrus aphid	28.0	4.4	0.02	0	0
Sunflower aphid	3.1	0	0	0	0
Total aphids per tree	7,085	61,110	11,570	11,960	6,890
Melon aphids per tree	442	8,287	409	0	39

It appears improbable that the control of aphid populations by insecticides in individual citrus groves will slow the spread of quick decline enough to make it practical.

The spread is by winged melon aphids that fly from infected orange or other citrus trees to healthy orange trees. The infection of a healthy orange tree very probably takes place within the first few minutes that the aphid feeds on it. Killing her—all melon aphids are females—after she has infected the tree is futile.

To effectively reduce the spread of the virus it would be necessary to keep aphids carrying the virus from landing on and feeding on healthy trees. An effective aphid repellent would be the obvious answer, but none is known. Another method would be to keep the melon aphids from breeding upon infected trees since these are the aphids that are most likely to carry the virus. But it would not be enough to keep the aphids killed off the trees showing quick decline symptoms.

Transmission may take place from infected trees on sweet orange root that will never show symptoms or from infected trees on sour orange root that have not yet shown any sign of the disease. It would be necessary to keep the melon aphid populations very low on all citrus trees for some—not known—distance around the orchard to be protected. On rare occasions aphids can be carried long distances by wind, but it is probable that they ordinarily move not more than five miles and that flights of less than a mile are the usual rule. Most commonly they fly only short distances, sometimes from one tree to the next.

Perfect aphid control in an orange orchard should reduce the spread of quick decline slightly, but most orange orchards are too small units to expect aphid control to give practical protection from the spread of citrus quick decline.

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The above progress report is based on Research Project No. 1370.

CHRYSANTHEMUM

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and an approved respirator—as well as protective clothing and care in handling—is necessary during mixing and application.

The main advantage in the use of OMPA for control of the two-spotted spider mite on chrysanthemums is in the ease of application. One hundred per cent control was obtained in all cases, when the top coverage of the plants was thorough. When coverage on the lower, older leaves was spotty, control of the mites was found to be incomplete.

In small plots consisting each of several hundred plants—as well as in a small cloth-house containing about 4,000 plants—it was five weeks following treatment with OMPA before a reinfestation of spider mites was found. The OMPA formulation was applied at a rate of two or three pints per 100 gallons of water, and the lighter infestations of mites were treated with the lighter dosage in these tests.

OMPA is excellent for aphid control. Several species of aphids feed on chrysanthemums—the leaf-curl plum aphid, the green peach aphid, the chrysanthemum aphid, and the cotton or melon aphid are found most commonly. The leaf-curl plum aphid is the most difficult to control, because it penetrates the buds so deeply.

Experimental results indicate that all of these aphids may be controlled with applications of two pints of the OMPA formulation per 100 gallons of water at a minimum of three weeks apart.

No adverse affects to chrysanthemums were noted in experimental work with OMPA. Applications were made to immature plants as well as to flowers coming into bloom, and observations continued until cutting.

In addition to a number of plots—several hundred plants each—about 6,000 plants were treated with dosages of one pound of OMPA per 100 gallons of water. Varieties included were: Lemon Yellow, Buckingham, Kashima Red, Bright Rose, Spiders—pink, yellow, and white—Rayonant, Fuji—white, pink, yellow, bronze—Indianapolis, J. W. Prince, Good News, Detroit News, Armistice Day, Wait's—bronze and yellows—Albatross—notorious for aphid infestation—and Turner's—yellow and white.

Another 4,000 plants—representing Masterpiece and Mefo varieties—received 1½ pounds OMPA per 100 gallons of water and again no plant injury was evident. No spider mites were present on these plants when cut one month later, whereas the checks were unmarketable.

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The above Progress Report is based on Research Project No. 1318.