TABLE 1. Summary of data pertaining to crop water use from saline water tables in California

Soil type	Water table Salinity	Water table Depth	Cotton ET supplied by water table*
	dS/m	m	%
Panoche loam†	5.1	1.44	53 a
Levis silty clay	26.7	1.32	20 b
Merced clay loam	6.7	0.80	35 c
Armona clay loam‡	7.5	1.25	22 d
Oxalis clay loam§	10	1.73	12 e
Oxalis clay loam	10	1.90	10 f

* Letters correspond to data points in figure 1.
† Study by D.W. Grimes et al. 1984. Water Resources Center Report No. 188. University of California, Davis.
‡ Study by B.R. Hanson and S.W. Kite. 1984. ASAE Transactions 27: 1430-34.
§ Study by J.E. Ayars and R.A. Schoneman. 1986. ASAE Transactions 29:1674-78.

TABLE 2. Coefficients of linear regression equations relating water table depth (D) to upward flow rate expressed as %ET of cotton supplied by water table (q_u=a-bD)

Location (soil type)	Equation parameters a	$b(m^{-1})$	R^2
Texas (sandy loam)*	0.698	0.203	0.92
California (clay loam)†	0.511	0.223	0.99
Egypt (heavy clay)‡	0.356	0.167	0.96

* L. N. Namken et al. 1969. Agronomy Journal 61:305-10.
† See table 1.
‡ A.T.M. Moustafa et al. 1975. Ag. Research Review 5:21-24. Ministry of Agriculture, Cairo, Egypt.

27 dS/m (mmho/cm) range, which is consistent with the salt tolerance of cotton. This finding implies that water table salinity variations in this range can be disregarded in modeling and design of irrigation-drainage systems.

Conclusions

We have been able to devise a simple equation to predict water table contributions to crop water use for cotton grown in semi-arid regions such as the San Joaquin Valley. As more information becomes available, similar predictive equations could also be developed for sugarbeets, alfalfa, and other crops. In all cases, however, considerable experimental work in the field is necessary to refine these equations. Long-term effects of salinization of the root zone due to upward flow from the water table may also need to be considered.

Development of predictive equations makes it possible for planners to incorporate interactions between the water table and root zone into design of irrigation-drainage systems on a regional scale, and may help reduce the capital needed to install such systems, lower irrigation costs, and reduce environmental effects associated with disposal of saline drainage water.

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A new disease of myrtle

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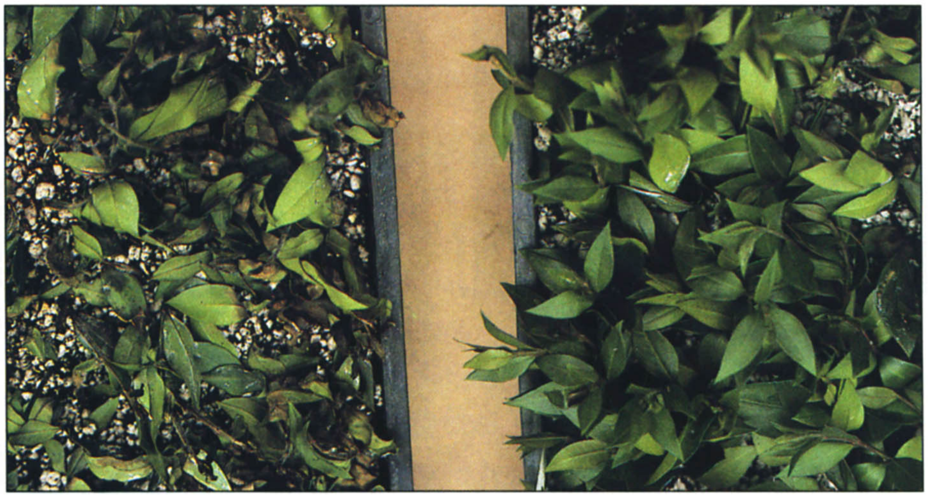
Cylindrocladium root and crown rot, once established, is difficult to control

Common myrtle is a perennial ornamental valued for its use in cut flower arrangements. An established field of myrtle (*Myrtus communis*) can be used as a source of cut foliage for several years.

During the summer of 1986, extensive plant death was reported in a mature myrtle planting in San Diego County. Cuttings taken from plants in this field frequently died during rooting despite routine application of Terraclor (quintozene) and Subdue 2E (metalaxyl) to the cut ends before transplant.

Cylindrocladium scoparium was isolated from both cuttings and crowns of myrtle. This soilborne fungus causes root rot, stem canker, damping off, and foliage blight on plants throughout the world. The host range includes more than 100 species of plants, many of them ornamentals, although this is the first report of the pathogen attacking myrtle. This fungus is difficult to isolate from natural soils but is an aggressive colonizer of living and dead plant tissues in disturbed soils such as fumigated fields. The fungus produces microsclerotia within plant tissues; these resistant propagules can sometimes survive fumigation and recolonize the nursery bed.

Mature myrtle plants with cylindrocladium root rot show branch dieback and stunting; cankers may appear in the crown region, and the wood beneath the bark is dark brown. Cuttings exposed to the fungus initially develop lesions on the



Mature myrtle from field (photo at left) shows symptoms of crown and root rot caused by *Cylindrocladium scoparium*. Discoloration of inner tissue is visible in the area where outer bark has been scraped away. Above left, myrtle cuttings six days after transplant to infested potting medium show dead tissue on stems and leaves. Healthy cuttings at right were planted in noninfested medium.

cut ends; these lesions enlarge and extend up the stems. Both stem and leaf tissues turn brown or black.

Experimental methods

We conducted greenhouse pathogenicity tests using *C. scoparium* isolates from mature myrtle plants. The fungus was grown in a sterilized mixture of 1 part cornmeal and 20 parts moistened sand until microsclerotia were abundant. This inoculum was uniformly mixed (1 part per 20) with the grower's potting medium (1 part peat to 5 parts perlite), and 10-day-old myrtle seedlings obtained from the grower were transplanted into the medium. Before transplant, tissue from roots and crowns of 12 seedlings was surface-disinfested and plated on potato dextrose agar amended with 250 parts per million streptomycin sulfate per liter. *Cylindrocladium* was not recovered from any of these plants.

Two flats (15 by 14 inches) were infested and two were not. Flats were kept in a mist chamber for five days, then removed to a greenhouse bench. Ten days after transplant, root and crown tissue from 12 seedlings randomly selected from each flat were surface-disinfested and plated on potato dextrose agar.

Benlate (benomyl) is currently the only fungicide registered to control cylindrocladium rots on woody ornamentals, and no information is available on its use to control cylindrocladium crown and root rot of myrtle. We performed tests to evaluate the effectiveness of Benlate 50W and three experimental chemicals in controlling root rot: Prochloraz 50W, Terragard (triflumizole) 50W, and PP696 50W (6-Hydroxy-2,2,7,7-tetramethyl-5-[1*H*-1,2,4-triazol-1-yl]-3-octanone). These chemicals were tested on nonrooted cuttings that were transplanted to naturally infested field soil after rooting and on nonrooted cuttings in flats artificially infested with the fungus.

In all tests we used myrtle cuttings obtained from the grower. The cut ends had been dipped in Terraclor and Subdue before the experiments. Four 15- by 14-inch flats of cuttings were treated with each chemical, and four flats were left untreated as a control. All four chemicals were applied to the point of runoff at rates of 0.06 ounce active ingredient per square foot, except PP969, which was applied at 0.02 ounce active ingredient per square foot.

Chemical applications were made in the greenhouse and two weeks later after cuttings had been transplanted to the field. There were about 125 cuttings in each flat, and the field plot design was a randomized complete block design where each block represented one flat of cuttings. Disease counts were made 6, 9, and 14 weeks after the last chemical treatment.

In a separate experiment, nonrooted cuttings were transplanted into potting medium that had been infested with the *Cylindrocladium* fungus. Benlate, Terragard, and Prochloraz were each applied to one 11-inch-square flat containing 72 cuttings immediately after planting and again seven days later. One flat was infested but not treated with fungicide, and one flat was not infested or treated.

The dead cuttings were counted two weeks after cuttings were transplanted to flats. During this period, seedlings grown in noninfested potting medium rooted, but root growth was reduced greatly when seedlings were grown in infested potting medium.

Results

After one week all artificially inoculated cuttings in the greenhouse showed stem or leaf lesions or both, and after 10 days all plants were dead. All of the isolations from stems and leaves yielded *C. scoparium*. The disease also caused substantial losses in flats when the grower used contaminated cuttings in his commercial operation.

None of the chemicals tested significantly reduced disease incidence in the field or greenhouse when compared with the untreated control. When the inoculum is low, it is possible that Benlate would provide some control, and some growers may elect to use this fungicide. When cuttings were exposed to high levels of inoculum in artificially infested soil, chemical treatments reduced the number of dead plants during the first two weeks of treatment, but virtually all cuttings showed severe symptoms of cylindrocladium root and stem rot at the end of the two-week period.

Conclusions

At present, there appear to be few alternatives from which growers can choose to manage this disease once it has become established. Studies in forest nurseries indicate that fumigation may not kill all propagules of the fungus, and that sometimes it can reestablish itself rapidly in fumigated areas.

Experience with the *Cylindrocladium* fungus and the diseases it causes on other woody plants suggests that the best available defense is vigilant use of strict sanitary procedures to prevent the fungus from becoming established. These include avoiding the branches close to the ground when taking cuttings from field plants for propagation; lower branches may have become contaminated by splashing of fungal spores onto stem and leaf tissues during irrigation or rainfall. Plants from areas known to be infested should not be used as a source of propagative material. If soil is fumigated with methyl bromide, plant debris should be removed or allowed to decay before chemical application, since woody plant tissues will protect the fungus from the effects of the fumigant.

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