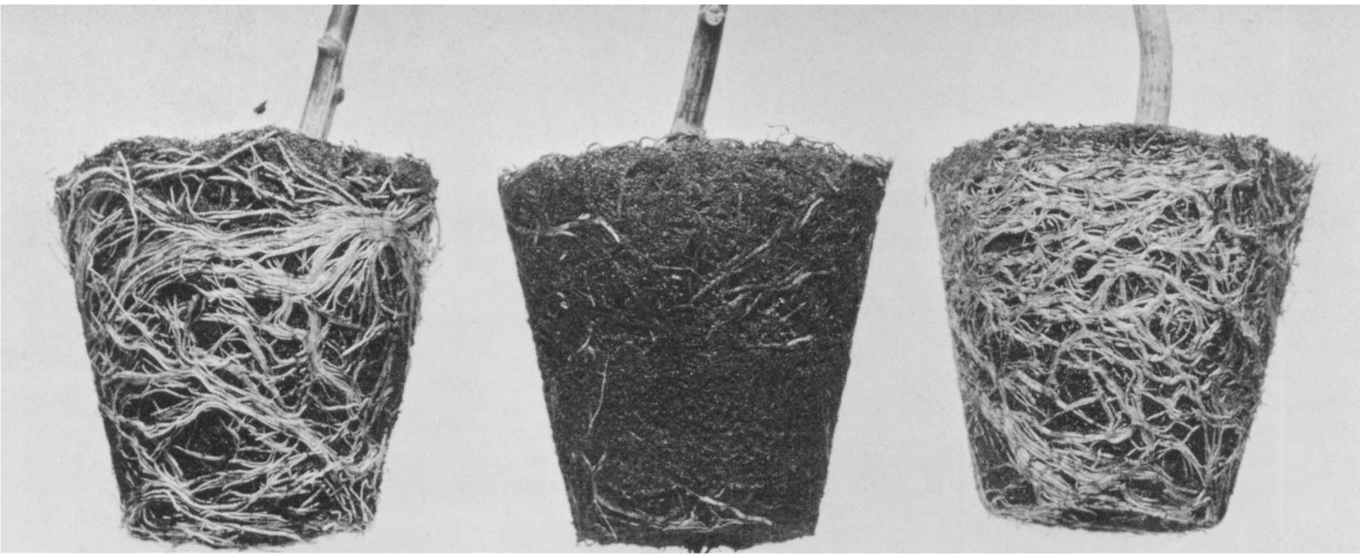

Root rot control in inoculated poinsettias, variety Paul Mikkelson. The plant at the left was drenched with Benlate-Dexon, the plant at the right was drenched with Benlate-Terrazole, and the plant in the center was left untreated.

FUNGICIDE MIXES for POINSETTIA root rot control

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ROOT ROT OF POINSETTIA is important, not only because it may kill plants during the growing season, but also because it is a principal factor in causing leaf drop both before and after the plants are marketed. This serious disease results from infection by at least three root-rotting fungi, namely *Pythium ultimum* (other *Pythium* species may also be involved), *Rhizoctonia solani* and *Thielaviopsis basicola.*

All of these fungi are known to be present in soils and propagation areas in which susceptible crops are continually or intermittently grown. Control by sanitation under such conditions has become extremely difficult so poinsettia growers have resorted to the use of drenching fungicides into the soil to give control of this root rot complex. As the fungi involved are of diverse types, no single fungicide has been found to give control and mixtures of fungicides have been used with fair to good results. Occasionally disease outbreaks occurred even where fungicide mixes had been used, thus prompting a continuing search for new and more effective materials to be used in the mixes.

Recently several new experimental materials belonging to a group of systemic fungicides have been developed and have shown promise in controlling a number of fungi including some which are soilborne. These experimental materials were tested in combination with several known fungicides on a number of crops, including poinsettias, under greenhouse production conditions. The materials were used not only as soil drenches but as additions to the soil mix, prior to planting.

Two poinsettia experiments were completed at Fred Breitner's greenhouses in Colma. In one, the variety Paul Mikkelson was grown in 5-inch pots. In this experiment the plants were not pinched and the fungicides and fungicide mixtures were mixed thoroughly in the planting mix prior to planting. No additional materials were added before the plants were sold. The materials used, the concentrations, and the results expressed in size of plants and amount of disease in the roots are given in table 1.

From these results, it can be seen that the fungicide mixes gave almost complete control of the root rot. In addition, the plants treated with the mixes produced larger bracts than the untreated plants and in two of the mixes, the plants were taller, though the heights of the resulting plants were of little importance since all were in a range that could be sold readily.

In another experiment at the same nursery, fungicides and fungicide mixes were added to the pots as soil drenches at monthly intervals starting in September. Two hundred ml (about ½ pint) of the fungicides were added to each six-inch pot. Immediately following this, two-thirds as much water was added to help carry the fungicides down into the planting mix. The variety Paul Mikkelson was grown as single-pinched plants. The materials, concentrations, and results of the treatments are given in table 2.

From the results, it can be seen that the fungicide mixtures not only decreased the amount of disease but also produced taller plants with larger bracts. The disease control was not as good, however, when the

TABLE 1. RESULTS OF MIXING FUNGICIDES INTO THE PLANTING MIX PRIOR TO PLANTING POINSETTIAS

Treatment	Concentration	Plant height	Bract width	Roots diseased
	ppm	inches	inches	%
Check		9.80	8.24	57.4
Dexon	25	10.30	8.70	75.0
Terrazole	50	8.30	8.70	75.0
Benlate	150	10.60	8.20	20.0
Mertect	50	9.29	8.0	14.0
Mertect + Dexon	50 25	11.56	9.0	trace
Benlate + Dexon	150 25	12.65	9.90	trace
Benlate + Terrazole	150 50	9.40	9.35	trace

TABLE 2. RESULTS OF THE ADDITION OF FUNGICIDE DRENCHES TO POTTED POINSETTIAS

Treatment	Concentration	Plant height	Bract width	Roots diseased
	ppm	inches	inches	%
Check		15.66	10.0	19.0
Dexon	100	15.80	9.88	29.0
Mertect	50	16.0	10.3	15.5
Benlate	150	15.15	9.96	8.0
Dexon + Benlate	100 150	16.11	10.16	6.58
Dexon + Mertect	100 50	16.54	10.07	11.0

fungicides were drenched in as it was when they were mixed in the soil prior to planting. Also, applications of single fungicides were observed to sometimes increase disease severity in the two experiments mentioned. This result probably occurred because a fungicide which is effective against only one fungus (in a disease complex), by controlling it, will remove some of the competition, thus allowing another organism to build up and cause more damage.

Because the disease-producing organisms were at low levels in the soil used in the drenching experiment, another experiment was started at the U. C. greenhouse in Berkeley. Plants of seven varieties of poinsettias, furnished by Paul Ecke, Encinitas, were grown in 5-inch pots. The plants were drenched with fungicide mixes three times, the second drench 20 days after the first and the third drench 29 days after the second. All fungicides were used at the rate of 100 ppm and 200 ml (½ pint) were added to each pot. Four days after each drench, heavy suspensions of *Pythium*, *Rhizoctonia* and *Thielaviopsis* were added to each pot. Only disease ratings were taken and these are given in table 3.

TABLE 3. FUNGICIDAL CONTROL IN POINSETTIA PLANTS INOCULATED WITH THREE ROOT ROT FUNGI

Variety	Check no treatment	Diseased Roots	
		Benlate + Dexon	Benlate + Terrazole
	%	%	%
Eckespoint	82	18	6
Paul Mikkelson	58	3	7
Barbara Ecke Supreme	38.5	4.3	5.7
C-64	83	7	7
Elisabeth Ecke	45	4.4	3.3
B-28	83.3	16.7	16.7
B-7	75	15	1.0
Average for all varieties	59.4	7.22	6.43

Under conditions where large amounts of the root-rotting fungi were added to the soil, mixtures of Benlate and Dexon or Benlate and Terrazole proved to be extremely effective in giving control. The amount of control is even more convincing when one observes the root systems of treated and non-treated plants (photo).

Of the fungicides mentioned, only Dexon presently is available for use on poinsettias. Benlate, Mertect and Terrazole should be cleared for use for the next growing season. In the meantime, additional studies are underway to determine which combinations and concentrations are most effective.

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HOW TO PRODUCE MILK with a normal milk fat percentage is a major problem for California dairymen during the period from May to October each year. There are indications that high temperatures (85° F and up) plus the feeding of large amounts of green chop forages, which reduce fiber intake, both depress the fat composition of milk. There are a few feedstuffs and additives which, when added to the ration, will partially counteract this seasonal depression in the percentage of fat in milk; however, cost and/or low palatability makes it impractical to use most of these in a commercial dairy operation. An additive that has been suggested as promising is dried whey—a by-product of the processing of butter and cheese. Dried whey product is highly palatable and, when fed at the rate of 10 per cent of the ration, has been successfully used to maintain a normal fat test under conditions of high temperature and low fiber rations. When dried whey product is incorporated into pelleted concentrates at this level, however, mechanical difficulties develop in the pelleting process. Reduction of the level to 5 per cent of the pelleted concentrate has overcome this problem but the effect on fat percentage at this level has not been tested.

This feeding trial was conducted at the Loma Linda University Dairy, Riverside County, to evaluate the commercial application of feeding dried whey product as 5 per cent of the pelleted concentrate. The total concentrate mix was composed of rolled barley and whole cottonseed with the remainder of the ingredients, as shown in table 1, combined into a pellet. Therefore, the dried whey product made up 3.7 per cent of the total concentrate mix.

The 400 milking cows on the dairy were divided randomly into two separate herds with 40 cows from each herd paired according to: (1) Previous DHIA production or, in the case of first calf heifers, predicted production from previous DHIA test-day data; (2) Number of previous lactations; and (3) Number of days elapsed in the present lactation. One member of each pair was allotted to one of two treatment groups and her pair-mate was allotted to the other treatment group. Both groups remained in separate corrals for the duration of the trial. Average past or predicted milk production, days in milk, and lactation number for the two groups are shown in table 2.

Double reversal

A double-reversal design with three periods, each six weeks in length, was used for the trial. This design eliminates the possibility of higher producing cows being on only one treatment because all cows go through both treatments. The first week of each period was used as a change-over period and data from these weeks were not used in evaluation of the results. Individual milk weights were recorded and milk samples taken for analysis of milk fat on the same day every week. One cow in the experiment died, so her data and that of her pair-mate were eliminated from the results. The trial started on May 28, 1968 and ended on October 1, 1968.

When cows were on the control treatment, they received a 14.5 per cent crude protein concentrate mix which had been fed regularly at the dairy prior to initiation of the trial. When on the test treatment they were fed the same concentrate mix plus 3.7 per cent dried whey product incorporated into the concentrate mix (table 1). Cows in each of the corrals were fed approximately 5 lbs of concentrate mix daily as a top dressing on the green-chop in outside mangers and the remainder was fed in an elevated, tandem-stall milking parlor. The parlor was divided into two parts, each with four stalls. All of the cows in the herd fed the