Orchard location	Mite species: ERM	Brown almond	Two-spotted	Pacific	Peach silver
Whitmore Ave., Modesto	+ + + + +	+	+ +	+	+ +
Hwy 99, Modesto	+ + + +	+	+	+	+
Hwy 132, Stockton	+	+	+ + +	+	0
Wheatland	+ + +	+ +	+	0	+ +
Yuba City	+ +	+ + +	+	+	+ + +

Mite Populations in Five Northern California Almond Orchards in 1977

+ + + = abundant
+ = present, but low
0 = not found

Chrysopa carnea Stephens. These predators were very active.

The increase in ERM in the trees treated with Sevin (fig. 1) is statistically significant, although less dramatic. This may be due to suppression of ERM numbers in very hot weather. Few predators were found in these trees during August.

Figure 2 shows the mite trends in the other Modesto orchard (near Highway 99), exhibiting an increase in ERM after the Guthion treatment. However, drift of Plictran applied on July 14 to adjacent blocks of trees prevented an assessment of the impact of Sevin on this orchard.

As noted above, Guthion applications in the Stockton orchard had no impact because so few mites were present in May. The Sevin application did not cause a significant increase in *T. urticae* or *T. pacificus* numbers, but drift of the acaricide Plictran applied aerially to an adjacent block affected the assessment.

The Guthion application in the Yuba City orchard decreased peach silver mite numbers dramatically, but there were no significant differences in *T. urticae* or ERM numbers.

The untreated orchard in Wheatland had a diverse array of pest mites and predators. ERM, brown almond mite, and twospotted spider mite were present, but no dramatic outbreaks of these mites occurred. Coccinellids, chrysopids, and thrips were common predators, but spiders and predatory hemipterans and phytoseiids were also found, though not commonly.

Conclusions

Results of this single season's work showed that the use of NOW insecticides in northern almond-growing areas can increase ERM pest populations significantly. The reasons for the ERM population increases were not determined in this study. Several hypotheses could explain these increases: for example, the NOW insecticides might destroy insect predators of the mites, or might stimulate ERM reproduction.

Because the economic injury levels for ERM, the dominant pest mite during 1977 in four of the five orchards sampled, have not yet been determined for almonds, it is not clear when acaricide applications are justified. However, growers in these northern growing areas should be aware that NOW insecticide applications may dramatically affect ERM populations. Furthermore, the variability in mite species and their relative abundance in northern almond orchards make it difficult to devise a uniform almond pest management program. Careful monitoring of orchards will be necessary to ensure appropriate action in any almond pest management program.

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Effectiveness of Osmocote fertilizer influenced by placement and dosage

Ruth A. Coleman ■ Tom Mock ■ Tok Furuta

Incorporation of Osmocote into a soil mixture for the culture of plants in containers and subsequent storage of that mixture for more than a week or so is not a recommended nursery practice due to the release of nitrogen from the Osmocote fertilizer and subsequent buildup of soluble salts in the soil mixture. This buildup could injure newly transplanted plants unless leaching is practiced to reduce the level of soluble salts. Such leaching, while insuring the health of the transplanted plants, wastes fertilizer and, should the leaching water run off the nursery, could result in undesirable pollution of the surrounding area.

Yet, the use of the controlled-release fertilizer Osmocote for the culture of ornamental plants in containers is a desirable practice. More efficient use of the applied fertilizer, reduction of environmental pollution with nitrogen, and the systemization of fertilization practices are reasons for its use. Due to the problem of storing soil mixtures containing the controlled-release fertilizer, placement methods that are an alternative to incorporation at the time of preparation of the soil mixture are desirable. The desirable method should be one that permits application of the fertilizer at the time of planting, would not increase the cost of applying the fertilizer, and would not interfere with efficient soil handling or transplanting practices.

Experiments were conducted at the South Coast Field Station to compare two possible methods of application with total incorporation. The methods studied were placing the fertilizer—14-month Osmocote—on the surface of the soil, and placing the fertilizer—14-month Osmocote—in one lump within the soil mass beneath the newly transplanted plant (liner).

Also, because previous experiments had demonstrated that the results of experiments studying fertilizer placement and dosage could be influenced by irrigation procedures and practices, two types of irrigation systems—overhead sprinkling and drip—were used.

Plant growth was used as an indicator of the effectiveness of the treatments. Although many factors were studied, a factorial experiment was not used. Rather, selected combinations were studied—the treatment combinations were selected on the basis of previous experiments that showed the direction and type of results to be expected. Any other handling of the treatments would have made the experiment unmanageable.

Placement and dosage

One of the central questions for this series of studies was to determine whether placements of Osmocote other than incorporation or mixing into the soil could be used, and, if so, what was the effect of dosage and irrigation method. Plant growth was equal whatever the placement of fertilizer. The results in table 1 show interaction of dosage and placement. It is possible to see that the dosage was more important than the placement in the size of the plants that resulted.

Thus, it is possible to suggest that the controlled-release fertilizer may be placed in a lump under the plant at transplanting time, or, depending on the irrigation system, applied to the surface following transplanting. Both of these procedures can be easily worked into the transplanting operation without increasing the cost, delaying or prolonging the transplanting operation, and the problem of storage of soil mix with fertilizer incorporated is eliminated.

Irrigation and placement

As expected, the influence of fertilizer placement and dosage on plant growth in containers was influenced by irrigation practices. Under drip irrigation, plant growth was less when surface placement or application of Osmocote was used, compared with incorporation or one lump placement of the fertilizer (table 2). This result is to be expected because the surface of the soil remains dry and the Osmocote was not moistened to release the fertilizer. Because overhead irrigation did moisten the surface, all three placements were expected to be equally effective—this was the result.

Irrigation and dosage

Because the irrigation methods result in different moisture regimes (wetting and drying of the soil mixture) within the container and different amounts of leaching of the fertilizer at each irrigation, we studied the effect of different dosages of Osmocote on plant growth. An extremely slow release rate fertilizer was used (14 months), the dosages of 1, 2, 4, and 8 pounds of Osmocote per cubic yard. Under both irrigation systems, largest plants resulted when the 8-pound rate was used. Under overhead irrigation, plant growth was the same at the 2- and 4-pound rates, and smallest at the 1-pound rate (table 3). Under drip irrigation, plant growth was directly correlated with dosage.

Irrigation and supplemental fertilization

Many reports in the past have shown that largest plants and optimum growth of ornamental plants in containers require a program of preplant incorporation of fertilizer and frequent applications of supplemental fertilizer after plant growth commences. The results of these studies are the same. The three irrigation regimes studied were: L 1—two fertilization-irrigations a week with 25 percent leaching at each application; L 2—two irrigations a week without fertilization; and L 3—daily irrigation without supplemental fertilization.

Largest plants resulted when the supplemental fertilizer was used and the placement of the fertilizer did not influence the results. All other combinations resulted in significantly smaller plants (table 4). It is interesting to note that the smallest plants resulted from surface application of the fertilizer.

Conclusion

The results of these studies illustrate again that irrigation system, irrigation frequency, use of supplemental fertilizer are all very important in considering the use of controlled-release fertilizer for the culture of plants in containers.

These series of trials also demonstrated that placement of the fertilizer Osmocote on the soil surface or in some spot within the soil in the container is as good as incorporation throughout the soil mixture.

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TABLE 1. Effect of Placement on Rate of Nitrogen Release from Osmocote

Pounds Osmocote/cubic yard	Fresh wt of plant tops (g) by placement of Osmocote		
	mixed	center	surface
8	142a*	150a	127a
4	132a	114b	107b
2	110b	112b	88c
1	55c	74c	65d

*Mean separation in columns, Duncan's Multiple Range, 5% level.

TABLE 2. Plant Growth as Influenced by Osmocote Placement under Drip Irrigation.

Osmocote placement	Fresh wt of plant tops (g)
center	99.4a*
mixed	96.5a
surface	73.4b

*Mean separation by Duncan's Multiple Range, 5% level.

TABLE 3. Effect of Osmocote Rate and Irrigation System on Plant Growth.

Rate of N (lb/cubic yard)	Fresh wt of plant tops (g) by irrigation system	
	overhead	drip
8	162a*	118a
4	131b	102b
2	123b	85c
1	76c	53d

*Mean separation in columns, Duncan's Multiple Range, 5% level.

TABLE 4. Interaction of Fertilizer Placement and Leaching-Supplemental Fertilizer Regime.

Treatment	Fresh wt of tops (g)
surface x L 1*	148.5a**
center x L 1	140.1a
mixed x L 1	136.0a
mixed x L 3†	109.9b
center x L 3	99.7bc
center x L 2‡	98.0bc
surface x L 3	85.8c
mixed x L 2	83.2c
surface x L 2	56.0d

* L 1 = twice weekly irrigation with supplemental fertilizer.
† L 3 = daily irrigation without supplemental fertilizer.
‡ L 2 = twice weekly irrigation without supplemental fertilizer.
** Mean separation by Duncan's Multiple Range, 5% level.