FOAM OR SPRAY?

Economics of Growth Regulator Application

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ECONOMIC UTILITY of certain plant growth regulators is frequently limited by the high concentrations required for effective response. Alar is an example of such a case. This chemical possesses desirable characteristics in that it may cause vegetative growth reduction, primarily from shortening internode length, and it causes neither leaf deformity nor reduction of flowering.

Greenhouse trials conducted with Alar applied in heavy foams showed that the effective Alar concentration could be reduced from 1% to .5%.[1] The advantage of the foam application was related to the lengthening of wetting which allowed a longer time when the chemical solution might enter the plant. As the foam breaks, the liquid solution drains over the foliage and is available for entry. Tests with growth regulators have shown that the greatest uptake is during the wetting of the spray.[2]

This report gives results of further experiments conducted on commercial landscape and freeway plantings.

Procedure: Trials had four or five replications of treatments with plot size of one to five plants. Sprays were applied with a field gun or by a backpack sprayer. Preliminary trials were conducted testing several methods of foam expansion. This equipment consisted of either aerating spray nozzles or foam-generating pumps. The Waukeshau foam generator pump produced a suitable foam and was used in the foam application.

Foam: Foams differ in their stability under varying temperatures, their capacity for expansion, their degree of phytotoxicity to the plant, and in their compatability with commercial growth regulator formulations.

The foams were tested approximately at 60 fold expansion. Temperatures above 70 degrees F., high radiant energy and wind decreased the persistence of the foams. Commercially available foaming agents were tested and no attempt was made to characterize the potentially desirable ingredients of these foaming agents. The Alar was used as the 80% wettable powder.

Results: Six foaming agents were compared for their effectiveness in increasing the growth reduction of Alar on oleander. These foam applications were applied on December 21 when temperatures ranged from 45 to 65 dregrees F. with a maximum wind of four mph. The minutes to dryness of the one percent Alar in foam, for the foams which showed greater growth reduction on April 11, were: Fomex, 32; Jet X, 107; and Fomark, 265. These three foaming agents were tested in further experiments since they showed the greatest growth reduction with the Alar.

A comparison of the oleander shoot growth reductions from treatments with 1% Alar in combination with X-77 adjuvant, Jet X foam, or Amchem LoDrift spray additives are shown in Table 1. The LoDrift (alone or with Alar), Alar plus X-77 and foam only treatments were ineffective for reducing growth. Alar applications in both 1% and 1.25% Jet X foam showed a growth reduction on both marked shoots and on plant height for seven months with the two spray applications.

Foam application of Alar on a freeway median planting of Oleander. The foam expansion is by a Waukeshau foam generator.

A compact Oleander plant at the left showing growth retardation at 107 days after treatment with 1% Alar in 1% Jet X foam. The longer internode length and greater height of the untreated control is shown to the right. The Alar in foam treated plant is starting to make normal growth.

A recently trimmed oleander hedge was used to compare a spray of 2% Alar plus .1% X-77 with a foam application of 2% Alar in 1% Fomark (Table 2). Treatments were also made with sprays of the growth inhibitor NIA 10656. In this experiment both Alar in foam and the NIA 10656 treatments caused good growth reductions and resulted in a more dense hedge wall than either the Alar plus X-77 or control treatments. An oleander hedge does not bloom because of frequent prunings. The potential use of NIA 10656 is practical under these conditions since it inhibits flowering as well as vegetative growth. The inhibitor treatment is less desirable when oleander is not hedged and flowering is desired.

A comparison of Alar in Jet X foam and Alar in Jet X unexpounded foaming agent is shown in Table 3. It was possible to apply the Jet X as a spray (not foaming) by CO_2 pressure displacement on the spray mixture. While the treatment with Alar in foam showed less

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Table 1: Growth reductions of oleander from various Alar treatments applied 3-5-73 with retreatment 7-10-73.

	Shoot growth cm							Plant height cm
	Days after treatment							
Treatment	44	73	99	127	157(30)[1]	183(56)	224(87)	224
1. 1% Alar + 0.1% X-77	3.6a[4]	9.5b	23.8b		44.1c	51.5a	73.6a	155ab
2. 1% Alar + 1% Jet X foam	2.2a	6.3c	15.8c		32.8c	36.4b	56.0b	134b
3. 1% Alar + 1.25% Jet X foam	2.9a	6.2c	13.3c	Re-	32.7c	35.4b	50.5b	125b
4. 1% Alar + Lo Drift[2]	5.0b	13.9a	29.4ab	spray	52.9ab	59.2a	76.2a	155ab
5. 1.25% Jet X foam	4.6b	13.7a	30.0a		59.6a	64.8a	83.9a	165a
6. 0.25% Lo Drift[3]					54.5ab	61.5a	81.5a	158a
7. Control	4.9b	14.3a	28.3ab		55.9ab	61.6a	85.4a	167a

[1] Days after retreatment shown in parenthesis.
[2] Lo Drift at 1% on 3-5-73 spray and 0.25% on 7-10-73 respray.
[3] Shoots marked but not treated on 3-5-73 and treated 7-10-73.
[4] Duncan's multiple range mean separation, 1% level, for each day period.

Table 2: Growth reduction of an Oleander hedge sprayed on 7-10-73.

Treatment	Shoot growth cm, Days after treatment 74	84	111	Height above old cut cm 84
1. 2% Alar + 0.1% X77	7.7ab[1]	10.7ab	25.9a	18.1a
2. 2%Alar + 1% Fomark foam	3.1bc	3.9bc	13.5bc	4.7b
3. 0.4% NIA 10656	0.6c	2.3bc	5.7bc	4.3b
4. 0.5% NIA 10656	0.5c	0.7c	4.7c	3.7b
5. Control	10.0a	16.1a	17.3b	24.9a

[1] Duncan's multiple range mean separation, 1% level, for each day period.

Table 3: Growth reductions of Oleander from varying application of 1% Alar in Jet X.

Treatment	Shoot growth cm, Days after treatment 30	56	77	Plant height cm 77
1. 1% Alar + 0.25% X-77	18.9abc[1]	27.9bc	45.9ab	144.0abc
2. 1% Alar + 1% Jet X unexpanded	17.1bc	24.8bc	34.5bc	137.5bc
3. 1% Alar + 1% Jet X foam	16.1c	21.2c	27.9c	129.2c
4. 1%Jet unexpanded	23.8ab	39.0a	47.1ab	154.6abc
5. 1% Jet X foam	24.2ab	32.3ab	42.8ab	158.8a
6. Control	24.5a	38.2a	51.2a	156.4ab

[1] Duncan's multiple range mean separation, 1% level, for day period.

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growth, it was not significantly different from the growth of the spray application with Alar plus Jet X. This growth reduction from Alar in foam persisted to the termination of the experiment four months after treatment. The Alar plus X-77 and Jet X alone, as spray or foam, did not cause a growth reduction as compared with the untreated plants.

Summary: Foaming agents were consistent in showing greater oleander growth retardation than Alar alone or Alar with the spray adjuvant X-77. Fomark, Jet X and Fomex were the most effective foaming agents tested with Alar. The foam generating pump was superior to aerating nozzles for a foam expansion of approximately 60:1 which gave a persistent foam.

The increased growth retardation of Alar in foams over Alar in unexpanded foaming agents which had been observed in greenhouse trials was not found for field applications. This difference was attributed to more variable, and frequently less desirable, climatic conditions in the field. The effectiveness of the unexpanded foaming agents could be due to a high surfactant concentration response.

The growth inhibitor NIA 10656 treated plants showed a growth reduction for over 12 months from a single spray application of 0.3%.

Literature Cited

[1]Hield, Henry, 1972. California Agriculture 26(11):7.

[2]Horsfall, Frank, Jr., and R. C. Moore. 1962. Proc. Amer. Soc. Hort. Sci. 80:15-32.

The cooperation and chemicals furnished in these and other concurring experiments is gratefully acknowledged to: CalTrans, Riverside Plaza Shopping Center and The Braddock Co. for experiment locations; Uniroyal for the Alar; Colloidal Products Inc. for Fomex and Fomark foam; G. W. Rockwood for Rockwood and Jet X foam; The R.L.Wilson Co. for Foamspray; and the Waukeshau Foundry Co. for the use of a foam generator.