

Rooting of Poinsettia Cuttings Treated with Various Fungicides in IBA-Talc Powder

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Additional index words. *Euphorbia pulcherrima*, indolebutyric acid, disease control, ferbam, benomyl, metalaxyl, PCNB, ethazol, fenaminosulf

Abstract. Cuttings of poinsettia (*Euphorbia pulcherrima* Willd.) treated with a basal dip of 0.1% indolebutyric acid (IBA) alone (control) or in combination with 5% ferbam (ferric dimethyldithiocarbamate), benomyl [methyl 1-(butyl-carbamoyl)-2-benzimidazole-carbamate], metalaxyl [N-(2,6-dimethylphenyl)-N-(methoxyacetyl) alanine methyl ester], PCNB (pentachloronitrobenzene), and ethazol (5-ethoxy-3-trichloromethyl-1,2,4-thiadiazole) did not differ in rooting index or weight. Increasing the percentage of fungicide above 5% generally reduced rooting. However, rooting was similar to the control with combinations of ferbam at 5% to 67% or metalaxyl at 20%. Fenaminosulf (p-dimethylaminobenzenediazo sodium sulfonate) at 5% to 67% reduced rooting.

The poinsettia is prone to fungal infections during propagation (3). Thus, Ecke and Matkin (3) have recommended the addition of a fungicide in the rooting powder. Fungicides such as benomyl and ferbam have been reported to stimulate (11, 12) for inhibit (6, 7) rooting. Fenaminosulf, ethazol, and PCNB have been implicated as inhibiting rooting (1), although other studies indicate otherwise (8, 13). In this study we investigated the influence of various fungicides and various fungicide concentrations on root initiation and development of poinsettia cuttings.

Cuttings from field-grown stock plants of 'Annette Hegg Brilliant' were propagated on September 1 in plastic flats containing coarse perlite. Flats were placed in a shaded greenhouse (21.1 klx or less) with natural ventilation at 21°C minimum night temperature. Treatment combinations are shown in Table 1. The control was 0.1% IBA and talc. There were 20 treatments with 3 replications of 7 cuttings each in a completely randomized block design. Mist (3 sec per 60 sec) was used from 8:30 AM to 5:30 PM. Four weeks after propagation, rooting was graded visually (10) on a 7-point scale (Table 1). Root dry weight was obtained by drying at 75°C for 24 hr.

The control and all 5% fungicide treatments, except the fenaminosulf treatment, produced cuttings with similar rooting indexes and root dry weight (Table 1). Rooting indexes and root dry weight of all other treat-

ments were reduced significantly compared to the control, supporting Snyder's (12) observation that higher concentrations of fungicide inhibited rooting. Inhibitory results reported in other research work (6, 7) may have been due to excessive amount of fun-

gicide applied. As in other studies (6, 12) ferbam was notable for not causing great decreases in rooting even at the 67% concentration (Fig. 1). Fenaminosulf was noted to cause reduced rooting even at low concentrations. This result agrees with earlier work by Boodley (1). No stimulation of rooting was observed in the present study.

The action of fungicides on rooting is not understood. Snyder (12) has suggested that competitive action may exist between molecules of a fungicide and the root-inducing substances for position on substrate. Such competitive action may explain the inhibitory results obtained in the present study. Hare (5) has noted that, although fungicides may improve rooting indirectly by protecting against disease, some fungicides may promote rooting directly. Certain isoxazoles have been shown to act alone (4) or synergistically (15) with root-inducing substances to promote rooting. McGuire and Vallone (11) concluded that benomyl cannot be a mobilizer in rooting as it interferes with DNA synthesis, acts as a pruin anti-metabolite, replaces nicotinamide in NAD, and retards senescence.

We conclude from the results of the present study that fungicide application as a powder at the time of cutting propagation is not recommended if the medium is disease-free initially and later contamination can be pre-

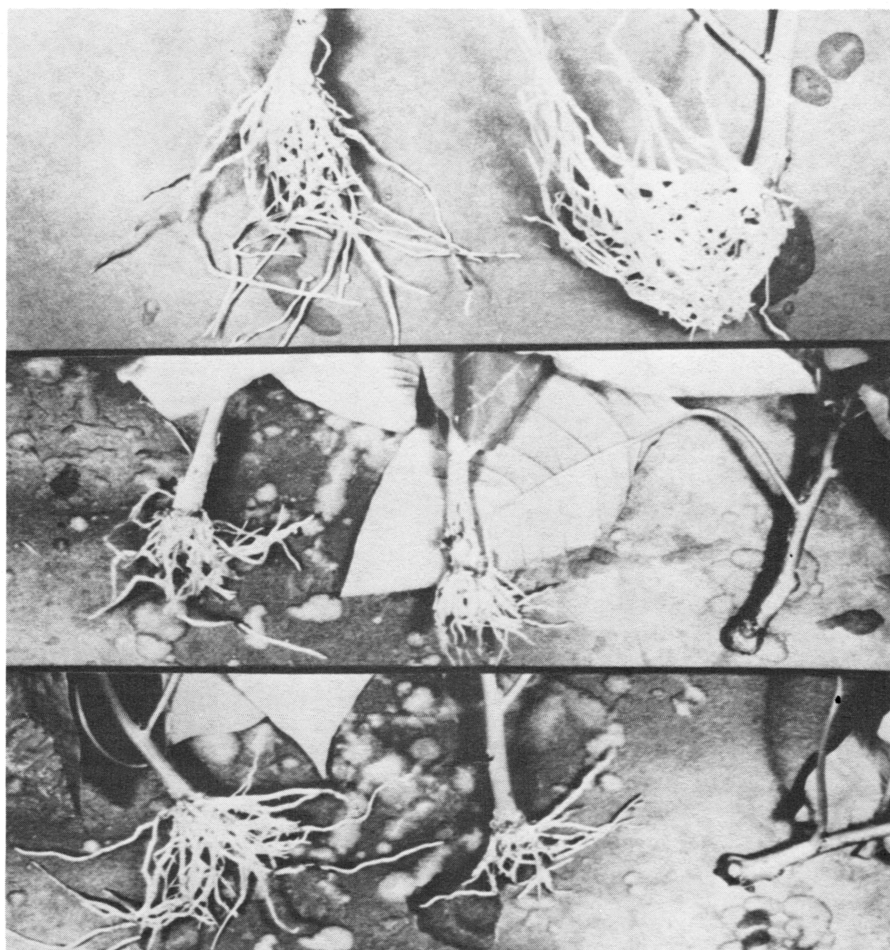


Fig. 1. Comparison between rooting of poinsettia cuttings treated with IBA alone (control) or IBA in combination with various fungicides. Top (left to right): control, 67% ferbam 76 WP. Middle (left to right): 5%, 20%, and 67% fenaminosulf. Bottom (left to right): 5%, 20% and 67% metalaxyl.

Received for publication September 18, 1982. Appreciation is expressed to Paul Ecke Poinsettias, Encinitas, Calif. for supplying materials used in this research. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.

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Table 1. Rooting indexes and dry weight of poinsettia roots after treatment with fungicide powders prior to rooting.

Fungicide ^z	Rate (%)	Rooting index ^y	Root dry wt (g)
Control	---	6.28 a ^x	1.08 a ^x
Benomyl 50 WP	5	5.90 abc	0.90 abc
	20	4.62 d-h	0.50 d-g
	67	2.95 i	0.21 g
Ethazol 30 WP	5	5.38 a-f	0.73 a-e
	20	4.76 c-g	0.60 b-f
	67	4.33 e-h	0.48 d-g
Ethazol 30 WP + PCNB 75 WP	10 + 10	5.24 a-g	0.64 b-f
Fenaminosulf 35 WP	5	4.75 c-g	0.58 c-f
	20	5.00 b-g	0.64 b-f
	67	3.47 hi	0.36 fg
Ferbam 76 WP	5	6.24 ab	0.95 ab
	20	5.86 a-d	0.88 abc
	67	5.57 a-e	0.77 a-e
Metalaxyl 25 WP	5	5.63 a-e	0.83 a-d
	20	5.33 a-f	0.69 b-f
	67	4.00 ghi	0.41 efg
PCNB 75 WP	5	5.38 a-f	0.73 a-e
	20	4.14 fgh	0.48 d-g
	67	4.81 c-g	0.63 b-f

^zControl treatment consisted of 0.1% IBA in a talc base with no fungicide. Other treatments had various percentages of fungicides and 0.1% IBA in a talc base.

^yRooting scores were: 1 = no roots or callus, 2 = callused, 3 = poor rooting, 4 = poor to moderate rooting, 5 = moderate rooting, 6 = moderate to heavy rooting, and 7 = heavy rooting.

^xMeans in columns followed by the same letter(s) are not significantly different according to Duncan's multiple range test at 5% level.

vented. Given the probability of specific pathogen presence, low concentration of specific fungicides could be incorporated into a poinsettia rooting powder providing the causal pathogen and the disease-control specificity of the fungicide are recognized. For example, ferbam (8) would only provide control of *Rhizoctonia solani* Kuehn., whereas benomyl (9) is effective against *Rhizoctonia*, *Botrytis cineria* Pers., and *Thielaviopsis basicola* Kopf. Also, metalaxyl (2), ethazol (14), and fenaminosulf (14) are effective against *Pyth-*

ium spp.; however metalaxyl (2) is a more reliable control of *Phytophthora parasitica* Dast. than ethazol or fenaminosulf (14).

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