- The name, address, and telephone number of the principal investigator will be provided.

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ONE SUCCESS STORY - STILL IN THE MAKING

A few years ago the I.P.P.S. - Eastern Region research grant was awarded to assist a small commercial propagator in developing key parts of an automated cutting preparation and sticking system. That grant provided the credibility and leverage needed to receive an additional $249,000 in phase 1 and 2 SBIR (Small Business Innovation Research) grants from the USDA. The findings of that research have verified that it is practical to automate the rooted cutting production process. Speed of rooted cutting production will rise while the associated costs and tedious labor decline.

This effort was proposed by someone who saw a need which affected cut flower, pot plant, bedding plant, woody landscape, and forest products producers. The applicant developed a feasible solution concept, did a careful cost analysis, and recruited key technical people. They then wrote a convincing proposal. It applied the best of technology to a broad-based need. In another year or so you may see the fruits of that original grant as commercially available systems which will allow an ordinary assistant propagator to prepare and stick up to 7200 cuttings per hour with a system which pays for itself in a couple of years of normal use.

Taxus Response to Differential Concentration and Timing of Pendimethalin Application

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Suspected herbicide phytotoxicity injury in the nursery industry initiated our interest in this project. Industry reports indicated that phytotoxicity damage had occurred when pendimethalin was used for weed control in the production of *Taxus*. Initial reports stated foliar death occurred where herbicide application had resulted in foliage contact. Reports have indicated plant injury occurred, but not total plant loss. Our interest was to determine if pendimethalin application was the cause of *Taxus* injury and if so, was it due to application at early growth stage or rate or formulation of material applied.

An established field planting of 24- to 30-inch *T.* ×*media* 'Densiformis' was used for this experiment. Treatment plots measured 12 ft × 7 ft, with three plants per plot. Five treatments were used on three spray dates, for a total of 15 treatments

Table 1. Phytotoxicity ratings on *Taxus* after treatment with pendimethalin.

Treatment	Form	Rate and unit	Application date	May 12 rating	June 3 rating	June 18 rating	Aug. 28 rating	Sept. 30 rating
Pendulum	3.3 EC	2.0 lb AIA	April 28	0.0 b	0.1 b	0.4 abc	0.6 fg	1.1 e
Pendulum	3.3 EC	4.0 lb AIA	April 28	0.1 ab	0.1 b	0.5 ab	1.1 def	1.4 de
Pendulum	3.3 EC	8.0 lb AIA	April 28	0.3 ab	0.1 b	0.5 ab	1.9 cd	2.3 c
Pendulum	60 WG	4.0 lb AIA	April 28	0.4 a	0.4 a	0.7 a	1.0 def	1.1 e
Control			Aril 28	0.0 b	0.0 b	0.0 e	0.0 g	0.0 f
Pendulum	3.3 EC	2.0 lb AIA	May 13		0.1 b	0.1 de	1.9 cd	2.1 cd
Pendulum	3.3 EC	4.0 lb AIA	May 13		0.1 b	0.2 bcde	3.3 a	3.9 ab
Pendulum	3.3 EC	8.0 lb AIA	May 13		0.2 ab	0.2 bcde	3.0 ab	4.3 ab
Pendulum	60 WG	4.0 lb AIA	May 13		0.2 ab	0.4 abc	1.2 cdef	1.1 e
Control			May 13		0.0 b	0.0 e	0.0 g	0.0 f
Pendulum	3.3 EC	2.0 lb AIA	May 30			0.3 bcd	1.2 cdef	1.9 cd
Pendulum	3.3 EC	4.0 lb AIA	May 30			0.2 cde	1.7 cde	3.7 b
Pendulum	3.3 EC	8.0 lb AIA	May 30			0.4 abc	2.1 bc	4.7 a
Pendulum	60 WG	4.0 lb AIA	May 30			0.3 bcde	0.8 efg	1.0 e
Control			May 30			0.0 e	0.0 g	0.0 f

Column means followed by different letters are significantly different (P=0.05; ANOVA)

Table 2. Weather data for Lexinton, Kentucky for the seven day period following herbicide application

Treatment time	Date	Air temperature Max.	Air temperature Min.	Precipitation
Date of Treatment 1	April 28	56	47	T
	April 29	67	40	
	April 30	78	46	0.32
	May 1	57	47	0.04
	May 2	76	46	0.19
	May 3	61	47	1.03
	May 4	64	41	
Date of Treatment 2	May 13	61	41	T
	May 14	71	46	0.09
	May 15	61	42	0.06
	May 16	60	33	
	May 17	73	48	0.08
	May 18	84	61	0.02
	May 19	82	64	0.37
Date of Treatment 3	May 30	75	54	0.06
	May 31	66	63	2.85
	June 1	70	62	0.53
	June 2	79	52	0.07
	June 3	72	57	0.01
	June 4	65	53	
	June 5	67	53	T

T = trace.

replicated three times. The treatments were: pendimethalin (Pendulum) 3.3 EC at 2, 4, and 8 lb active ingredient per acre (AIA); pendimethalin (Pendulum) 60WG at 4 lb AIA; and a control. The spray dates were: 28 April, 13 May, and 30 May 1997. Treatments were applied over the top of the plants using a CO_2-pressurized backpack sprayer calibrated to 26 GPA using 8004 nozzles at 30 psi at the boom. New growth on the *Taxus* was approximately 1 inch in length on 28 April 1997.

Plant phytotoxicity was measured on a scale from 0 to 10 (0 representing no phytotoxicity and 10 representing plant death). Spray date one was evaluated on May 12; spray date one and two were evaluated on 3 June; spray dates one, two, and three were evaluated on 18 June. Evaluation on 7 July was not performed because no visible change in foliage was observed. Once dead foliage was observed, evaluations were continued for all three spray dates on 28 Aug. and 30 Sept. 1997.

Phytotoxicity during the 12 May, 3 June, and 18 June ratings consisted of slight foliar discoloration. No change had occurred by 7 July and the plot was not rated.

This was different from what was reported in the nursery industry where foliar death was reportedly occurring within weeks. By mid August, foliar injury had become more pronounced and ratings were resumed on 28 Aug. and 30 Sept. Phytotoxicity increased in intensity as the season progressed. Final level of damage was still unknown on 30 Sept. With the EC formulation, phytotoxicity increased as the rate increased from 2 to 8 lb (Table 1). Although the WG formulation initially caused more severe discoloration during the first ratings, by the Sept. rating damage was less than that of the EC formulation. Besides causing foliar discoloration, the most severely affected plants also exhibited stunted growth of newly emerged shoot tissue.

This class of herbicides is known to influence root system growth and has strong adsorption to soil. Little information is available on foliar uptake or injury associated with woody landscape plants. For turfgrass, pendimethalin will be retained on and within the foliage (Stahnke, 1991). Exposure to sunlight and high temperatures are thought to contribute to initial pendimethalin dissipation (Stahnke, et al., 1991). Temperatures were below normal for Lexington, Kentucky, during our initial treatment. Varying levels of rainfall occurred immediately after application on each treatment date (Table 2). Rainfall apparently had limited influence on *Taxus* injury and growth; however, the influence of mild temperatures is unknown. Mild temperatures may contribute to the slow development of severe phytotoxicity. Photos were taken 16 September 1997.

Pendimethalin, at levels of 2 to 8 lb acre^{-1}, may inhibit new shoot development for cutting propagation in *Taxus*. The slow rate of phytotoxicity symptom development could mean that cuttings taken from treated plants may fail after entering the propagation cycle.

LITERATURE CITED

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