WOOD TREATED WITH PENTA CAN DAMAGE PINE NURSERY SEEDLINGS

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Wood treated with pentachlorophenol should be used with caution in pine seedling nurseries. During 1958 many freshly germinated pine seedlings died in experimental nurseries in Mississippi and Texas where the bedboards and screen frames were of preservative-treated wood. Damage was suspected to have been caused by the preservative, 5 percent pentachlorophenol in diesel oil.

Some of the wood had been treated 6 to 8 months previously, but ripped immediately before use; some had been treated for 6 months and allowed to weather in the open; and some had been freshly brush treated. Shortly after germination, damage was apparent in all nursery beds where treated wood had been used. Symptoms first appeared next to the wood, but spread rapidly across the 4-foot bed on all species except longleaf.

Since copper naphthenate had proved safe for greenhouse use with tomato plants,[2] tests were made late in 1958 at the Austin Experimental Forest greenhouse, Nacogdoches, Texas, to compare toxicity to pine seedlings of this chemical and pentachlorophenol.

Sideboards for ten 24-inch square seed flats were cut from 1- by 4-inch pine boards. When the boards had been cut to length, the following treatments were applied:

1. Five-percent pentachlorophenol in diesel oil (three flats).
2. Copper naphthenate (2 percent metallic copper) in diesel oil (three flats).
3. Diesel oil (two flats).
4. Check--no treatment (two flats).

After cold-soaking for approximately 4 hours, the sideboards were assembled and allowed to weather in the open for 30 days. Then untreated plywood bottoms with drainage holes were nailed on each flat.

On November 4, all flats were filled with soil and placed on the floor in the center aisle of the greenhouse, according to a plan of randomization. Adjacent flats were spaced 2 feet apart. Flats were divided into quarters, and each quarter was sown with 100 seeds of one of the 4 major southern pines: all four species were represented in each flat. The flats were mulched with pine straw and watered according to normal greenhouse practices.

One month after sowing, more than 90 percent of all species had germinated. Damage was very apparent, on all species except longleaf, in those flats that had been treated with penta. The symptoms were needle twisting, followed by blanching and then desiccation.

1 Maintained in cooperation with Stephen F. Austin State College, Nacogdoches. Texas.
2 Kaufert, F. H., and K. A. Loerch. 1955. Treated lumber for greenhouse use.-Minn. Forestry Notes 36, 2 pp.

Two months after sowing, the flats treated with penta had fewer than 10 percent of slash, loblolly, or shortleaf seedlings alive, and some of the survivors showed injury, as follows:

	Slash		Loblolly		Shortleaf		Longleaf	
	Killed (percent)	Injured (percent)	Killed (percent)	Injured (percent)	Killed (percent)	Injured (percent)	Killed (percent)	Injured (percent)
Copper naphthenate	0	3	0	7	0	8	0	0
Diesel	0	4	0	6	0	9	0	0
Penta	86	8	94	5	90	9	0	50

Injuries from the copper naphthenate and the diesel oil were in single flats of each treatment. In each case, the flat was adjacent to and west of a penta-treated flat. The greenhouse is cooled by two exhaust fans in the east wall, and air movement is from east to west.

An additional test was installed in January 1959. Soil from the variously treated flats was removed and replaced in differently treated flats, so that soil from an untreated flat was moved to a treated flat and vice versa. Slash pine seed was sown, the flats were mulched, and routine greenhouse practices followed as before. Two months after sowing, mortality had occurred only in the flats that had been treated originally with penta, and in these flats averaged less than 50 percent. There was no evidence of damage from soil that had been exposed previously to penta-treated boards. This finding, together with evidence from the initial test, supports the premise that penta damage to seedlings is caused by volatile material diffused through the air.

The low mortality in the second test indicates that toxicity of penta-treated wood is reduced by a time lapse after treatment. More than a year after being soaked in penta, however, test bedboards in the Austin Experimental Forest nursery harmed some germinating loblolly seedlings.

Unless local trials have shown how much time is required to eliminate harmful effects, penta-treated materials should be avoided in greenhouses or tree nurseries. Even then the minimum safe weathering period will apply only to material cut to size before weathering, not to material cut up after weathering. If preservative is needed for wood that will be close to freshly germinated southern pine seedlings, either in a nursery or in a greenhouse, a good choice might be 0.2 percent metallic copper solution of copper naphthenate in either diesel oil or one of the other lighter hydrocarbons.