Other rats in this experiment have shown parathyroid hyperplasia of varying degrees.

A nonfunctioning, metastasizing carcinoma of the parathyroid is described as one of several tumors, benign and malignant, in the irradiated member of a pair of parabiont rats. This is the first parathyroid carcinoma to be reported in the rat (*9*).

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Antiozonant-Treated Cloth Protects Tobacco from Fleck

Abstract. Tobacco is protected from fleck, caused by high concentrations of atmospheric ozone, by enclosing groups of the plants completely in tents of cloth treated with the antiozonant 4,4′-dioctyl diphenylamine in butyl latex. The treated cloth also reduces the amount of fleck on adjacent, unenclosed plants. Spraying the antiozonant on the walls of a previously untreated tent prevents subsequent flecking of plants within the tent.

Air pollution is becoming increasingly important as a limiting factor in growing crops around metropolitan areas. Ozone, one of the principal air pollutants, is particularly harmful to tobacco on which it causes an injury called "fleck" (*1*).

Rich and Taylor (*2*) described laboratory experiments in which they protected plants from ozone damage by the use of cloth treated with antiozonants. The use of this technique in the field to protect tobacco from fleck is reported here. These tests were made at the Connecticut Agricultural Experiment Station Tobacco Laboratory, Windsor.

On 10 July 1961, three separate tents 16 feet square and 8 feet high were erected over five rows of fleck-susceptible tobacco, strain W-3. The five rows were adjacent to but outside of a half-acre field of tented tobacco. The W-3 tobacco had been set out on 16 June 1961. The three experimental tents were 16 feet apart, and each tent completely enclosed approximately 60 plants. The rows of plants were continuous, resulting in unshaded sections both between the tents and extending beyond the end tents on each side. All the tents were of cotton cloth, type Cannon 88, a commercial shade-tent cloth with eight to ten threads per inch. The cloth on one tent was treated by the manufacturer (*3*) with a mixture of 3 parts of 4,4′-dioctyl diphenylamine to 2 parts of butyl latex. This antiozonant formulation was applied by means of a stencil in a polka dot pattern at the rate of 1.8 ounces per square yard of cloth. Each polka dot was about ½ inch in diameter, on 1¼-inch centers. The cloth of the second, or check tent was left untreated. The cloth of the third tent was left untreated until after the first fleck outbreak. Then, on 21 July, the walls of the third tent were sprayed with a water emulsion of 4,4′-dioctyl diphenylamine in butyl latex, which was applied with a 3-gallon hand sprayer at the rate of approximately 1.8 ounces per square yard of cloth. The walls were sprayed from the inside out. The top of the tent was not sprayed. The unshaded sections of the five rows outside the tents remained untreated.

Natural outbreaks of fleck occurred on 17 and 24 July. During both fleck-inducing periods the wind was southerly. Fleck damage was scored after each outbreak by rating each leaf on a progressive scale from 0, for no fleck, to 5, for severe flecking of the entire leaf. The leaf ratings for a single plant were summed to give the score for that plant. All the flecking was on the lower leaves. The most badly flecked leaves were usually near the base of the plants.

After the first outbreak, the plants inside the check tent had an average fleck score of 11.3, but there was no fleck at all on the plants in the factory-treated tent.

Most surprising, the treated tent cloth also reduced the amount of fleck on adjacent plants outside the tent. The first five outside plants adjacent to the check tent in each row had an average fleck score of 13.1, while comparable

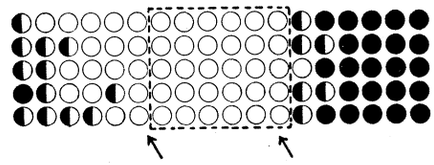

Fig. 1. Fleck severity in and out of tent made of cloth factory-treated with 4,4′-dioctyl diphenylamine. Dotted line is tent outline. Each circle is average score of a pair of plants. Open circles are no fleck. Half-black circles are mild fleck (score 1 to 5). Blackened circles are severe fleck (score greater than 5). Arrows show direction of prevailing wind during the fleck-inducing period.

plants outside the treated tent averaged only 2.4. This reduction in fleck was most evident in those plants downwind from the treated tent, as shown in Fig. 1. The pattern suggests that the polluted air was purified as it passed through the treated tent.

After the first outbreak of fleck in the third tent, at that time untreated, fleck was as severe as it was in the check tent. The effectiveness of spraying the walls of the third tent after the first outbreak was assessed by the difference between the first scoring and the second scoring. Inside the check tent, the fleck score of 11.3 increased to 19.7 after the second outbreak. During this period there was no increase in the severity of fleck on plants in the tent with freshly sprayed walls. Within the factory-treated tent, a small amount of fleck did appear, giving a score of 0.2 at the second scoring (*4*).

These results demonstrate that cloth treated with antiozonants can be used to protect tobacco in the field from fleck. The method may also prove useful to protect other plants, both in the field and in greenhouses, from ozone damage. Filters of cloth, or other fibers, impregnated with antiozonants could also serve to exclude ozone from dwellings or buildings in the event that air pollution by ozone ever becomes a health hazard.

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