RESEARCH NOTE

RETENTION OF PHOSPHINE GAS WITH 2 MIL POLYETHYLENE

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INTRODUCTION

Phosphine gas produced from Phostoxin® has been very effectively used in the tobacco industry for several years for the control of the cigarette beetle, *Lasioderma serricorne* (F.) and the tobacco moth, *Ephestia elutella* (H.). Successful gas penetration into tobacco cases lined with 4 and 6 mil low density polyethylene bags, poly duplex kraft paper and asphalt duplex case liners in fumatoria using a 2 mil polyethylene covering were made by Edmond, Hadden and Yu. [1].

Tobacco warehouses 300,000 ft.^{3} to 1.5 million ft.^{3} in size which were not properly sealed for fumigation have been successfully fumigated, with phosphine, after being wrapped with 2 mil polyethylene. The following test was made to determine the concentration of phosphine in the air space with and without a commodity under a covering of 2 mil polyethylene. The test was conducted in a warehouse, located at Fuquay-Varina, N.C., furnished by the Flue-Cured Tobacco Cooperative Stabilization Corporation.

MATERIALS AND METHODS

Three fumatoria of 500 ft.^{3} (50 x 12½ x 8 ft.) each were constructed from 2 mil polyethylene which was sealed to the floor with sand "snakes". Two polyethylene tubes were placed in each fumatorium before treatment. Drager test tubes for measuring the concentration of the phosphine gas were used on the end of the polyethylene tubes. During the exposure period duplicate gas samples were taken from each fumatorium every 12 hours by drawing gas through the test tubes. New test tubes were used for each reading. The average of the two reading for each fumatorium is given in **Table 1.** A dosage of 20 Phostoxin® tablets per 1000 ft.^{3} was used with an exposure period of 96 hours. During this period, the average temperature was 68 degrees F. and the relative humidity was 67 per cent. There was no commodity placed in fumatorium #1, fumatorium #2 contained 50 empty tobacco hogsheads, and fumatorium #3 contained 50 hogsheads of tobacco. The gas readings at 24 and 36 hours were disregarded as it was discovered that these test tubes were out-dated and accurate readings were not obtained.

RESULTS

This test shows that any storage or commodity can be sealed with 2 mil polyethylene and effectively fumigated without loss of gas. If a commodity is under the polyethylene some of the phosphine is sorbed. **(Table 1.)** The amount of sorbtion is dependent on the commodity being fumigated.

Table 1. Concentration of Phosphine (PH_3) occurring at specific hours in the air space of 3 fumatoria

Fumatorium	Average concentration of PH_3 in ppm after—					
#	12 hours	48 hours	60 hours	72 hours	84 hours	96 hours
1	287	500	500	495	495	497
2	162	492	482	462	447	447
3	330	445	382	327	290	281

ACKNOWLEDGEMENTS

The authors acknowledge the valuable assistance of Mr. T. A. Dean and Mr. Odell Henderson of Flue-Cured Tobacco Cooperative Stabilization Corporation for the use of the warehouse during the experiment and for furnishing the 50 hogsheads of tobacco and the 50 empty hogsheads

LITERATURE CITED

1. Edmond, D. E., R. Hadden, G. Yu. The Penetration of Phosphine Gas into Lined Tobacco Cases During Atmospheric Fumigation. Tobacco Science 15: 84-87. 1971.

[1]Fumigators, Inc., Raleigh, N.C. 27602. [2]Phostoxin Sales, Alhambra, California 91801. Contribution received: July 31, 1972. Tob. Sci. XVII: 24; 1973.