

Efficacy of Dodine and Glyodin as Foliar Protectants for Control of Tobacco Mosaic Virus

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ABSTRACT

Dodine (*n*-dodecylguanidine acetate) and glyodin (2-heptadecyl-2-imidazoline) at rates as low as 500 $\mu\text{g/ml}$ have demonstrated highly significant activity as foliar protectants against infection by tobacco mosaic virus (TMV). Dodine appeared slightly more effective than glyodin. Both compounds were superior to dry milk.

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During the past half century, the development of chemical agents for control of plant diseases has been so great a success that many diseases can be chemically controlled. The phytoviral diseases, however, appear to be one of the exceptions. The most-studied phytovirus, TMV, still remains uncontrolled by chemical methods, although numerous inactivation agents have been explored. Most control candidates are animal products, plant extracts, and only a small handful of common chemicals. However, only milk treatment is considered practical, even though not readily accepted by farmers (1).

At the Crop Protection Institute (CPI), it has been determined that dodine and glyodin are effective foliar protectants for controlling contact transmission of TMV. At CPI, dodine has been used as the reference standard since 1968. Performance has been consistent and more effective than milk at the same rates.

Tobacco plants (*Nicotiana glutinosa* L.) 20.3- to 25.4-cm (8- to 10-inches) tall, were sprayed to run-off with dodine (Cyprex 65W, Cyanamid) or glyodin (Union Carbide) at rates of 2,000, 1,000, and 500 $\mu\text{g/ml}$. Dry milk was sprayed at rates of 10,000 and 2,000 $\mu\text{g/ml}$ as a reference standard. After the sprayed foliage surfaces had dried, four plants were randomly selected and the four largest leaves of each plant were selected for inoculation.

Purified TMV, designated as P-12 Monsanto (provided by G. B. Lucas, North Carolina State University), was a concentrated aqueous suspension of 25 $\mu\text{g/ml}$. Before inoculation, 200 ml of water and

TABLE 1. Efficacy of dodine and glyodin applied as foliar protectants for control of tobacco mosaic virus

Treatment	Rate ($\mu\text{g/ml}$)	Lesions (Avg no. per plant)	Control (%)
Dodine	2,000	3.3 a ^z	99
Glyodin	2,000	13.3 ab	95
Dodine	1,000	16.5 ab	94
Dry milk	10,000	21.0 ab	93
Glyodin	1,000	37.3 bc	87
Dodine	500	48.8 cd	83
Glyodin	500	70.0 de	75
Dry milk	2,000	90.3 e	68
Control		285.3 f	

^z Means not followed by the same letter are significantly different at the 5% level of probability as determined by Duncan's multiple range test.

5 g of Carborundum were added to 1 ml of the concentrate. After vigorous shaking for 1 to 2 minutes, 3 ml of the diluted TMV suspension was pipetted into each of 36 small vials. Inoculation was performed by rubbing the selected leaves with Q-tips[®] (Johnson & Johnson) which were soaked previously and individually in the vials. A one Q-tip/vial per plant procedure was used. Lesions were counted on the third day after inoculation.

All treatments, including dry milk, had highly significant activity against virus infection. Dodine appeared to be the most effective but the differences between dodine and glyodin were not statistically significant at the same rates. Both dodine and glyodin outperformed dry milk: the effectiveness of 1,000 $\mu\text{g/ml}$ of dodine or glyodin was statistically comparable to that of 10,000 $\mu\text{g/ml}$ of dry milk.

Since this experiment was conducted on a nonsystemic host, the efficacy of both dodine and glyodin for control of this disease on commercial tobacco may still be questionable. This virus is highly systemic on commercial tobacco varieties, a single infection, as well as many infections will be enough to cause a complete loss of the plant. However, in general, the natural inoculum pressure is not nearly as high as our artificial inoculation. Consequently, on a population basis, a substantial reduction in disease incidence is still quite possible.

From another point of view, because both dodine and glyodin are established fungicides, this TMV-inhibiting activity can be considered an additional bonus, and thus, may generate interest in further study.

LITERATURE CITED

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