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About Our Cover

The cover photograph shows the new 4 acre 2,4-D dissemination plots in use at the Iowa State University Horticulture Station for relating chronic effects of non-lethal exposures to 2,4-D throughout the growing season. Ten representative horticultural plants are spaced 2 ft apart in each arc-shaped plot. Each row is spaced 12 ft further from dissemination center and contains 6 to 12 arcs. Exposure as a function of proximity to the source of 2,4-D is obtained by exposing the isopropyl ester (8 g acid equivalent) to ambient air from a treated cheesecloth which is renewed 10 times each season.

Except for the polyethylene mulch and test plants in the arcs, the border area between arcs and the center area are in mowed grass to facilitate weed control and traffic from visiting commercial and amateur horticulturists. Trickle tube irrigation and injection fertilization help insure that plants are in responsive growing condition.

Other work with 2,4-D has featured greenhouse studies using both air passed over activated charcoal (either with or without added 2,4-D) and unfiltered air, as well as similar plots planted outside in open air. Growth, yield and quality were best in plots which were kept free of 2,4-D.

Supplementary work includes use of a small treatment greenhouse containing 6 exposure chambers for short period exposures (10 to 100 min) of small plants to 1 to 100 ppm 2,4-D and other

gases including O₃, SO₂, NO₂, NH₃, H₂S and C₂H₄ (singly and in combination). Other plants are treated with soak, drop, and spray applications of 2,4-D formulations at low concentrations (0.001.1 ppm acid equivalent) (see p. 211-214).

Large amounts of 2,4-D are used in Iowa for farm crop, highway and home gardening purposes. About 5 million acres of corn and 1/2 million acres of highway right-of-way are sprayed at least once a year with 1 to 1/2 lb. per acre of 2,4-D. On the basis of interpolation from available information, it is estimated that 5 to 10 million pounds of 2,4-D are used in Iowa each year. Low volatile forms are available in all counties and only 5 restrict use of high volatile forms. Only commercial applicators are required to show some competence as shown by an understanding of spray compound terminology.

In Iowa, the term "low volatile" as contrasted to "high volatile" 2,4-D refers to forms which have more (or less) than 5 carbons in the side chain. Present work suggests that low volatility is not as useful in estimating safe usage as is commonly believed. Is spray drift (wet or dried) more likely to be concentrated out than volatile drift? How much of the problem is relevant to volatility in factors such as the use of plant parts for mulching, dislodged 2,4-D contaminated dust or pollen, re-emission of perhaps more volatile forms of 2,4-D by the vegetation?

Each community in Iowa has community-wide damage to susceptible horticultural plants every year. We

estimate less than 1/4 the 2,4-D damage can be related primarily to known instances of 2,4-D use as air, water, container, equipment, or other traceable contamination. Consider any means of pollution -- from contaminated clothing to contaminated agricultural chemicals, storages or common carriers -- and it has been encountered in Iowa!

Climatology studies have found 2,4-D in ambient air. 2,4,5-T, detergents, oil, and other chemicals are commonly added to increase effectiveness. Although some recommended procedures are followed such as application in fall instead of spring and summer or use of inert emulsions, these are not popular. The lower cost of the higher volatile forms combined with their faster apparent effect tend to favor continued use of these materials.

Staff horticulturists who are or have been primarily responsible for extension and research work with 2,4-D in Iowa include A. E. Cott, E. L. Denisen, J. P. Mahlstedt, C. H. Sherwood, Ben F. Vance, and J. L. Weigle. Many others have contributed a great deal as graduate students or in teaching.

Other personnel and departments have specialized and contributed much useful work regarding 2,4-D as a pollutant in Iowa. Although their work is not mentioned here, some of those best known are: Botany and Plant Pathology -- W. E. Loomis, A. H. Epstein, R. W. Pohl, D. W. Staniforth, and E. P. Sylwester; Agronomy and Climatology -- R. H. Shaw; Forestry; Agricultural Engineering; and Economics.