Influence of 2,4-D Spray Applications on Vegetative Growth and Seed Development in Timothy

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Many of the common lawn and pasture grasses, such as Kentucky bluegrass, redtop, fescue, ryegrass, and others, have proved to be quite resistant to 2,4-dichlorophenoxyacetic acid (2,4-D) when used as a differential herbicide to eradicate many of the weeds that infest such plantings. This report is concerned with preliminary experiments on the effects of spray applications of 2,4-D and related compounds on the vegetative growth of timothy. Data also were obtained on the germination of timothy seed that was produced on areas treated with 2,4-D, and on the relative effectiveness of these compounds in killing a number of serious farm weeds.

MATERIALS AND METHODS

For the purpose of the experiment, plots 4 feet wide and 25 feet long were used. Two parallel series of 16 plots each (total of 32 plots) were laid out on March 27, 1946, on a rather uneven established stand of timothy, Phleum pratense, that had become infested with the following weedy plants; Wild garlic, Allium vineale; broad-leaved plantain, Plantago major; narrow-leaved plantain, Plantago lanceolata; common winter cress, Barbarea vulgaris; early winter cress, Barbarea verna; bitter dock, Rumex obtusifolium; sheep sorrel, Rumex acetosella; common yarrow, Achillea millefolium; oxeye daisy, Chrysanthemum leucanthemum; and Indian strawberry, Duchesnea indica.

On the above date, when the timothy and weeds had developed from 2 to 6 inches of new vegetative growth, a single plot in each series received a spray application of 1,000 p.p.m. concentration of either 2,4-dichlorophenoxyacetic acid (2,4-D) or the ammonium salt, morpholine salt, triethanolamine salt, acetamide or amyl ester form of this acid. A similar plot in each series was sprayed with 2,000 p.p.m. concentration of each of these compounds. The various spray treatments were assigned at random in each series of plots and four unsprayed plots were left in each series. Carbowax 1,500 at 2.0% concentration was used as a dispersing and spreading agent for the acid, acetamide, and ester compounds, while in the case of the various salts, which are directly soluble in water, 0.5% Carbowax was used as a spreader. Each spray treatment was applied with a small mechanically operated pressure sprayer at the rate of 5 gallons per 1,000 square feet and 100 pounds pressure so as to apply approximately 1.5 and 3 pounds per acre of each herbicide at the 1,000 p.p.m. and 2,000 p.p.m. spray concentration, respectively.

Periodic observations were made on the effects of the spray treatments on the growth of both timothy and weeds from May 10 until July 26 when the timothy was harvested by plots. At harvest the timothy seed heads were starting to shatter and were removed with the attached straw to a greenhouse bench to dry. The seed was permitted to mature in the seed heads for a period of 45 to 54 days, after which it was rubbed out by hand and held for germination tests.

The seed was cleaned, September 20, 1946, on an air blast blower designed by Leggatt (1). In the samples having weed seeds it was necessary to remove them by sieving and hand picking.

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*Physiologist, Assistant Botanist, and Senior Physiologist, respectively.
*“Seed” as used in this paper refers to the mature caryopsis with the enclosing lemma and palea when these are persistent.
*Figures in parenthesis refer to “Literature Cited”, p. 783.