On July 14, 1944, one of these, 2,4 dichlorophenoxyacetic acid at a concentration of 1,000 ppm in water was applied as a spray to two 100-foot rows of apple nursery stock infested with bindweed (*Convolvulus arvensis L.*)—just enough to wet the leaves lightly. Before the chemical was introduced into the spray tank of water it was dissolved in .5 per cent. Carbowax 1500 as described by Mitchell and Hamner.[3] The diurnal temperatures for several days both preceding and following the application were approximately 80 to 85 degrees Fahrenheit by day and 55 to 60 degrees by night. No rain fell for several days either before or after application, and general field conditions were what would be termed "dry."

The sprayed plants showed change within a few hours following application. They appeared wilted. There was a slight upward folding of the leaves along the midrib and they were somewhat stiff to the touch. These symptoms were strongly evident within 24 hours of application, the plants becoming dull green in color and lying flat to the ground. Petals of unopened flowers failed to open and the stamens were arrested in development. No terminal growth of shoots was observed. The plants became progressively more harsh and woody to the touch during succeeding days. By the fifth day following application of the spray, the basal leaves were yellow, and at ten days the above-ground parts were dry and dead.

The etiolated, below-ground parts five days after spraying were spongy, water-soaked and enlarged to twice the diameter of similar parts of unsprayed plants. The outer layers showed longitudinal splitting and sloughing off.

Buds, which typically arise from the underground stems of the plant and which are responsible in large part for the difficulty of its eradication and for its noxiousness as a weed, were checked and failed to develop as shoots. Many small roundish budlike swellings appeared at nodes and rubbed off easily.

Sections of treated and untreated roots and underground stems were placed in a propagation frame in order to study bud development. Shoots arose from underground roots and stems of untreated plants, but not from treated plants. Within five days of placing in the frame, the roots and underground stems from treated plants were entirely dead.

On July 24, a second series of applications prepared in the same way with Carbowax were made to three 600-foot rows at concentrations of 1,000 ppm, 500 ppm and 100 ppm. Day temperatures were 80 to 85 degrees Fahrenheit; a rainy period immediately preceded application. The concentrations of 1,000 ppm and 500 ppm were equally effective and plant response was similar to that from the previous treatment at 1,000 ppm made on July 14. The concentration of 100 ppm also produced a definite response but of reduced intensity. A third set of applications at 1,000 ppm, 500 ppm and 100 ppm, followed within 15 minutes by a rain, were also of reduced intensity.

Miscellaneous applications of 2,4 dichlorophenoxyacetic acid at 1,000 ppm to Canada thistle, dewberry, broad-leaf plantain, dandelion, red raspberry, wild carrot, poison ivy, burdock, milkweed, sorrel and wild lettuce resulted in varying responses, such as severe curvature and chlorosis.

Preliminary observations on treatments with 2,4,5 trichlorophenoxyacetic acid indicate that this material also may be effective as an herbicide. Development of growing points of bindweed were not only arrested but also browned and killed at concentrations of 1,000 ppm, 500 ppm and 100 ppm, prepared with Carbowax 1500.

The method of killing by the use of growth-regulating substances seems of special significance with such a plant as bindweed which is deeply rooted and which regenerates so readily not only from seed but also from shoots arising from underground stems and roots. Not only is the foliage destroyed but also portions of the plant are affected at some distance from the point of application. It is possible that the effectiveness of the materials may be increased by applying them in warm solutions or as aerosols.[5]

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A MODIFIED TECHNIC OF CUTTING THE EGG SHELL FOR VIRUS CULTURE

THE culture of virus on the chorio-allantoic membrane of the developing chick embryo according to the method of Woodruff and Goodpasture,[1] as well as the modifications by Burnet[2] and Burnet and Faris,[3] requires that the egg shell be cut. This procedure is accomplished by the use of a small electrically operated rotary drill or the small vibrating cutter,[4] which recently appeared on the market. The latter instrument, which makes 120 vertical strokes per second, has

[1] A. M. Woodruff and E. W. Goodpasture, *Am. Jour. Path.*, 7: 209, 1931.

[5] C. L. Hamner, H. A. Schomer and L. D. Goodhue, SCIENCE, 99: 85, January 28, 1944.

[2] F. M. Burnet, *Jour. Path. Bact.*, 37: 107, 1933.

[3] F. M. Burnet and D. D. Faris, *Jour. Bact.*, 44: 241, 1942.

[4] Examined through the courtesy of Simeon Trenner.

the advantage of not damaging the egg membrane, as may occasionally happen with the rotary drill.

It is customary to hold the egg to be cut in one hand and the drill in the other. This method of handling is a source of difficulty. A drill, when used by one operator for any length of time, may provoke one or all of the following complaints: (1) uncomfortable warmth because of the heat generated by the motor and by friction, (2) the bulk of certain drills makes them awkward for those with small hands, (3) the weight of the instrument becomes tiresome, (4) muscles become cramped from gripping the drill tightly, and (5) shell fragments and dust get in the face and eyes of a right-handed person since the drills rotate in a counter-clockwise direction. These complaints are voiced as readily by those using the professional dental drill with a flexible shaft as by those using the small, compact, hand-sized motor drills or vibrating tool.

These factors we have eliminated by clamping the drill to a stand so that the person engaged in the work need hold only the egg. At the present time drills can not be purchased readily and repairs are not always possible; therefore, we have begun using the electric stirrers available in this laboratory.

An electric stirring motor, preferably one fitted with a rheostat, is clamped on a stand with the drive shaft in a horizontal or slightly tilted position at a height convenient for the operator. This height will generally be about 5 inches above the base of the stand. The drive shaft is pointed towards the operator's right so that the shell fragments and dust will be directed away from the operator. The usual mandrel and grinding stone are attached to the stirrer. The addition of a chuck or wrapping of adhesive tape to the mandrel may be necessary for its secure fastening. Care should be taken to center the mandrel so that the stone rotates without describing an arc in addition to its prescribed movement. Support for the hands is obtained by allowing them to rest on the table or base of the stand.

Skill in cutting the shell in this manner is acquired rapidly and the average person can prepare more eggs in a shorter length of time than is possible when both the egg and the drill are held in the hands. Women engaged in this work have welcomed the method.

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THE PREPARATION OF APOZYMASE FROM BAKER'S YEAST

THE determination of coenzyme I, according to the methods of von Euler[1] and Myrbäck,[2] later modified by Axelrod and Elvehjem,[3] depends upon the principle that the addition of coenzyme I to a washed yeast preparation (apozymase) will result in fermentation, the rate of which is proportional to the amount of coenzyme I added. The above workers have used brewer's yeast for the preparation of apozymase, as has Greig[4] in her simplified method of preparation.

We have recently been able to prepare an apozymase from baker's yeast (Fleischmann's) which is usually more easily obtained than is fresh brewer's yeast. It is prepared as follows:

To 1.5 liters of distilled water in a large beaker are added 100 gm fresh baker's yeast and 25 cc carbon tetrachloride. This mixture is stirred with a power stirrer for one hour, centrifuged, the supernatant discarded and the yeast dried overnight under a fan. When the yeast is thoroughly dry, it is resuspended in 2 liters distilled water and stirred for three hours. The mixture is again centrifuged, the supernatant discarded and the yeast dried under a fan. When dry the yeast is ground and stored in a desiccator.

The dry powder is stable at least a month. It may be added to the reaction vessel as a powder, or is easily suspended in water or phosphate buffer for pipetting.

Since this yeast is quite aerobic, oxygen uptake is still demonstrable after this method of preparation, and consequently the coenzyme I determination must be carried out in an atmosphere of nitrogen. With most preparations there is a latent period of one hour from the time at which the apozymase is introduced into the vessels until active fermentation begins. We have found that 100 mg of this preparation per vessel gives a CO_2 evolution of about 200 mm^3 per hour in the presence of 20 micrograms of coenzyme I.

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