Sweet Corn Hybrids

effects on hybrid varieties when 2,4-D is used in sprays for weed control

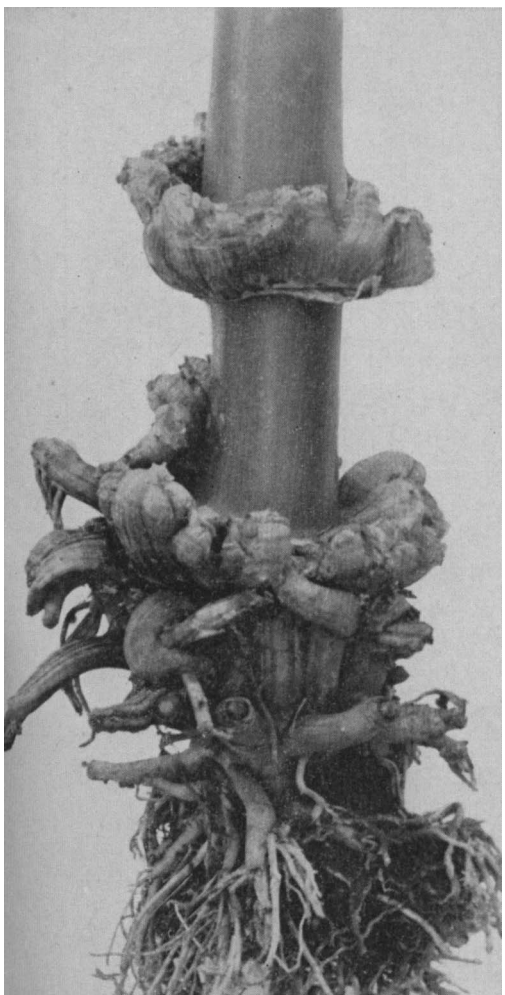
F. W. Zink

Pre-emergent or post-emergent spraying with 2,4-D for control of weeds in field corn may reduce cultivation to a minimum.

Where grass is not a problem 2,4-D can sometimes be used effectively for weed control after the corn plants have attained a height of a foot or more. There has been some indication in tests around the country that corn varieties differ in their resistance to 2,4-D when it is used as a post-emergence spray.

Post-emergence treatment of 15 hybrids was carried out at Davis to determine the resistance of different varieties of sweet corn to dosages of one, two and three pounds of 2,4-D acid per acre. Three replications were used of each treatment. All varieties were sprayed when they were approximately 12 inches tall.

The spray was applied in the form of the sodium salt of 2,4-D in 20 gallons of water per acre without the addition of a wetting agent. The boom and nozzles were so spaced that the spray came in contact with the base of the corn stalks and not on the leaves.



Abnormal development of brace roots on variety *Tendermost*. Two pounds per acre of 2,4-D.

Symptoms of Damage

The first symptoms of damage to the corn were curvature of the corn stalks and abnormal development of brace roots. These roots turned upward instead of growing towards the soil. Often a heavy collar effect of these roots developed around the base of the corn stalk. The more severely injured corn plants lodged and became brittle. Varieties which showed a heavy collar effect appeared to have a more compact root system than the less susceptible varieties. It seemed as if the later development of the roots had been inhibited by the 2,4-D spray.

Effect of 2,4-D on Yield

Yield data consisting of the number of marketable ears per plant and weight of corn in the husk per plot were taken. Applications of one, two and three pounds of 2,4-D per acre did not bring a significant reduction in yield compared to plots receiving only cultivation.

The wide differences between susceptibility of these hybrids may be accounted for in part by the two principles of selectivity.

These two principles are morphological differences and physiological differences in plants. Morphological differences between plants may be in the location of the growing point and differences in structure as to leaf type and the nature of the waxy covering. Physiological differences between plants are differences in the proto-plasmic sensitivity to a certain chemical toxicant.

The earlier maturing hybrids Seneca 60, Marcross, Carmelcross, and Golden Glory appear to be less susceptible to injury than other varieties. This may be due to a more advanced physiological age at the time of spraying even though all varieties were about the same height. The differences in susceptibility may be due in part to a morphologic difference between these hybrids.

There is quite a variation between varieties in the number of brace roots and the time these roots develop. The 2,4-D may penetrate these brace roots more readily than the main stalk with the result that more herbicide is taken into the plant. Those hybrids having the least development of brace roots in cultivated plots also showed the least amount of injury in the 2,4-D treated plots. These hybrids were Seneca 60, Marcross, Carmelcross, Lincoln, and Seneca Chief.

Continued on page 16

Percentage of Plants Injured by 2,4-D Application on 15 Varieties of Hybrid Sweet Corn

Variety	Pounds 2,4-D per acre	Nature of 2,4-D injury	Per cent of plants injured
Golden Beauty	1	No injury	0.0
	2	Abnormal brace roots	8.6
	3	Abnormal brace roots	7.4
Goldenray	1	Abnormal brace roots	34.4
	2	Collar effect	34.8
	3	Collar effect	60.9
Ioana	1	Abnormal brace roots	17.7
	2	Abnormal brace roots	16.3
	3	Abnormal brace roots	33.0
Tendermost	1	Abnormal brace roots	12.9
	2	Collar effect	21.0
	3	Collar effect	47.6
Golden Cross V.T. 20	1	No injury	0.0
	2	Abnormal brace roots	15.8
	3	Abnormal brace roots	21.1
Aristogold	1	Abnormal brace roots	15.6
	2	Collar effect	25.2
	3	Collar effect	47.2
Golden Grain	1	Collar effect	40.6
	2	Collar effect	41.7
	3	Collar effect	59.3
Lincoln	1	Abnormal brace roots	4.6
	2	Collar effect	26.6
	3	Collar effect	30.4
Topflight	1	Abnormal brace roots	14.8
	2	Collar effect	51.1
	3	Collar effect	49.3
Seneca Chief	1	No injury	0.0
	2	Abnormal brace roots	2.6
	3	Abnormal brace roots	11.3
Golden Glory	1	Abnormal brace roots	3.0
	2	Abnormal brace roots	10.5
	3	Abnormal brace roots	15.3
Seneca "60"	1	No injury	0.0
	2	No injury	0.0
	3	Abnormal brace roots	4.3
Marcross	1	No injury	0.0
	2	No injury	0.0
	3	Abnormal brace roots	19.8
Carmelcross	1	No injury	0.0
	2	No injury	0.0
	3	Collar effect	21.8
Tristate	1	No injury	0.0
	2	Abnormal brace roots	24.1
	3	Collar effect	19.2

ALFALFA

Continued from page 5

Tests have shown that the wilt resistance has been maintained, and the desirable characteristics of California Common have been combined with it.

This exact breeding procedure has been tested thoroughly with such self-pollinated crops as wheat and barley. The results obtained with alfalfa to date show that the procedure is equally applicable to cross-fertilized crops.

E. H. Stanford is Assistant Professor of Agronomy and Assistant Agronomist in the Experiment Station, Davis.

B. R. Houston, Assistant Professor of Plant Pathology and Assistant Plant Pathologist in the Experiment Station, Davis, is coöperating in this development program.

POULTRY

Continued from page 13

upper beak is removed—according to general observations—it takes about six months to grow back. The rate of debeaking varies with operators and their experience. A crew of two men can debeak about 300 birds per hour.

Future Research

The most certain information on cannibalism is its uncertainty and complexity. This is not surprising since inheritance, management and nutrition may all be involved in its expression. Reports on studies of cannibalism are numerous, which is a measure of how little accurate and reliable information is available on the subject.

Until such a time as cannibalism can be produced at will, there will be little hope for a successful attack on the problem.

Wilbor O. Wilson is Assistant Professor of Poultry Husbandry and Assistant Poultry Husbandman in the Experiment Station, Davis.

The above progress report is based in part on Research Project No. 677D3.

CORN

Continued from page 15

The selective action of 2,4-D is a relative matter depending on several factors: amount of 2,4-D used, weed species present, age of sweet corn, growth conditions such as temperature and rainfall previous to application, and rainfall and irrigation following application of 2,4-D. A disregard of these factors involved can bring about injury to the crop plants or a poor kill of the weeds, or both.

No pre-emergence spraying or cultivation was used in the plots of this experiment previous to the use of 2,4-D. The weeds were purposely allowed to attain considerable size and were therefore hard to kill.

Effect in Weeds

Water grass was not killed at all by the 2,4-D. Rough pigweed and tumbling pigweed required three pounds per acre of 2,4-D for a satisfactory kill. All the other weeds present were killed satisfactorily by the one- or two-pound applications.

It would seem as though a pre-emergence treatment with a fortified oil emulsion, or one early shallow cultivation, followed by a one pound per acre application of 2,4-D sprayed at the base of the plants when they are a foot high would be an effective procedure for weed control in sweet corn.

F. W. Zink is an Associate in Truck Crops, Davis, and stationed at the Meloland Field Station in the Imperial Valley.

NEW PUBLICATIONS

A copy of the publications listed here may be obtained without charge from the local office of the Farm Advisor or by addressing a request to Publications Office, College of Agriculture, University of California, Berkeley 4, California.

FERTILIZERS, SOIL ANALYSIS, AND PLANT NUTRITION, 1949, by D. R. Hoagland, Cir. 367, Revised April, 1949.

This circular explains in nontechnical terms how plants, soils, and fertilizers are related. It does not give specific recommendations for fertilizing a particular soil or crop; but gives farmers a basis for choosing their fertilizer program wisely. It lists the "plant foods" crops need and discusses certain soil conditions that sometimes make it difficult for plants to get some of them from the soil. It explains the limitations of soil analysis in solving fertilizer problems, and describes the use of plant analysis for studying what "plant foods" a crop lacks.

DONATIONS FOR AGRICULTURAL RESEARCH

Gifts to the University of California for research by the College of Agriculture accepted in April, 1949

BERKELEY

General Chemical Division, Allied Chemical & Dye Corporation
48 lbs. Geniton S-50, 48 lbs. Astr. Lead Arsenate
Division of Entomology & Parasitology

American Cyanamid Co. ..... 10 lbs. Parathion
Division of Entomology & Parasitology

Beet Sugar Development Foundation $1,500.00
Division of Plant Nutrition

California Olive Association $250.00
Division of Food Technology

California Spray Chemical Corp. ..... 1 drum Tanatox
Division of Entomology & Parasitology

Chipman Chemical Company ..... 1 gallon can Toxaphene 60% liquid
Division of Entomology & Parasitology

Corn Industries Research Foundation $7,000.00
Division of Plant Nutrition

E. I. DuPont de Nemours ..... 50 lbs. Copper A Compound
Division of Plant Pathology

Lederle Laboratories Division, American Cyanamid Co.
1000 micrograms of Vitamin B-12, 1 bottle 15 unit liver preparation
Division of Poultry Husbandry

Dr. D. F. Green, Merck & Co., Inc. ..... 2 10-gram ampules Neopyrithiamine hydrobrom
Division of Poultry Husbandry

Dr. L. I. Pechuman ..... 14 species—16 specimens of Talanidae for insect collection
Division of Entomology & Parasitology

Sherwin-Williams Co. ..... 1 gallon "Dimite"
Division of Entomology & Parasitology

DAVIS

Anderson's Hatchery, Rio Linda ..... 150 Cockerels
Division of Poultry Husbandry

Mrs. Belle Benchley ..... A pair of ocellated turkeys
Division of Poultry Husbandry

E. I. DuPont de Nemours
250 grams D(–) Lysine Monohydrochloride, 250 grams L(+) Lysine Monohydrochloride
Division of Poultry Husbandry

Essick Manufacturing Co.
Model 530-S Essick Air-Power Sprayer with Mechanical Agitation, Serial #490159
Division of Botany

Julius Hyman & Co. $1,250.00
Division of Entomology

W. A. Stine and Jack Farnham ..... 1—Model 7 Webster—Chicago Wire recorder with foot control, 6 assorted spools of recording wire. 1—Worthington centrifugal pump for sprinkler irrigation
Division of Pomology

U. S. Rubber Company ..... 10 lbs. Spurgon Seed Protectant
Division of Agronomy

RIVERSIDE

California Fruit Growers Exchange $545.00
Division of Plant Physiology