

The Evaluation of the Weed Control Properties of
Six Experimental Chemicals Furnished by the
Monsanto Chemical Company

1959

Robert P. Upchurch, Department of Field Crops
North Carolina Agricultural Experiment Station

During the spring of 1959, the North Carolina Agricultural Experiment Station and the Monsanto Chemical Company entered into an agreement whereby the Company would supply certain experimental herbicides which the Experiment Station would evaluate. The Company also supplied certain funds for use in this work. This is a final report of the results obtained with the crops peanuts, soybeans, and cotton. A letter report during the summer of 1960 will furnish the final information on the horsenettle experiment.

A total of six experiments were conducted and the details relating to each are given below.

Experiment H-55-A - Cotton. Herbicides applied either as pre- or post-emergence treatments. Planted May 2, treated (pre-emergence) May 4, and treated (post-emergence) May 25. Both pre- and post-emergence treatments applied as band applications at a per acre broadcast volume of 50 and 112 gallons per acre, respectively. Post-emergence applications directed at base of cotton plants. Four replications, plots one-row (36 inches) wide x 50 feet long. Randomized block design. Excellent stand of cotton and crabgrass obtained. Norfolk sandy loam soil, Clayton, North Carolina.

Experiment H-55-B. Details identical to H-55-A except that soybeans were used.

Experiment H-56-A - Peanuts. Planted May 2. Herbicides applied as pre-emergence band treatments at a broadcast spray volume of 38 GPA. Treated May 4, three replications, plots one-row (36 inches) wide x 50 feet long. Randomized block design. Excellent stand of peanuts and crabgrass obtained. Norfolk sandy loam soil, Clayton, North Carolina.

Experiment H-56-B - Peanuts. Planted June 10. Herbicides applied as pre-emergence band treatments at a broadcast spray volume of 38 GPA on June 12. Three replications. Plots one-row (36 inches) wide x 50 feet long. Randomized block design. Norfolk sandy loam soil, Clayton, North Carolina. The management of this experiment was influenced by the fact that some established grass present before planting was not destroyed in the soil preparation operation. Also note that a drought persisted for about four weeks after planting. A fair stand of peanuts was obtained and a sparse stand of young crabgrass developed.

Experiment H-56-C - Peanuts. Planted April 1. Herbicides applied as post-emergence band over-the-top treatments at a broadcast spray volume of 38 GPA. Treatment on April 20 at 19 days after planting. Excellent stand of crabgrass and peanuts obtained. Peanuts and crabgrass were in the 3 to 5 leaf and 2 to 3 leaf stages, respectively, when treated. Plots one-row wide (36 inches) by 50 feet long. Randomized work design. Four replications. Norfolk sandy loam soil, Clayton, North Carolina.

Experiment H-60. Established horsenettle in tall fescue - bluegrass pasture. Treatments applied at 38 GPA broadcast June 8 using a 6 foot boom and plots 40 feet long. Five replications. Randomized block design. Horsenettle in pre-bloom stage at treating time. Cecil soil, Raleigh, North Carolina.

Ratings for all experiments were on a 1 to 5 scale with 5.0 being perfect control or normal vigor of crop plant and 1.0 being no control over weeds or extreme crop injury. Intermediate values of 1+, 2+, 3+, and 4+ were used. Two or more raters per plot were used. A rating difference of 1.0 will normally be significant at the .05 probability level.

Discussion

Cotton (H-55-A). Excellent results were obtained with GP 21946 applied as a pre-emergence treatment to cotton. No cotton injury was obtained at 9 pounds per acre and satisfactory grass control was maintained for 37 days at the 6 pounds per acre rate. GP 10545 and GP 861 were unsatisfactory as post-emergence treatments at rates up to 4 and 9 pounds per acre, respectively, due to lack of grass control although no injury to cotton was obtained with GP 861 and only slight injury with GP 10545 at the highest rates used. GP 17029 and GP 20101 gave fair control of grass when applied post-emergence at rates of 4 and 9 pounds per acre, respectively. Cotton was injured severely by post-emergence rates of GP 17029 as low as one pound per acre, whereas GP 20101 was non-toxic at the highest rate used (9 pounds/acre).

Soybeans (H-55-B). The results in this experiment were essentially the same as for those in the cotton experiment with the exception that soybeans are more susceptible to post-emergence applications of CP 20101 than is cotton.

Peanuts Pre-Emergence (H-56-A). Forty-five days after application, CP 17029, CP 20101, and CP 21946 gave grass control equivalent to 1 pound per acre of diuron at 2, 9 and 6 pounds per acre, respectively. CP 861 and CP 10543 gave little or no grass control at the highest rates used (9 and 4 pounds per acre, respectively). Of all the CP chemicals used as pre-emergence treatments, only CP 17029 at 4 pounds per acre and CP 10543 at 4 pounds per acre gave indication of causing injury to peanuts.

(H-56-B) (This experiment represents chemical performance under drought.) In this drought situation the three CP chemicals tested gave appreciable weed control, whereas simasin performed poorly. However, fairly high rates of the three CP chemicals were required to give good weed control (4 pounds per acre for CP 17029, 9 to 15 pounds per acre for CP 20101 and CP 21946). Furthermore, these rates required for good weed control were on the borderline of the rates required to give peanut injury.

Peanuts Post-Emergence (H-56-C). CP 861 gave poor grass control and no peanut injury at rates up to 9 pounds per acre. CP 17029 gave excellent grass control at 2 pounds per acre but severe injury to peanuts at 1 pound per acre. Similarly, CP 20101 gave fair grass control at 9 pounds per acre but severe injury to peanuts at 3 pounds per acre, and CP 10543 gave fair

grass control at 4 pounds per acre but severe injury to peanuts at 1 pound per acre. CP 21946 gave poor grass control at 9 pounds per acre and injured peanuts at 3 pounds per acre. In the case of CP 17029 and CP 10543 the injury to peanuts was revealed by a count of dead peanuts as well as by peanut vigor ratings.

Horsenettle (H-60). Control ratings made on September 10 following treatment on June 8 indicate that CP 20101 at 3, 6 and 9 pounds per acre is toxic to horsenettle but that it is inferior to 2,4,5-T at 2, 4 and 8 pounds per acre. It is possible that the degree of control indicated for these two chemicals represents only a temporary setback for the horsenettle. Further evaluation will be made next spring.

Summary by Chemicals

CP 861. This chemical showed no potential for pre- or post-emergence weed control at rates up to 9 pounds per acre. Since it did not injure cotton, soybeans, or peanuts when applied post-emergence or peanuts when it was applied pre-emergence, it is possible that a rate above 9 pounds per acre might show desirable properties.

CP 10543. This chemical appears too toxic for post-emergence use in cotton, soybeans, or peanuts. In one experiment out of three, some post-emergence grass control was obtained and there is, therefore, the possibility that this chemical might be useful at 4 to 8 pounds per acre as a post-emergence herbicide in some crop other than cotton, soybeans, or peanuts.

Further testing as a pre-emergence herbicide might be justified on the basis that little weed control and no injury to peanuts were observed at pre-emergence rates up to 4 pounds per acre.

CP 17029. Cotton, soybeans, and peanuts are quite susceptible to post-emergence applications of this herbicide but appreciable grass control is obtained at 2 to 8 pounds per acre, and its potential for post-emergence use in other crops should be considered. As a pre-emergence herbicide, 17029 looks good for peanuts at about 4 pounds per acre, and further work along pre-emergence lines should give consideration to other crops in addition to peanuts. The safety margin for pre-emergence use in peanuts may be small.

CP 20101. Poor to good post-emergence grass control was obtained with 9 pounds per acre of 20101 with soybeans, with peanuts being injured severely by this rate, and cotton being tolerant. Further experiments for cotton and crops other than soybeans and peanuts using post-emergence rates of 6, 9, and 15 pounds per acre should be conducted. As a pre-emergence herbicide for peanuts, 20101 looks equivalent to 17029 in all respects except that the optimum rate appears to be 9 pounds per acre. 20101 should be considered as a pre-emergence herbicide for other crops. It does not appear especially promising for horsenettle control, according to one experiment.

CP 21946. This chemical gave excellent pre-emergence grass control without injuring cotton, soybeans, or peanuts at 6 to 9 pounds per acre. Under drought conditions, grass control was not quite so good. Indications are that the safety margin for use of 21946 in peanuts may be small. It should

be evaluated for pre-emergence use in other crops. 21946 gave no indication of being a successful post-emergence herbicide at rates up to 9 pounds per acre.

Identification Pre- and Post-Emergence Weed Control - Cotton - Experiment H-55-A
 Crop Leader Robert P. Upchurch Date
 Unit of measure Average of Four Replications Project Monsanto Contract - 1959

Tr. No.	Treatment Chem.	Lbs/A	Applied*	Grass Control Ratings**		Cotton Vigor Ratings***	
				May 26 (24 da)*	June 8 (57 da)*	May 26 (24 da)*	June 8 (57 da)*
1	CP 861	3	POE-D		1.6		4.4
2	"	6	"		1.7		4.6
3	"	9	"		1.8		4.5
4	CP 17029	1	"		2.1		5.1
5	"	2	"		2.5		1.8
6	"	4	"		3.5		1.1
7	CP 20101	3	"		1.8		4.4
8	"	6	"		2.0		4.4
9	"	9	"		2.8		4.0
10	CP 21946	3	PE	4.6	5.6	4.8	4.6
11	"	6	"	5.0	4.7	4.7	4.5
12	"	9	"	5.0	4.7	4.5	4.6
13	CP 10545	1	POE-D		1.1		4.2
14	"	2	"		1.4		4.1
15	"	4	"		1.5		5.6
16	CK	-		**1.0	1.0		5.0

* POE-D = post-emergence - directed; PE = pre-emergence
 * = days after treatment.
 **1.0 = no control; 5.0 = perfect; ratings average of two raters
 ***1.0 = extreme stunting; 5.0 = normal plants; ratings average of two raters.

Identification Pre-emergence Weed Control - Peanuts - Experiment E-56-A
 Crop Leader Robert P. Upchurch Date
 Unit of measure Average of Three Replications Project Monsanto Contract - 1959

Tr. No.	Treatment Chem.	Lbs/A	Grass Ratings**		Peanut Vigor Ratings***		Peanut Stand (Plants/ft. of row)
			May 26 (22 da)*	June 18 (45 da)*	May 26 (22 da)*	June 18 (45 da)*	
1	CP 861	3	2.5	1.7	4.4	4.2	1.2
2	"	6	3.0	2.1	4.8	4.5	1.6
3	"	9	3.1	2.1	4.5	4.2	1.2
4	CP 17029	1	4.5	3.5	4.6	4.7	1.4
5	"	2	5.0	4.5	3.8	4.1	1.5
6	"	4	5.0	4.8	3.5	3.4	1.5
7	CP 20101	3	3.2	1.8	4.6	4.5	1.4
8	"	6	4.0	2.8	4.0	4.5	1.5
9	"	9	4.8	4.0	3.7	4.2	1.1
10	CP 10543	1	2.2	1.6	4.7	4.5	1.5
11	"	2	3.6	2.1	4.7	4.4	1.5
12	"	4	3.5	2.5	4.5	3.9	1.0
13	CP 21946	3	4.3	3.0	4.8	4.8	1.4
14	"	6	5.0	4.5	4.8	4.9	1.4
15	"	9	5.0	4.6	4.6	4.9	1.5
16	diuron	1	5.0	4.5	4.4	4.1	1.0
17	CK	-	1.6	1.2	4.7	4.0	1.5

* PEB-0 = post-emergence - directed; PE = pre-emergence
 * = days after treatment. **1.0 = no control; 5.0 = perfect; ratings average of two raters
 ***1.0 = extreme stunting; 5.0 = normal plants; ratings average of two raters

Identification **Pre-emergence Weed Control - Peanuts - Experiment R-36-B**
 Crop Leader **Robert P. Upchurch** Date
 Unit of measure **Average of Three Replications** Project **Monsanto Contract - 1959**

Tr. No.	Treatment Chem.	Lbs/A	Gross Ratings*		Peanut Vigor Ratings***							
			July 17 (25 da)*		July 17 (25 da)*							
1	CP 17029	1	3.7		4.4							
2	"	2	3.2		4.6							
3	"	4	4.0		4.1							
4	"	8	5.0		2.8							
5	CP 20101	3	2.3		4.6							
6	"	6	2.8		4.4							
7	"	9	5.8		3.9							
8	"	15	4.4		2.7							
9	CP 21946	5	2.7		4.6							
10	"	6	3.4		4.4							
11	"	9	3.3		3.9							
12	"	15	3.8		3.0							
13	Sinsin	1	2.5		4.3							
14	"	2	3.0		4.1							
15	"	4	3.0		3.9							
16	CK	-	2.3		4.3							

* 50E-B = post-emergence - directed; PS = pre-emergence
 † = days after treatment.
 **1.0 = no control; 5.0 = perfect; ratings average of two raters
 ***1.0 = extreme stunting; 5.0 = normal plants; ratings average of two raters.

Temperature
Clayton, North Carolina - 1959

Day	April		May		June		July	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	76	49	82	56	81	65	98	72
2	75	53	87	55	80	68	98	71
3	71	36	94	63	81	65	93	68
4	70	42	90	63	80	61	81	64
5	73	38	82	55	79	59	85	64
6	77	53	79	57	82	58	89	62
7	74	44	91	60	85	59	89	67
8	86	55	89	66	87	61	86	65
9	86	62	79	52	87	61	88	68
10	84	60	78	56	88	64	88	70
11	81	62	81	64	89	66	88	67
12	67	42	83	62	87	68	73	69
13	43	36	82	67	93	68	88	70
14	57	35	86	62	90	60	83	70
15	71	40	73	45	82	54	82	69
16	75	48	72	46	82	58	90	70
17	79	49	75	51	76	55	84	69
18	79	54	78	56	75	52	85	71
19	71	61	86	63	81	59	88	73
20	82	67	84	68	88	58	87	69
21	78	58	79	67	88	63	88	70
22	62	48	83	69	91	69	89	70
23	58	45	86	69	93	70	90	72
24	71	39	87	68	91	69	89	72
25	75	48	86	63	93	69	91	72
26	78	58	81	55	95	70	87	71
27	81	61	84	58	99	76	87	70
28	80	62	87	62	100	75	88	70
29	78	56	87	64	99	73	92	69
30	83	59	87	65	103	76	93	71
31	--	--	85	70	--	--	91	70
Average	74.0	50.7	83.3	60.5	87.5	64.3	88.0	69.2

Rainfall
Clayton, North Carolina - 1959

Day	April	May	June	July
1			.42	.56
2	.70		1.53	
3				.78
4	.07	.23	1.61	
5		.10		
6				
7				
8				
9				.14
10		.60		1.86
11	.50	.01		2.29
12	2.25			.62
13	.38	.25		.65
14	.23	.08		.75
15				1.13
16				.18
17			.01	
18		.02		.05
19	.88			.03
20	1.39	.24		.64
21	.99	.40		.47
22	.12	.20		1.32
23		.05		
24			.05	
25				
26				.26
27				1.15
28				.56
29	.03			.05
30				.05
31				1.51
Total	7.60	2.18	3.42	15.05

March 16, 1959

Mr. C. H. Soumer, Vice-President
Organic Chemicals Division
Monsanto Chemical Company
800 North Lindbergh Boulevard
St. Louis 66, Missouri

Dear Mr. Soumer:

We gratefully acknowledge receipt of the check from your company in the sum of \$2,000. This money will be used in support of an investigation under the direction of Drs. Klingman and Upchurch concerning the herbicidal action of chemical compounds supplied by Monsanto Chemical Company.

The results of such investigations will be made available to a representative of your company as the work progresses, and a final report will be provided the Monsanto Chemical Company.

We sincerely appreciate the support you have given our weed control projects, and are looking forward to continuing cooperation with your organization.

Very truly yours,

Thurston M. Mann, Acting Head
Field Crops Department

cc: L. H. Hannah
R. L. Lovvorn

MONSANTO CHEMICAL COMPANY

ORGANIC CHEMICALS DIVISION

800 NORTH LINDBERGH BOULEVARD
ST. LOUIS 66, MISSOURI

March 5, 1959

Dr. Paul Harvey, Head
Farm Crops Department
North Carolina State College
Raleigh, North Carolina

Dear Dr. Harvey:

In support of an investigation under the direction of Dr. Klingman and Dr. Upchurch of the Farm Crop Department during 1959, concerning the herbicidal action of chemical compounds supplied by Monsanto Chemical Company, St. Louis, Missouri, we propose to make a gift to the North Carolina State College in the sum of \$2,000.00.

We are enclosing our check in the above amount payable to the North Carolina State College.

It is our understanding that a representative of Monsanto Chemical Company will have access to the results of the investigation as it progresses and a final report on the results will be provided us.

We will appreciate it if you will acknowledge receipt of the enclosed check.

Very truly yours,

MONSANTO CHEMICAL COMPANY

By 

Vice-President

Enc.

MONSANTO CHEMICAL COMPANY

ORGANIC CHEMICALS DIVISION

800 NORTH LINDBERGH BOULEVARD
ST. LOUIS 66, MISSOURI

March 5, 1959

Dr. Paul Harvey, Head
Farm Crops Department
North Carolina State College
Raleigh, North Carolina

Dear Dr. Harvey:

Enclosed are a letter signed by our Vice President, Mr. C. H. Sommer, and our check in the sum of \$2,000.00 payable to the North Carolina State College for support of herbicide investigations under the supervision of Drs. Glenn Klingman and Phil Upchurch of the Farm Crops Department.

We trust that this gift will be acceptable and shall look forward with pleasure to cooperating with Dr. Klingman and Dr. Upchurch on the project.

Sincerely yours,

L. H. Hannah

L. H. Hannah, Agronomist
Development Department

LHH/hw
Enc.

cc: Dr. Glenn Klingman
Dr. Phil Upchurch