



Uploaded to the VFC Website

▶▶ ▶▶ **May 2014** ◀◀ ◀◀

This Document has been provided to you courtesy of Veterans-For-Change!

Feel free to pass to any veteran who might be able to use this information!

For thousands more files like this and hundreds of links to useful information, and hundreds of "Frequently Asked Questions, please go to:

[Veterans-For-Change](http://www.veteransforchange.org)

*Veterans-For-Change is a A 501(c)(3) Non-Profit Organization
Tax ID #27-3820181
CA Incorporation ID #3340400
CA Dept. of Charities ID #: CT-0190794*

If Veterans don't help Veterans, who will?

We appreciate all donations to continue to provide information and services to Veterans and their families.

https://www.paypal.com/cgi-bin/webscr?cmd=_s-xclick&hosted_button_id=WGT2M5UTB9A78

Note:

VFC is not liable for source information in this document, it is merely provided as a courtesy to our members & subscribers.



Item ID Number 04330 **Not Scanned**

Author Burleson, Charles A.

Corporate Author The Ansul Company, Marinette, Wisconsin

Report/Article Title Development of Arsenic Based Defoliants: Second and Third Semiannual Report, 1 November 1967 - 31 October 1968

Journal/Book Title

Year 1968

Month/Day

Color

Number of Images 22

Description Notes Alvin L. Young filed these documents together under the label, "Arsenic/Cacodylic Acid and Herbicide Blue". Contract No. DAAA13-67-C-0113

AD-848456

Burleson, C. A. 1968

SECOND & THIRD

SEMI-ANNUAL REPORT

CONTRACT DAAA13-67-C-0113

PERIOD 1 NOV. 67 TO 30 OCT. 68

STATEMENT #2 UNCLASSIFIED

This document is subject to special export controls and each transmittal to foreign governments or foreign nationals may be made only with prior approval of Dept. of Army, Fort Detrick, ATTN: Technical Release Branch/ TID, Frederick, Maryland 21701

Type of Report - Second Semiannual Report

Title: Development of arsenic based defoliants

Dates covered by report: 1 November, 67 to 30 April 68

Author: Charles A. Burleson

Contract Number: DAAA13-67-C-0113

Work Performed for: Fort Detrick; Frederick, Maryland

Publication Date: 1 December 68

Name and address of organization preparing report:

**The Ansul Company
Marinette, Wisconsin 54143**

This publication or any portion thereof may not be reproduced without specific authorization from the Commanding Officer, Fort Detrick, ATTN: Technical Releases Section, Technical Information Division, Frederick, Maryland 21701. However, DDC is authorized to reproduce the publication for U. S. Government purposes.

The information in this publication has not been cleared for release to the public.

DDC AVAILABILITY NOTICE

Qualified requestors may obtain copies of this publication directly from DDC.

Foreign announcement and dissemination of this publication by DDC is limited.

A B S T R A C T

Development of arsenic based defoliants - - -

Second semiannual progress report

Phase I:

Thirty-eight (38) new arsenical compounds were tested in primary screening against six plant species. Commercial formulation of cacodylic acid and monosodium acid methanearsonate were also tested for comparison purposes.

Preparation of 100g or greater quantities of the more active compounds tested against gardenia and privet were prepared and shipped to Fort Detrick.

This completes Phase I of the contract.

Phase II

No work was done on Phase II due to the time of year. The portion of Phase II that is incomplete will be completed and reported in the third semiannual progress report.

Development of arsenic based defoliant - - -

Second semiannual progress report

The second semiannual progress report will cover that research completed during the period of 1 November 67 through 30 April 68.

Phase I

- a. Primary Screening: Thirty-eight (38) new arsenical compounds prepared and selected by the contractor from some fifty synthesized were subjected to a primary screening program in the greenhouse using two replicates and the following test plants

(1) 7 day old plants:

- (a) Beans ---- Black Valentine
- (b) Soybean -- Chippewa
- (c) Morningglory--Heavenly Blue
- (d) Radish ---- Comet
- (e) Oats ----- Lodi
- (f) Rice ----- Bellè Patna

(2) 14 day old plants:

- (a) Beans ---- Black Valentine

In some tests, commercial formulations of cacodylic acid and monosodium methanearsonate (Phytar 160 and Ansar 170, respectively) were included for comparison.

PROCEDURE

Growing of Test Plants

Seeds of the six test species used were planted in a soil medium in either six-inch earthen pots or 4 1/4 X 4 1/8 inch plastic pots. The soil medium consisted of three parts local high organic clay loam soil, one part peat moss and one part sand. To assure adequate fertility, the equivalents of 1000 lb/A lime and 10 lb/A each of N , P_2O_5 , and K_2O were added to and thoroughly mixed into the soil medium prior to use.

The temperature was maintained at a constant 78-82°F in the growing greenhouse, but relative humidity varied from 30 to 65%, and variation in light quantity and intensity gave variable germination rates. Because of these differences in germination and seedling growth rates from one season of the year to another, seedlings made for the 7-day treatments were made from 7 to 10 days prior to treatment. This allowed time for grasses to develop 3 to 4 true leaves. Likewise, the seedlings made for the 14-day treatments were made from 14 to 18 days prior to treatment. This allowed time for at least two trifoliolate leaves to fully develop on the Black Valentine Beans.

Chemical Sample Preparation

Preliminary experimentation was conducted to determine the relative solubility of the new compounds in water, acetone, and methanol.

When sample material was adequate, 1.8 g. of a given compound was dissolved or suspended in the selected solvent and the solution brought up to a volume of 60 ml base solution.

1 lb/A Rate - - - 8 ml of the original solution was diluted further with the selected solvent, 0.04 ml of Tween 20 surfactant was added and the solution brought up to a volume of 40 ml.

5 lb/A Rate - - - To the remaining 52 ml of the base solution was added 0.052 ml Tween 20.

The above concentrations were calculated to provide 1 and 5 lb/A rates when applied at a 20 gal/A volume. The surfactant level was equal to 0.1% on a volume basis.

Spray Application

Application of the sample preparations was accomplished with a "Beltsville Type" spray apparatus employing a stationary spray nozzle and moving belt. The apparatus employed a T-Jet fan type nozzle with air pressure as the propellant. It was calibrated to apply a volume of 20 gal final spray solution per acre. Pots or plastic containers containing plant material to be sprayed were assembled in 14 X 20 inch flats for ease in loading on to and off of the moving belt. The belt moved at an approximate speed of 2 mph.

Sprayed plant material was held in the headhouse until completely dry prior to being moved to the "treated plant" greenhouse.

Evaluation

Observations were made of treated plants daily for two weeks following application, and notes were made of any unusual response. Approximately two weeks after treatment final evaluations were made as to type and extent of response. A sample data sheet is attached as Page 1 of the appendix of this report. Response ratings for six (6) species of 7-day old plants and 14-day old Black Valentine bean plants were made on a 1 to 4 rating basis as follows:

1. Equals no effect
2. Equals slight effect
3. Equals moderate effect
4. Equals severe effect

A summary of the data resulting from the primary screening is found in Table I. New compounds screened under this contract are listed by Ansol code numbers only. Two copies of the original data sheets providing the chemistry of each compound with its corresponding code numbers are being furnished Mr. J. Ray Frank, Project Officer, Plant Physiology Division (PROV.) Fort Detrick, Maryland. The ratings listed under the column headed 7-day plants are the sum of the individual ratings for respective rates of the six species involved.

Table I. Average ratings from two replicate treatments made two weeks following application of chemicals indicated using the 1 to 4 rating described above. Values under the "7-day Plants" Column represent the total of the average evaluations for six crops.

Code Numbers		Chemistry	Activity Rating	
			7-day Plants	14-day Plants
<u>Fort Detrick</u>	<u>Ansul</u>			
	AN-513	Confidential	17/20	3/4
	AN-514	Confidential	19/23	4/4
	AN-515	Confidential	20/22	4/4
	AN-516	Confidential	13/16	3/4
	AN-517	Confidential	11/12	2/3
	AN-518	Confidential	12/12	3/3
	AN-519	Confidential	16/17	4/4
	AN-520	Confidential	9/11	3/3
	AN-521	Confidential	7/9	1/1
	AN-522	Confidential	8/12	1/1
	AN-523	Confidential	19/22	4/4
	AN-524	Confidential	20/22	4/4
	AN-525	Confidential	6/7	1/1
	AN-526	Confidential	10/16	2/3
	AN-527	Confidential	14/20	4/4
	AN-528	Confidential	14/18	3/3
	AN-529	Confidential	18/21	4/4
	AN-532	Confidential	12/14	2/3
	AN-533	Confidential	20/22	4/4
	AN-534	Confidential	24/24	4/4

<u>Fort Detrick</u>	<u>Ansul</u>	<u>Chemistry</u>	Activity Rating 1#/5#	
			<u>7-day Plants</u>	<u>14-day Plants</u>
	AN-536	Confidential	12/20	3/4
	AN-537	Confidential	17/18	3/4
	AN-538	Confidential	15/21	3/4
	AN-539	Confidential	18/24	4/4
	AN-540	Confidential	23/24	4/4
	AN-544	Confidential	22/24	4/4
	AN-545	Confidential	20/24	4/4
	AN-546	Confidential	23/24	4/4
	AN-547	Confidential	23/24	4/4
	AN-550	Confidential	15/20	3/4
	AN-551	Confidential	6/7	1/2
	AN-552	Confidential	12/15	2/3
	AN-553	Confidential	14/18	3/4
	AN-554	Confidential	13/15	2/3
	AN-556	Confidential	9/11	1/2
	AN-557	Confidential	16/19	3/3
	AN-558	Confidential	14/17	3/4
		Ansar 170 (Commercial)	16/20	4/4
		Ansar 160 (Commercial)	21/23	4/4

b. Secondary Testing - - No secondary screening was performed due to lack of manpower and reorganization.

Phase II

No work was performed on this section of the government contract during this period. This phase will be completed and reported on in the third semi-annual report.

GOVERNMENT
PRIMARY SCREENING
DATA SHEET

Screening No.: _____

Book No.: _____

Compound: _____

Date Applied: _____

7 day old crops		Rate lbs/A	Abscission	Chlorosis	Contact	Curvature	Formative	Galling	Killing	Necrosis	Abn. Pigment	Quilling	Advent. Rt.	Stunting	Activity Rating	Remarks
Species	Variety															
Bean	Black Valentine	1.0														
		5.0														
Soybean	Chippewa	1.0														
		5.0														
Morning Glory	Heavenly Blue	1.0														
		5.0														
Radish	Comet	1.0														
		5.0														
Oat	Lodi	1.0														
		5.0														
Rice	Bellii Patma	1.0														
		5.0														

Response: 1 - None; 2 - Slight; 3 - Moderate; 4 - Severe

14 day old crops		Rate lbs/A	Abscission	Chlorosis	Contact	Curvature	Formative	Galling	Killing	Necrosis	Abn. Pigment	Quilling	Advent. Rt.	Stunting	Activity Rating	Remarks
Species	Variety															
Bean	Black Valentine	1.0														
		5.0														

Response: 1 - None; 2 - Slight; 3 - Moderate; 4 - Severe

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) The Ansul Company One Stanton Street Marinette, Wisconsin 54143		20. REPORT SECURITY CLASSIFICATION Unclassified	
		20. GROUP Not applicable	
3. REPORT TITLE Progress Report --- Development of arsenic based defoliants			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Second Semi-annual Progress Report, 1 November 67 - 30 April 68			
5. AUTHOR(S) (First name, middle initial, last name) Burleson, Charles A			
6. REPORT DATE 1 December 68		7a. TOTAL NO. OF PAGES 13	7b. NO. OF REFS None
8a. CONTRACT OR GRANT NO. DAAA13-67-C-0113		8b. ORIGINATOR'S REPORT NUMBER(S) None	
9. PROJECT NO.		9c. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Qualified requestors may obtain copies of this publication directly from DDC. Foreign announcement and dissemination of this publication by DDC is limited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Biological Center Fort Detrick, Frederick, Maryland 21701	
13. ABSTRACT Phase I - Thirty-eight (38) new arsenical compounds were tested in primary screening against six plant species. Commercial formulation of cacodylic acid and monosodium acid methanearsonate were also tested for comparison purposes. Preparation of 100g or greater quantities of the more active compounds tested against gardenia and privet were prepared, and shipped to Fort Detrick. This completes Phase I of the contract. Phase II - No work was done on Phase II due to the time of year. The portion of Phase II that is incomplete will be completed and reported in the third semiannual progress report.			

14.

KEY WORDS

LINK A

LINK B

LINK C

ROLE

WT

ROLE

WT

ROLE

WT

Organic arsenicals

Defoliation

Desiccation

Type of Report: 3rd Semiannual Progress Report

Title: Development of arsenic based defoliants

Dates covered by report: 1 May 68 to 31 October 68

Author: Charles A. Burleson

Contract Number: DAAA 13-67-C-0113

Work performed for: Fort Detrick, Frederick, Maryland

Publication date: 6 January 68

Name and address of organization preparing report:

The Ansul Company
Marinette, Wisconsin 54143

This publication or any portion thereof may not be reproduced without specific authorization from the Commanding Officer, Fort Detrick, ATTN: Technical Releases Section, Technical Information Division, Frederick, Maryland 21701. However, DDC is authorized to reproduce the publication for U. S. Government purposes.

The information in this publication has not been cleared for release to the public.

DDC AVAILABILITY NOTICE

Qualified requestors may obtain copies of this publication directly from DDC.

Foreign announcement and dissemination of this publication by DDC is limited.

ABSTRACT

Development of arsenic based defoliants---
Third semiannual progress report

PHASE I

Seventy-one (71) new arsenical compounds were previously tested against six plant species. Nine (9) previously tested compounds and commercial formulations of cacodylic acid and MSMA were tested also. See semiannual progress report numbers one and two for the results.

The above and all other portions of Phase I were reported previously as complete.

PHASE II

Five (5) of the more active compounds in greenhouse tests were tested in field trials against willow, Salix spp. and mesquite, Prosopis spp. They were compared to commercial formulations of cacodylic acid.

CONTRACT NO. DAAA 13-67-C-0113

Development of arsenic based defoliant---

Third semiannual progress report

The third semiannual progress report will cover that research completed during the period of 1 May 68 through 31 October 68.

PHASE I

This portion of the contract has been completed and was reported in the first and second semiannual progress report.

PHASE II

- a. Five (5) of the more active compounds on the basis of Phase I evaluations were previously tested against red maple in field trials. Results of these trials were previously reported in the first semiannual report.
- b. Field trials were conducted on willow and mesquite using the five (5) compounds previously mentioned. These materials were compared to Phytar 160 and Phytar 138 (AN-425).

PROCEDURE

Plant Material - - Three to five-foot naturally seeded willow and mesquite seedlings were selected for treatment in their original habitat near Weslaco, Texas. At the

time of treatment, seedlings were growing vigorously. 7.24 inches of precipitation fell two months prior to spray application and 4.39 inches fell in the two months following application of the herbicides.

Chemical Sample Preparation - - A 2.46 g quantity of chemical, that was 100% active, was diluted to 205 ml with water or methanol, which comprised the base solution. The amount of chemical was adjusted accordingly if it was not 100% active.

5 lb/A Rate - - 0.35 ml. Multifilm X-77 surfactant was added to 70 ml of the base solution. This was then diluted with the appropriate diluent to 140 ml.

10 lb/A Rate - - 0.34 ml Multifilm X-77 surfactant was added to the remaining base solution.

Spray Application

A 5 sq. ft. quadrat was placed over the seedling to be treated. A 43 ml aliquot of respective final solution was then sprayed uniformly over the seedling and quadrat area, using a portable sprayer equipped with an 8001-E Tee Jet nozzle at 30 pounds pressure with CO₂ pressure. This gave a volume of application of 100 gal/A and a surfactant concentration of 0.25%. All treatments were made in triplicate.

The plots containing mesquite were sprayed on September 3, 1968. The temperature on that date was 88° F with 65% relative humidity. The plots containing willow were sprayed on September 4, 1968. The temperature on that date was 89° F with 68% relative humidity. The skies were partly cloudy and the wind speed was 8 - 12 mph on both days.

Evaluation

Seedlings were rated for degree of desiccation and defoliation at 7 and 14 days after application using a rating scale of 0 to 10, where 0 indicated no damage and 10 complete desiccation or defoliation. The data from these evaluations are tabulated in Table 1 and Table 2.

Table 1. Average ratings from three replicate treatments to mesquite seedlings made at indicated intervals following application on 3 September 68. Ratings are on a basis of 0 to 10 with 0 indicating no damage and 10 indicating complete desiccation or defoliation.

Chemical	Rate lb/A	Desiccation		Defoliation		Regrowth								
		Days after		Days after		Days after								
		Application		Application		28 1/			42			90		
		7	14	7	14	Reps			Reps			Reps		
						I	II	III	I	II	III	I	II	III
Methyl (4-chlorophenyl) arsinic acid AN-394 D80033	5	10	10	5.3	8.7	x	x	x	x	x	x	x	x	x
	10	9.7	10	5.3	7.5	x	x	x	x	x	x	x	x	x
Ethylmethylarsinic acid AN-451 D15464	5	9.3	9.3	4	6	x		x	x	x	x	x	x	x
	10	10	9.8	4.3	6.7	x	x	x	x	x	x	x ^{2/}	x ^{2/}	x ^{2/}
Butylmethylarsinic acid AN-452 D 15465	5	9.3	9.5	5.3	7.2	x	x	x	x	x	x	x	x	x
	10	10	10	3.2	5.2	x	x	x	x	x	x	x	x	x
Methylpropylarsinic acid AN-453 D15466	5	10	10	6	7.7	x		x	x	x	x	x	x	x
	10	10	10	2.2	4	x	x	x	x	x	x			x
Reaction product of n-butyl alcohol and cacodylic acid AN-499 D80166	5	10	10	9	9	x	x	x	x	x	x	x	x	x
	10	10	9.8	6.5	7.7	x	x	x	x	x	x		x	x
Cacodylic acid (Phytar 160) AN-481 D15675	5	9.3	9	10	10	x	x	x	x	x	x	x	x	x
	10	10	10	8.7	9.3	x	x	x	x	x	x	x	x	x
Cacodylic acid (Phytar 138) AN-471 D15678	5	10	9.2	9	10		x	x	x	x	x	x	x	x
	10	10	10	6.7	8.8	x	x	x	x	x	x	x	x	x

1/ Individual reps are listed, x indicates regrowth

2/ No regrowth on the upper 2 feet

Table 2: Average ratings from three replicate treatments to willow seedlings made at indicated intervals following application on 4 September 68. Ratings are on a basis of 0 to 10 with 0 indicating no damage and 10 indicating complete desiccation or defoliation.

Chemical	Rate lb/A	Desiccation		Defoliation		Regrowth 1/ Days after Application								
		Days after Application		Days after Application		28			42			90 2/		
		7	14	7	14	Reps			Reps			Reps		
						I	II	III	I	II	III	I	II	III
Methyl (4-chlorophenyl) arsinic acid AN-394 D80033	5	4.5	9.3	8	8.3			x		x		x		
	10	8.5	10	6.8	7.7					x		x		
Ethylmethylarsinic acid AN-451 D15464	5	5.8	9	5.7	8					x		x		
	10	8.5	10	4	5									
Butylmethylarsinic acid AN-452 D15465 AN-452 D15465	5	7.7	9.5	4.7	4.7					x				
	10	9.7	10	2.8	3.3									
Methylpropylarsinic acid AN-453 D15466	5	5	7.7	3.7	3.8	x				x				
	10	6.7	9.8	2	2							x		
Reaction product of n-butyl alcohol and cacodylic acid AN-499 D80166	5	4.8	7.8	2.2	2.7	x		x		x		x		
	10	6.3	8.8	2.3	2									
Cacodylic acid (Phytar 160) AN-481 D15675	5	5.5	9.3	2.2	2.3		x			x		x		
	10	7.3	10	3.2	2									
Cacodylic acid (Phytar 138) AN-471 D15678	5	5.5	8.7	4	5		x	x				x		
	10	6.7	10	2	2									

1/ Individual reps are listed, x indicates regrowth

2/ Plots were destroyed prior to 90 day ratings