THE EFFECTS OF CHEMICAL DESICCANTS ON GRAIN SORGHUMS

By

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDIX TABLES

Appendix Table | Page

Randomized Block Experiment

INTRODUCTION

Grain sorghum production has greatly increased in recent years. Factors responsible for this increase are improved varieties and hybrids and an increased acreage. The acreage increase has occurred not only in the Southern Great Plains Region, but also northeast of this region. Sorghum has replaced many acres of cotton, wheat and corn, because of the acreage control on these crops.

In the Southern Great Plains Region, the farmer is often hindered from planting on the optimum date. This may be due to either excess or insufficient soil moisture. If for any reason sorghum is planted after the optimum date and/or if fall rains begin prior to date of maturity, harvesting and storage become problems due to an excessive amount of moisture in the grain.

Now that sorghums are planted outside their primary region of adaptation, harvesting and storage have become even greater problems. Low temperature, high humidity and rainfall, in the new production region, often make artificial grain drying necessary, because sorghum grain should be approximately 13 percent moisture for safe storage.

Several species of the Leguminosae family respond to desiccant application. Many acres of clover, alfalfa, beans and other legumes are desiccated each year. This permits an earlier harvest date and allows the seed to be stored with a lower moisture content.

The purpose of this study was to determine if chemical desiccants could be used to reduce the moisture content of sorghum grain and threshed residue and to determine their effects on seed germination and test weight.

LITERATURE REVIEW

Addicott and Lynch (1)[1/] stated that the principal purpose of desiccation was to accelerate the curing of the leaves and stems preceding threshing. They indicated that the essential step in desiccation is cell membrane injury sufficiently severe to permit a rapid loss of water. The degree of injury to some extent determines the rate of desiccation, but environmental factors, especially relative humidity, are more influential. The differences between desiccants in their drying properties are relatively few, but they do differ in effectiveness under different conditions and on different crops.

Shafer (7) found that sorghum varieties and hybrids differ in their reactions to desiccants. After application of desiccants, the average change in moisture content of the varieties was greater than that of the hybrids. Also, the amount of change in moisture content was consistent for the varieties, while the change for the hybrids varied from a small to a large amount.

In another experiment, Shafer (6) applied desiccants to the seed production rows of male sterile Combine kafir 60 (MS-385) when the moisture content of the grain was 38 percent. It was found that pentachlorophenol was more effective in reducing the moisture content of the grain than magnesium chlorate and 4,6-dinitro o secondary butylphenol.

1/ Figures in parenthesis refer to Literature Cited.

Shafer (5) applied four desiccants to the variety Martin with a moisture content of 20 percent. When moisture samples were taken one week after the date of application, the rank of the desiccants, in order of their effectiveness were: 4,6- dinitro o secondary butylphenol (2 qts/A), pentachlorophenol (6 qts/A), magnesium chlorate (8 qts/A) and 3,6-endoxohexahydrophthallic acid (8 qts/A).

Phillips (3) failed to appreciably reduce the moisture content of the variety Midland from 40 percent by applying pentachlorophenol (4 lbs/A). He also applied desiccants to this variety when the moisture content of the grain was 18 percent. No appreciable moisture reduction was obtained from pentachlorophenol (4 lbs/A), 4,6-dinitro o secondary butylphenol (1.25 lbs/A) or endoxohexahydrophthallic acid (1 gal/A).

METHODS AND MATERIALS

A sorghum desiccation study was conducted in 1958 on the Oklahoma State University Perkins Research Station.

Two sorghums, the variety Redlan and a hybrid Texas 660 (Combine kafir 60 MS-385 x Caprock SA-7000), were planted June 7, 1958, on a Vanoss loam soil. These sorghums were used because they were late maturing and adapted to the area. Also, this allowed for a comparison between a variety and a hybrid.

Sorghums were the main plots in a split-plot field design. Each sub-plot of the main plots was composed of three rows which were 42 inches wide and 20 feet long. The sub-plots were laid out in a randomized block design. All possible combinations were made in the sub-plots using four desiccants, three rates of application and two dates of application. Also a check plot was included in each main plot for each date of application. The availability of irrigated land limited the number of replications to three.

The desiccants used in the study were 3,6-endoxohexahydrophthallic acid, magnesium chlorate, 4,6-dinitro o secondary butylphenol and pentachlorophenol. Information on desiccants used in this study is given in Table I.

The plots were fertilized with ammonium nitrate at the rate of 150 pounds per acre and were surface irrigated twice during the vegetative growth period. Also a surface irrigation was applied on September 8,

TABLE I

INFORMATION ON DESICCANTS USED IN THIS STUDY

Chemical Name	Trade Name	Percent Active Ingredient by Weight	Carrier	Gallons of Solution/A	Cost Per Gallon
3,6-endoxohexa-hydrophthallic acid	Endothal	6.30	Water	20	$ 3.75
Magnesium chlorate	Magron	40.00	Water	20	3.20
4,6-dinitro o secondary butylphenol	Dow General	55.00	Diesel oil	10	12.00
Pentachlorophenol	PCP	35.00	Diesel oil	10	3.50

The chemical designations used in this thesis are Endothal, magnesium chlorate, DNBP and PCP.

1958, to retard natural ripening which was being accelerated by warm temperature and low humidity.

Comparable stands were obtained. The within row plant spacing was approximately one foot. The plots were hoed and cultivated periodically to control weeds.

Insects were present throughout the growing season. Those present in greatest numbers during the vegetative stage of growth were the chinch bug Blissus leucopterus and a flea beetle Chaetocnema pulicaria. Dieldrin applied at the rate of one-half pound per acre in 15 gallons of water gave partial control. Also the fall armyworm Laphygma frugiperda, the corn earworm Heliothis zea and the corn leaf aphid Rhopalosiphum maidis were present, but their damage did not necessitate control measures. During the flowering stage, the sorghum midge Contarinia sorghicola did excessive damage which resulted in the seed set being approximately one-half that of normal. Later in the season, the sorghum webworm Celama sorghiella was present, but no damage was observed. Bird damage was negligible.

The first date of desiccant application was September 26, 1958, when the grain moisture percentages of Redlan and Texas 660 were approximately 17.8 and 15.9, respectively. Desiccants were applied with a knap-sack sprayer. The sprayer nozzle was held approximately 10 inches above the plant which permitted the desiccant to contact most of the foliage. A protective shield was used to prevent adjacent plots from becoming contaminated. Application procedures were the same for the second date of application on October 3, 1958. On this date the moisture percentages of Redlan and Texas 660 were approximately 15.4 and 15.0, respectively.

Beginning one week after the date of application, moisture samples were taken at weekly intervals for a period of three weeks. Heads were selected at random in each sub-plot and threshed in a Vogel nursery thresher. Moisture content of the grain was determined by a Steinlite Electronic Moisture Tester, Model G.

Three weeks after each sub-plot was treated, the remaining heads were harvested and threshed. This grain was used for weight per bushel and germination determinations. Also, the threshed residue moisture content was determined for each plot.

A standard test weight apparatus was used to determine weight per bushel of the grain.

Procedures of the germination test were in accordance with the rules of the Association of Official Seed Analysts (4). Two Stulz Dalite germinators, located in the U.S.D.A. Grass Seed Research Laboratory, Stillwater, Oklahoma, were used. They were set for alternating temperatures of 20-30° C. Low temperatures within the alternating temperature germinators were set for 16 hours of darkness and the high temperatures were set for eight hours of light.

Germinator boxes, 2 7/8 inches x 2 7/8 inches, made of clear plastic were used. Fifty seed were placed in each box on eight layer kimpac pads which were moistened with 10 milliliters of distilled water.

Replication I was randomized on trays one and two. Replications II and III were placed on trays three through six in the same manner. The six trays occupied the center portion of the germinator. This procedure was duplicated in the second germinator.

Visual observations were made to determine the amount of lodging in the field.

For additional information, another desiccation study was made using only Redlan which was planted July 3, 1958. The field design was a randomized block having three replications. All possible combinations were planned using the four desiccants, three rates of application, two dates of application and two check plots.

The date of application was October 17, 1958. The grain moisture content was approximately 28.4 percent, while the threshed residue measured approximately 58.0 percent. A second date of application was planned, but was omitted because of a killing frost.

Moisture samples were taken on the grain one and three weeks after date of application. Also, three weeks after date of application, the moisture content of the threshed residue was determined. Because of excess moisture in the grain, weight per bushel and germination of the grain were not determined. The application and sampling procedures were the same as those used for the split-plot field design.

Visual observations were made in the field to determine lodging.

The methods for statistical analyses of the data were taken from Snedecor (8) and Duncan (2).

RESULTS AND DISCUSSION

The grain moisture content of each plot in both experiments was not determined before desiccant application. Therefore, an analysis of covariance having the initial moisture as the covariable could not be made. It was thought that an analysis of variance of differences in moisture content from one period to another would be a better analysis than on moisture content only. The differences used were: (1) moisture content of the grain first week minus that for second week after application, (2) moisture content first week minus that for third week after application and (3) moisture content second week minus that for third week after application.

The split-plot design was used to study the changes in grain moisture content, moisture content of the threshed residue, test weight and germination of the grain. The changes in the moisture content of the grain from first to second week after application of desiccants were significantly different for the combinations of desiccants, rates and dates (Appendix Table II).

Similar results for changes in grain moisture content from the first week to the third week after application of desiccants were also found (Appendix Table III). The treatments of desiccants and rates which were applied on the first date of application showed a significantly greater decrease in moisture content than those applied on the second date of application. This was indicated by Duncan's Multiple Range Test

at the 5% level as shown in Tables II and III.

The threshed residue moisture contents three weeks after application of desiccants showed that the treatment combinations and the treatment combinations by varieties interaction were significantly different, (Appendix Table IV). Duncan's Multiple Range Test at the 5% level, Table IV, showed those combinations having the oil soluble desiccants, DNBP and PCP, and applied on the second date of application to be most effective. The moisture content of the threshed residue was not determined before application of desiccants, therefore the most effective treatment combination for each of the sorghums could not be determined.

The test weights of grain harvested three weeks after application of desiccants showed the treatment combinations were significantly different (Appendix Table V). The Duncan's Multiple Range Test, Table V, showed no desiccant, rate or date of application to have a consistent effect on the weight per bushel of grain. However, there was a trend toward higher test weights when the desiccants were applied on the second date of application.

The germination of grain harvested three weeks after application of desiccants showed the treatment combinations were significantly different (Appendix Table VI). The treatment combinations having water soluble desiccants, Endothal and magnesium chlorate, in general, had higher germination counts and would be more desirable for seed production fields than other combinations, Table VI.

Throughout the entire study no significant differences between sorghums were found in the changes in grain moisture content, moisture content of the threshed residue, test weight or germination of the grain.

TABLE II

DUNCAN'S MULTIPLE RANGE TEST FOR CHANGE IN MOISTURE CONTENT OF GRAIN FROM FIRST WEEK TO SECOND WEEK AFTER APPLICATION OF DESICCANTS

Desiccant	Date of Application	Rate of Application (qts/Acre)	Percent Change	Multiple Range
Mg chlorate	Oct. 3	8	-0.51	
Endothal	Oct. 3	4	-0.46	
PCP	Oct. 3	8	-0.34	
Check	Oct. 3		-0.28	
Endothal	Oct. 3	6	-0.17	
PCP	Oct. 3	6	-0.14	
DNBP	Oct. 3	2	-0.12	
Mg chlorate	Oct. 3	4	0.03	
DNBP	Oct. 3	4	0.11	
PCP	Oct. 3	4	0.15	
DNBP	Oct. 3	3	0.34	
Mg chlorate	Oct. 3	6	0.49	
Endothal	Oct. 3	8	0.54	
Mg chlorate	Sept. 26	8	2.31	
PCP	Sept. 26	6	2.32	
Mg chlorate	Sept. 26	4	2.89	
Endothal	Sept. 26	6	2.97	
Check	Sept. 26		3.07	
DNBP	Sept. 26	3	3.12	
PCP	Sept. 26	4	3.19	
Endothal	Sept. 26	4	3.29	
DNBP	Sept. 26	2	3.48	
Mg chlorate	Sept. 26	6	3.57	
PCP	Sept. 26	8	3.77	
DNBP	Sept. 26	4	4.18	
Endothal	Sept. 26	8	4.40	

Any two means connected by the same line are not significantly different at the .05 level.

TABLE III

DUNCAN'S MULTIPLE RANGE TEST FOR CHANGE IN MOISTURE CONTENT OF GRAIN FROM FIRST WEEK TO THIRD WEEK AFTER APPLICATION OF DESICCANTS

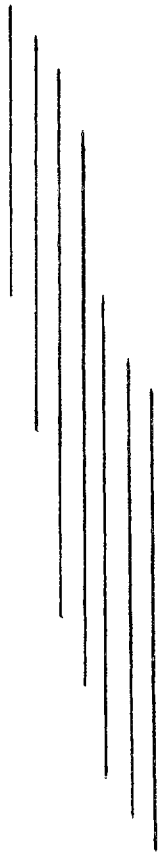
Desiccant	Date of Application	Rate of Application (qts/Acre)	Percent Change	Multiple Range
Endothal	Oct. 3	4	-0.26	
Mg chlorate	Oct. 3	8	-0.11	
Check	Oct. 3		0.03	
PCP	Oct. 3	8	0.07	
Endothal	Oct. 3	8	0.08	
Endothal	Oct. 3	6	0.13	
PCP	Oct. 3	4	0.23	
PCP	Oct. 3	6	0.27	
Mg chlorate	Oct. 3	4	0.31	
DNBP	Oct. 3	4	0.34	
DNBP	Oct. 3	2	0.48	
Mg chlorate	Oct. 3	6	0.60	
DNBP	Oct. 3	3	0.79	
PCP	Sept. 26	6	2.37	
Mg chlorate	Sept. 26	8	2.58	
Mg chlorate	Sept. 26	4	2.87	
PCP	Sept. 26	4	2.99	
Endothal	Sept. 26	6	3.06	
Check	Sept. 26		3.12	
DNBP	Sept. 26	3	3.25	
DNBP	Sept. 26	2	3.37	
Endothal	Sept. 26	4	3.40	
Mg chlorate	Sept. 26	6	3.44	
Endothal	Sept. 26	8	4.01	
PCP	Sept. 26	8	4.02	
DNBP	Sept. 26	4	4.32	

Any two means connected by the same line are not significantly different at the .05 level.

TABLE IV

DUNCAN'S MULTIPLE RANGE TEST FOR MOISTURE CONTENT IN THRESHED RESIDUE THREE WEEKS AFTER APPLICATION OF DESICCANTS

Desiccant	Date of Application	Rate of Application (qts/Acre)	Moisture Content (% by wt.)	Multiple Range
PCP	Oct. 3	8	15.48	
DNBP	Oct. 3	3	18.06	
DNBP	Oct. 3	4	19.72	
DNBP	Oct. 3	2	20.00	
PCP	Oct. 3	4	20.16	
PCP	Oct. 3	6	20.64	
DNBP	Sept. 26	4	21.16	
DNBP	Sept. 26	3	22.34	
Mg chlorate	Oct. 3	4	23.50	
Mg chlorate	Oct. 3	6	26.20	
Mg chlorate	Oct. 3	8	26.41	
DNBP	Sept. 26	2	26.88	
PCP	Sept. 26	6	27.76	
Endothal	Oct. 3	4	28.13	
Mg chlorate	Sept. 26	8	28.28	
Endothal	Oct. 3	8	28.35	
PCP	Sept. 26	4	28.65	
Endothal	Oct. 3	6	29.06	
PCP	Sept. 26	8	29.58	
Check	Oct. 3		30.28	
Mg chlorate	Sept. 26	4	30.34	
Endothal	Sept. 26	6	35.05	
Endothal	Sept. 26	8	36.01	
Check	Sept. 26		36.03	
Mg chlorate	Sept. 26	6	36.77	
Endothal	Sept. 26	4	37.33	



Any two means connected by the same line are not significantly different at the .05 level.

TABLE V

DUNCAN'S MULTIPLE RANGE TEST FOR TEST WEIGHTS OF GRAIN HARVESTED THREE WEEKS AFTER APPLICATION OF DESICCANTS

Desiccant	Date of Application	Rate of Application (qts/Acre)	Test Weight	Multiple Range
Endothal	Sept. 26	8	52.0	
Mg chlorate	Sept. 26	6	52.6	
DNBP	Sept. 26	2	52.8	
Endothal	Sept. 26	4	53.1	
DNBP	Sept. 26	3	53.5	
PCP	Sept. 26	8	53.5	
DNBP	Sept. 26	4	53.6	
PCP	Sept. 26	6	53.6	
Mg chlorate	Sept. 26	4	53.6	
Endothal	Sept. 26	6	53.8	
Endothal	Oct. 3	8	54.1	
DNBP	Oct. 3	2	54.1	
Check	Sept. 26		54.1	
Mg chlorate	Oct. 3	8	54.6	
DNBP	Oct. 3	3	54.6	
Check	Oct. 3		54.6	
Endothal	Oct. 3	4	54.8	
Mg chlorate	Sept. 26	8	54.8	
Mg chlorate	Oct. 3	6	54.8	
PCP	Oct. 3	8	54.8	
Mg chlorate	Oct. 3	4	55.0	
DNBP	Oct. 3	4	55.1	
PCP	Sept. 26	4	55.3	
PCP	Oct. 3	4	55.3	
PCP	Oct. 3	6	55.8	
Endothal	Oct. 3	6	56.3	

Any two means connected by the same line are not significantly different at the .05 level.

TABLE VI

DUNCAN'S MULTIPLE RANGE TEST FOR GERMINATION OF GRAIN HARVESTED THREE WEEKS AFTER APPLICATION OF DESICCANTS

Desiccant	Date of Application	Rate of Application (qts/Acre)	Germination (Basis of 50 seed)	Multiple Range
DNBP	Sept. 26	3	36.5	
DNBP	Sept. 26	2	37.0	
Endothal	Sept. 26	4	38.9	
DNBP	Sept. 26	4	39.0	
DNBP	Oct. 3	2	39.3	
PCP	Oct. 3	8	39.3	
PCP	Sept. 26	8	39.5	
Mg chlorate	Sept. 26	6	40.0	
PCP	Oct. 3	4	40.1	
DNBP	Oct. 3	3	40.4	
PCP	Sept. 26	6	40.4	
DNBP	Oct. 3	4	40.5	
Endothal	Sept. 26	8	40.6	
PCP	Oct. 3	6	40.8	
PCP	Sept. 26	4	41.2	
Mg chlorate	Oct. 3	8	41.4	
Endothal	Sept. 26	6	41.5	
Mg chlorate	Sept. 26	4	41.5	
Endothal	Oct. 3	4	41.7	
Check	Sept. 26		42.2	
Endothal	Oct. 3	8	42.2	
Mg chlorate	Oct. 3	4	42.5	
Check	Oct. 3		42.6	
Mg chlorate	Sept. 26	8	42.7	
Endothal	Oct. 3	6	43.5	
Mg chlorate	Oct. 3	6	44.7	

Any two means connected by the same line are not significantly different at the .05 level.

Grain from treated plots was no lower in moisture content, in general, than grain from untreated plots. The weather conditions during the fall months of 1958 were favorable for drying of grain sorghums.

The grain and threshed residue moisture contents, test weights and germinations of the grain are listed in Appendix Tables VIII and IX.

Federal Public Law 518 regulates the tolerance of chemicals in products that are to be consumed by humans or animals. It is important that the tolerance of a chemical be known before application is made to a commercial production field.

Visual observations were made to determine which of the desiccants were most effective in drying the sorghum plant. Ranked in order of effectiveness, they were: magnesium chlorate, PCP, DNBP and Endothal. The amount of lodging was neglible.

In a randomized block design, the changes in the moisture content of the grain from first week to third week after application of desiccants were not significantly different (Appendix Table X). Similar results were found for moisture content of the threshed residue (Appendix Table XI). The grain moisture content was too high for the determination of test weight and germination of the grain. The grain and threshed residue moisture contents are given in Appendix Table XII.

SUMMARY AND CONCLUSIONS

A sorghum desiccation study was conducted on the Oklahoma State University Perkins Research Station. The purpose of this study was to determine if chemical desiccants could be used to reduce the moisture content of sorghum grain and threshed residue and to determine their effects on seed germination and test weight.

In a split-plot design, two sorghums, Redlan and Texas 660, were treated with Endothal, magnesium chlorate, DNBP and PCP. Each desiccant was applied at three rates and on two dates of application. The results of this study indicated the following:

(1) The first date of application was significantly better than the second date.

(2) DNBP and PCP applied on the second date of application were most effective in reducing threshed residue moisture content.

(3) No desiccant, rate or date of application had a consistent effect on the weight per bushel of grain.

(4) Treatment combinations having Endothal and magnesium chlorate, in general, had higher germination counts than other combinations.

(5) Sorghums did not differ in their reactions to the treatment combinations.

In a randomized block design, the changes in the moisture content of the grain from first week to third week after application of desic-

cants were not significantly different. Similar results were found for moisture contents of the threshed residue.

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APPENDIX

APPENDIX TABLE I

DAILY RAINFALL AT PERKINS, OKLAHOMA, JANUARY 1, 1958 TO DECEMBER 1, 1958

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1								.49			
2				.06	.13						
3					.91						
4			.01								
5		.39	.03				T				
6		.01	.80				.02		.01		
7				.32		.06	.16		.01		
8			.66					.08			
9		.27		.01	.06						
10			.24	T	.08			1.06	.02		
11	.18										
12	.03		.58	.13			1.88	.10		.44	
13	T			.49							.19
14				.01	.06		.13		.12	T	T
15			.05		.31	.85			.13	.26	
16			.06			1.84			2.49		.37
17			.34	.03	.02			.65			.28
18						.04					
19	1.09			.92		.02					
20	.11					1.29		2.36	.03		
21				.14		1.33	.11	.02			
22					T	.05	.03				
23		.01	.72					.07	.02		
24											
25						2.04					
26		.22					.38			.04	
27							1.42				.23
28			1.20	.03	.06						
29			.02						.16		
30					.07				.08		
31											
Totals	1.41	.90	4.71	2.14	1.70	7.52	4.13	4.83	3.07	.74	1.07

APPENDIX TABLE II

ANALYSIS OF VARIANCE FOR CHANGE IN MOISTURE CONTENT OF GRAIN FROM FIRST WEEK TO SECOND WEEK AFTER APPLICATION OF DESICCANTS (SPLIT-PLOT EXPERIMENT)

Source of Variation	D. F.	Sum of Squares	Mean Square	F value
Total	155	173.8121		
Replications	2	2.0583	1.0291	
Sorghums	1	0.6398	0.6398	0.39
Reps X Sorghums	2	3.2581	1.6290	
Treat. Comb.	25	115.5280	4.6211	10.78**
Sorghums X Treat. Comb.	25	9.4749	0.3789	0.88
Error	100	42.8530	0.4285	

** Indicates significance at the 1% level of confidence.

APPENDIX TABLE III

ANALYSIS OF VARIANCE FOR CHANGE IN MOISTURE CONTENT OF GRAIN FROM FIRST WEEK TO THIRD WEEK AFTER APPLICATION OF DESICCANTS (SPLIT-PLOT EXPERIMENT)

Source of Variation	D. F.	Sum of Squares	Mean Square	F value
Total	155	153.2668		
Replications	2	0.8748	0.4374	
Sorghums	1	0.0016	0.0016	0.004
Reps X Sorghums	2	0.8435	0.4217	
Treat. Comb.	25	98.8936	3.9557	9.04**
Sorghums X Treat. Comb.	25	8.9130	0.3565	0.82
Error	100	43.7403	0.4374	

** Indicates significance at the 1% level of confidence.

APPENDIX TABLE IV

ANALYSIS OF VARIANCE FOR MOISTURE CONTENT IN THRESHED RESIDUE THREE WEEKS AFTER APPLICATION OF DESICCANTS (SPLIT-PLOT EXPERIMENT)

Source of Variation	D. F.	Sum of Squares	Mean Square	F value
Total	155	14488.5887		
Replications	2	51.6216	25.8108	
Sorghums	1	3412.9379	3412.9379	0.08
Reps X Sorghums	2	684.3645	342.1822	9.97
Treat. Comb.	25	5648.3589	225.9343	8.54**
Sorghums X Treat. Comb.	25	2046.8071	81.8722	3.10**
Error	100	2644.4987	26.4449	

** Indicates significance at the 1% level of confidence.

APPENDIX TABLE V

ANALYSIS OF VARIANCE FOR TEST WEIGHTS OF GRAIN HARVESTED THREE WEEKS AFTER APPLICATION OF DESICCANTS (SPLIT-PLOT EXPERIMENT)

Source of Variation	D. F.	Sum of Squares	Mean Square	F value
Total	155	521.5898		
Replications	2	16.1658	8.0829	
Sorghums	1	0.9228	0.9228	0.19
Reps X Sorghums	2	9.5012	4.7506	
Treat. Comb.	25	153.2558	6.1302	2.12**
Sorghums X Treat. Comb.	25	52.7442	2.1097	0.73
Error	100	289.0000	2.8900	

** Indicates significance at the 1% level of confidence.

APPENDIX TABLE VI

ANALYSIS OF VARIANCE FOR GERMINATION OF GRAIN HARVESTED THREE WEEKS AFTER APPLICATION OF DESICCANTS (SPLIT-PLOT EXPERIMENT)

Source of Variation	D. F.	Sum of Squares	Mean Square	F value
Total	311	3966.5870		
Germinators	1	142.6959	142.6959	2.86
Reps in Germ.	4	199.3321	49.8330	
Sorghums	1	2.3370	2.3370	0.18
Sorghums X Germ.	1	0.3871	0.3871	0.03
Reps X Sorghums in Germ.	4	51.0281	12.7570	
Treat. Comb.	25	1040.1703	41.6068	4.61**
Germ. X Treat. Comb.	25	198.2208	7.9288	0.88
Germ. X Sorg. X Treat. C.	25	215.5292	8.6211	0.95
Sorghums X Treat. Comb.	25	309.9127	12.3965	1.37
Error	200	1806.9732	9.0348	

** Indicates significance at the 1% level of confidence.

APPENDIX TABLE VII

ANALYSIS OF VARIANCE FOR CHANGE IN MOISTURE CONTENT OF GRAIN FROM SECOND WEEK TO THIRD WEEK AFTER APPLICATION OF DESICCANTS (SPLIT-PLOT EXPERIMENT)

Source of Variation	D. F.	Sum of Squares	Mean Square	F value
Total	155	22.2777		
Replications	2	1.0296	0.5148	
Sorghums	1	0.8462	0.8462	1.66
Reps X Sorghums	2	1.0167	0.5083	
Treat. Comb.	25	2.5828	0.1033	0.83
Sorghums X Treat. Comb.	25	4.2877	0.1715	1.37
Error	100	12.5147	0.1251	

APPENDIX TABLE VIII

MOISTURE CONTENTS, TEST WEIGHTS AND GERMINATIONS OF REDLAN THREE WEEKS AFTER APPLICATION OF DESICCANTS (SPLIT-PLOT EXPERIMENT)

Desiccant	Date of Appl.	Rate qts/A	Grain Moisture %	Threshed Res. Moisture %	Test Wt.	Germ. %
Endothal	Sept. 26	4	13.74	33.14	54.7	77.7
Endothal	Sept. 26	6	13.77	29.39	54.3	80.7
Endothal	Sept. 26	8	13.42	31.74	51.7	82.3
Endothal	Oct. 3	4	13.72	16.31	55.3	80.7
Endothal	Oct. 3	6	13.89	17.98	56.3	85.7
Endothal	Oct. 3	8	13.87	24.07	53.7	81.3
Mg chlorate	Sept. 26	4	13.87	25.21	52.3	82.3
Mg chlorate	Sept. 26	6	13.64	34.08	52.3	77.7
Mg chlorate	Sept. 26	8	13.88	26.70	54.7	85.0
Mg chlorate	Oct. 3	4	13.69	17.64	54.7	83.0
Mg chlorate	Oct. 3	6	13.55	13.82	55.0	90.0
Mg chlorate	Oct. 3	8	13.82	15.17	54.7	82.3
DNBP	Sept. 26	2	13.68	28.18	51.7	75.7
DNBP	Sept. 26	3	13.59	18.00	53.7	78.3
DNBP	Sept. 26	4	13.67	20.88	54.0	77.7
DNBP	Oct. 3	2	13.49	18.88	53.7	77.3
DNBP	Oct. 3	3	13.51	15.70	53.7	77.3
DNBP	Oct. 3	4	13.64	16.37	55.0	83.3
PCP	Sept. 26	4	13.70	24.08	55.0	82.0
PCP	Sept. 26	6	13.67	27.95	53.7	80.6
PCP	Sept. 26	8	13.49	26.29	54.0	81.0
PCP	Oct. 3	4	13.68	16.11	55.3	78.3
PCP	Oct. 3	6	13.73	15.11	55.3	85.0
PCP	Oct. 3	8	13.71	12.13	55.0	77.7
Check	Sept. 26		13.64	34.34	54.7	85.3
Check	Oct. 3		13.60	21.40	55.0	86.3

Values are an average of three replications.

APPENDIX TABLE IX

MOISTURE CONTENTS, TEST WEIGHTS AND GERMINATIONS OF TEXAS 660 THREE WEEKS AFTER APPLICATION OF DESICCANTS (SPLIT-PLOT EXPERIMENT)

Desiccant	Date of Appl.	Rate qts/A	Grain Moisture %	Threshed Res. Moisture %	Test Wt.	Germ. %
Endothal	Sept. 26	4	13.59	41.52	51.7	74.7
Endothal	Sept. 26	6	13.84	40.72	53.3	82.0
Endothal	Sept. 26	8	13.85	40.29	52.3	80.3
Endothal	Oct. 3	4	13.45	39.96	54.3	86.3
Endothal	Oct. 3	6	13.61	40.15	56.3	88.7
Endothal	Oct. 3	8	13.72	32.64	54.7	88.3
Mg chlorate	Sept. 26	4	13.67	35.48	55.0	83.7
Mg chlorate	Sept. 26	6	13.53	39.47	53.0	82.3
Mg chlorate	Sept. 26	8	13.56	29.86	55.0	86.0
Mg chlorate	Oct. 3	4	13.48	29.37	55.3	87.0
Mg chlorate	Oct. 3	6	13.81	38.58	54.6	89.0
Mg chlorate	Oct. 3	8	13.45	37.67	54.6	83.3
DNBP	Sept. 26	2	13.59	25.60	54.0	76.0
DNBP	Sept. 26	3	13.76	26.70	53.3	67.7
DNBP	Sept. 26	4	13.29	21.45	53.3	78.7
DNBP	Oct. 3	2	13.35	21.12	54.7	80.0
DNBP	Oct. 3	3	13.23	20.43	55.7	84.3
DNBP	Oct. 3	4	13.43	23.08	55.3	79.0
PCP	Sept. 26	4	13.78	33.24	55.6	83.0
PCP	Sept. 26	6	13.67	27.58	53.7	81.0
PCP	Sept. 26	8	13.37	32.87	53.0	77.3
PCP	Oct. 3	4	13.43	24.22	55.3	79.0
PCP	Oct. 3	6	13.39	26.18	56.3	81.7
PCP	Oct. 3	8	13.43	18.83	54.7	79.7
Check	Sept. 26		13.60	37.71	53.7	83.7
Check	Oct. 3		13.54	39.16	54.3	84.3

Values are an average of three replications.

APPENDIX TABLE X

ANALYSIS OF VARIANCE FOR CHANGE IN MOISTURE CONTENT OF GRAIN FROM FIRST WEEK TO THIRD WEEK AFTER APPLICATION OF DESICCANTS (RANDOMIZED BLOCK EXPERIMENT)

Source of Variation	D. F.	Sum of Squares	Mean Square	F value
Total	38	73.7380		
Replications	2	11.8008	5.9004	
Treat. Comb.	12	30.1346	2.5112	1.90
Error	24	31.8016	1.3250	

APPENDIX TABLE XI

ANALYSIS OF VARIANCE FOR MOISTURE CONTENT IN THRESHED RESIDUE THREE WEEKS AFTER APPLICATION OF DESICCANTS (RANDOMIZED BLOCK EXPERIMENT)

Source of Variation	D. F.	Sum of Squares	Mean Square	F value
Total	38	267.8799		
Replications	2	57.7290	28.8645	
Treat. Comb.	12	29.7091	2.4758	0.33
Error	24	180.4418	7.5184	

APPENDIX TABLE XII

MOISTURE CONTENTS OF REDLAN THREE WEEKS
AFTER APPLICATION OF DESICCANTS
(RANDOMIZED BLOCK EXPERIMENT)

Desiccant	Date of Application	Rate qts/A	Grain Moisture %	Threshed Residue Moisture %
Endothal	Oct. 17	4	20.14	37.08
Endothal	Oct. 17	6	18.56	35.97
Endothal	Oct. 17	8	19.78	38.59
Mg chlorate	Oct. 17	4	18.36	36.45
Mg chlorate	Oct. 17	6	18.81	37.10
Mg chlorate	Oct. 17	8	19.16	39.00
DNBP	Oct. 17	2	17.41	37.91
DNBP	Oct. 17	3	17.20	37.41
DNBP	Oct. 17	4	18.44	37.29
PCP	Oct. 17	4	18.58	38.03
PCP	Oct. 17	6	17.76	38.63
PCP	Oct. 17	8	17.90	36.56
Check			20.67	37.57

Values are an average of three replications.

VITA

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