Table 2. New Compounds. Application Date: October 6, 1978.
Plots were evaluated by two individuals on October 20.
The results are an average of the ratings.

Percentage Leaf-drop	Chemicals	Rate per Acre
75 a [1]	Bromoxynil and DEF-6 with Surfactant X-77 [2]	0.2 lb. + 2 pts.
73 a	Bromoxynil and DEF-6 with Surfactant X-77	0.1 lb. + 2 pts.
71 ab	DEF-6 with Surfactant X-77	2 pts.
70 ab	Nor-Am Dropp CP503	.2 lb. ai
68 ab	Bromoxynil with Surfactant X-77	.4 lb. + 0.5%
68 ab	DEF-6 and Paraquat with Surfactant X-77	2 pts. + 1/3 pt.
67 ab	Nor-Am Dropp CP503 with Sunoil 11E	.2 lb. + 1 qt.
66 ab	Nor-Am Dropp CP610	.2 lb.
65 ab	Nor-Am Dropp CP841	.2 lb.
64 ab	Nor-Am Dropp NA106	.2 lb.
63 ab	Upjohn CHI and DEF-6 with TD-12 Surfactant [3]	10g. + 34g. ai
63 ab	Bromoxynil with Surfactant O-H [4]	.4 lb.
58 b	Upjohn CHI + TD-12 Surfactant	60g.
44 c	Check	

[1] Percentages followed by the same letter are not significantly different at the 5% probability level by the Student-Newman-Keul's Test.

[2] Surfactant rate X-77 at 0.5% v/v.

[3] Surfactant rate TD-12 at 0.4% v/v.

[4] Surfactant rate O-H at 0.5% v/v.

1978 HARVEST-AID CHEMICAL RESEARCH AT YUMA

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Introduction

The cotton plants at the site of our 1978 experiments were considerably less responsive than in previous years to conventional harvest-aid chemicals and to the two other chemicals which appeared to be very effective in 1976 and 1977. Consequently, the conditions under which our 1978 experiments were conducted provided an excellent opportunity for progress in our search for improved cotton harvest-aid chemical treatments, with increased efficacy and reliability. Therefore, emphasis was placed on a continuation of the "biochemical approach" begun in 1976 and a further study of foliar spray adjuvants.

Summary of the Principles Involved in the "Biochemical Approach"

A healthy leaf remains attached to an actively growing plant indefinitely; it will not abscise unless it becomes unhealthy or senescent. In order to involve abscission, external factors must first induce senescence or injure leaf blades without adversely affecting the abscission zone. Desiccation results from injury to all plant parts contacted by the chemical or other external agents. Generally, the action of a desiccant is so rapid and the injury so severe that there is no opportunity for the physiological process of leaf abscission to take place.

Continued plant growth and development depends upon the biosynthesis of new plant material. The required additional organic compounds are synthesized from atmospheric carbon dioxide and products of catabolic processes, with the aid of reducing potential, mainly in the form of NADPH (reduced nicotinamide adenine dinucleotide phosphate) and biochemical energy, primarily resulting from the hydrolysis of ATP (adenosine-5'-triphosphate); all of which are obtainable via the essential processes

of photosynthesis and respiration. The biochemical processes involved are catalyzed by specific enzymes. The biosynthesis of each enzyme and other protein is directed by specific DNA (2'-deoxyribonucleic acid) via the appropriate RNA (ribonucleic acid).

Thus, active intermediary metabolism, including photosynthesis, respiration, and biosynthesis of essential chemical compounds, is required for continued plant growth and development; while senescence is characterized by a significant decline in these vital processes.

Therefore, it would be logical to anticipate that the proper use of one or more chemical compounds capable of effectively inhibiting at least one essential step in the biosynthesis of new plant material, and/or facilitating the degradation of previously synthesized plant material should aid in inducing senescence and facilitating cotton defoliation.

General Experimental Procedure

All experiments were conducted on Deltapine 61 cotton. The chemicals were applied to the upper leaf surfaces using a 3-gallon pressure tank sprayer and a single nozzle delivering a hollow cone spray pattern. The cotton was in a plant two, skip two pattern to facilitate spraying and evaluation. Plot size was two planted rows, each 21 feet long.

The condition of the cotton plants in each plot at the time of harvest-aid chemical treatment was carefully noted and recorded. Plant responses and environmental conditions were observed and recorded throughout the period of evaluation. Percent defoliation and desiccation in each plot before and after applying the harvest-aid chemicals were carefully estimated and recorded. These values were used in computing an "Efficacy Index" (E) according to the following formula:

$$E = \frac{(\%\text{ after treatment} - \%\text{ before treatment})}{(100 - \%\text{ before treatment})}$$

and based on the sum of the estimated percent defoliation and desiccation. The calculated "Efficacy Index" provides an evaluation of the effect of the harvest-aid chemical treatments on the foliage actually on the plants at the time of application.

Materials used in the harvest-aid chemical treatments are listed and briefly described in Table 1.

General Condition of the Cotton Plants

Plant development was generally uniform and satisfactory throughout most of the season, but pronounced variations in the condition of the plants, both within and between plots, had developed by the time the harvest-aid chemicals were applied.

The most unusual factor was the presence of considerable, but variable, amounts of young, succulent foliage in many plots. The new foliage developed in spite of the fact that the final irrigation was applied on 25 July, 1978. The presence of vigorous young foliage in many plots suggested that the plants might have access to subsoil moisture. Soil borings at representative spots revealed the presence of very moist soil at a depth of 5 to 6 feet. In areas with young succulent foliage, the soil above the very moist layer was easily penetrated by the soil auger and probably permeable to cotton roots. On the other hand, a soil boring in an area in which the plants were senescent revealed the presence of very hard, dry, compacted soil above the very moist soil. It seemed unlikely that the cotton roots could penetrate the hard, dry soil and reach the moist soil below. Hence, the observed variations in the presence or absence of new foliage was probably primarily due to variations in the degree of access to subsoil moisture.

Insect and mite injury to foliage also varied considerably within and between plots. These pests were not satisfactorily controlled with available pesticides. Localized defoliation and leaf blade desiccation occurred to a varying degree.

These above-mentioned factors resulted in important variations in the proportions of new and old or insect-damaged foliage and evidently influenced plant responses to the harvest-aid chemical treatments.

Principal Cultural Data

Previous Crop: Wheat 1976-1977, then fallow.
Planting Date: 15 March, 1978, in moist soil.
Fertilization: Ammonium nitrate broadcast preplant at the rate of 100 lbs N per acre. Urea side-dressed at the rate of 75 lbs. N per acre on 1 May and at the rate of 50 lbs N per acre on 30 May, 1978.
Herbicides: Trifluralin, applied preplant on 26 February over the furrowed soil at the rate of 0.75 lb. per acre, and promptly incorporated with a rolling cultivator, followed by sweeps. Trifluralin (0.375 lb. per acre) and prometryne (0.8 lb. per acre) applied as a directed spray at lay-by on 27 June, 1978.
Irrigations: Preplant: 10 February. Post-emergence: 9 and 31 May, 14 and 28 June, 11 and 25 July, 1978.
Cultivations: 12 April, 16, 17 and 31 May, 21 June, 1978.
Insecticides: "Guthion" and methomyl at the rate of 0.5 lb. per acre of each on 7 and 11 August. "Guthion" at the rate of 0.5 lb. per acre on 17 August. "Galecron" and "Supracide" on 28 August, 1978.

Principal Results

The "standard" defoliant, "DEF 6" (2.25 lb. per acre) plus endothall (0.13 lb. per acre) was moderately effective as a cotton defoliant only when applied 11 days before the 15 September harvest. Performance of this harvest-aid was very poor on all other application dates (Table 2). Seed cotton yields were significantly reduced in plots treated before 10 September, 1978. The average seed cotton yield of plots harvested on 26 October was nearly 15% higher than that of plots harvested on 15 September, 1978.

Nor-Am SN 49537 compared favorably with metribuzin and bromoxynil as a cotton harvest-aid on both application dates, but the differences were statistically significant only when the treatments were applied on the later date, 11 October, 1978 (Table 3). The "standard" defoliant, "DEF 6" plus endothall, was least effective; its performance was very poor on both application dates. All treatments were less effective when applied on the later date. Nor-Am SN 49537 was the most effective defoliant.

Metribuzin was an effective cotton harvest-aid, when applied with a suitable adjuvant, at rates of 0.3 or 0.4 lb. per acre (Table 4). Bromoxynil and paraquat were less effective. Bromoxynil with surfactant X-77 was more effective than paraquat at comparable rates.

In a separate experiment, paraquat, applied at the rate of 0.4 lb. per acre with either of two new experimental foliar spray adjuvants, was most effective. Paraquat was significantly less effective when applied at the same rate with surfactant X-77. Metribuzin, applied at the rate of 0.3 lb. per acre, was less effective than paraquat when paraquat was applied at the rate of 0.4 lb. per acre with the most effective adjuvant.

Nor-Am SN 49537 was very effective either as a pre-conditioner or as a defoliant (Table 5). Excellent defoliation was obtained without the use of a pre-conditioner when Nor-Am SN 49537 was applied at the rate of 0.15 lb. per acre with the aid of a new experimental foliar spray adjuvant. There was no evidence of any advantage in the use of a pre-conditioner.

The effect of various solvents and experimental foliar spray adjuvants on the performance of Nor-Am SN 49537 at the rate of 0.15 lb. per acre was evaluated in another experiment. Best results were obtained with any of three new experimental foliar spray adjuvants. The performance of Nor-Am SN 49537 without adjuvant was very poor. The use of a solvent in addition to an effective adjuvant did not appear to be advantageous (Table 6).

The effect of various experimental adjuvants and solvents on the performance of metribuzin and bromoxynil was also evaluated. Results with metribuzin were very similar to those obtained with Nor-Am SN 49537. Bromoxynil was less effective and less responsive to the adjuvants (Table 7).

Four preliminary exploratory experiments were conducted in a search for improved harvest-aid chemical treatments. Encouraging and impressive results were obtained with a few specific binary mixtures of effective and compatible chemical compounds with complementary modes of action. Plant responses in various relatively difficult situations were sufficiently impressive to justify planning a more intensive investigation.

Discussion

Plant responses to typical harvest-aid chemical treatments were influenced to a relatively high degree by the condition of the cotton plants at the time of treatment. The most unusual factor encountered in 1978 was the presence of considerable, but varying, amounts of young succulent foliage. Since senescence is an important prerequisite for successful defoliation, the reduced efficacy of typical harvest-aid chemical treatments on plants with an appreciable proportion of young, succulent foliage was not surprising.

The importance of an effective foliar spray adjuvant was clearly evident in the 1978 experiments. It was also evident that the selection of a most suitable adjuvant was influenced by the specific harvest-aid chemical(s) applied. The use of specific new experimental adjuvants, prepared in 1978, resulted in increased efficacy in difficult situations. Further research in this direction would seem to be justified.

Specific binary mixtures of effective and compatible chemical compounds with complementary modes of action were very effective, even in the most difficult situations, when applied with a suitable foliar spray-adjuvant. This phase of the investigation was just begun in 1978. Further research would seem to be well justified.

Nor-Am SN 49537 was generally effective as a cotton defoliant at low rates of application on relatively senescent plants. Its efficacy was significantly reduced on plants with young, succulent foliage.

Table 1. Materials Used in Cotton Harvest-Aid Chemical Experiments at Yuma in 1978.

Common Name, Trade Name, or Code Number	Chemical Name or Description
Adjuvants A, B, C, and D	Four different experimental foliar spray adjuvants, which were prepared on the basis of new information obtained in 1978.
Atlas AL-411F	An emulsifiable non-phytotoxic petroleum oil containing 83% Sunoco Superior Oil No. 11 and 17% nonionic emulsifier
Bromoxynil	3,5-dibromo-4-hydroxybenzonitrile
"DEF 6"	S,S,S-tributylphosphorotrithidate
Endothall	7-oxabicyclo (2.2.1.) heptane-2,3-dicarboxylic acid
Metribuzin ("Sencor")	4-amino-6-tert-butyl-3-(methylthio)-as-triazin-5(4H) one
Nor-Am SN 49537	N-phenyl-N'-1,2,3-thiadiazol-5-ylurea
Paraquat	1,1'-dimethyl-4,4'-bipyridinium ion
Pennwalt TD-1123	3,4-dichloroisothiazol-5-carboxylic acid, potassium salt
Solvents I, II, III, and IV	Four different chemical compounds whose properties suggested that they might be worthy of investigation
Surfactant X-77 ("Pardner" used as a replacement)	A blend of alkylarylpolyoxyethylene glycols, free fatty acids, and isopropanol

Table 2. Effect of Harvest Date and Defoliation to Harvest Interval on Defoliant Efficacy and Yield of Deltapine 61 Cotton at Yuma, 1978.

Defoliant Application Date[a]	Harvest Date[b]	Before Treatment[c,d] Defol. (%)	Before Treatment[c,d] Desic. (%)	Just Before Harvest[c,d] Defol. (%)	Just Before Harvest[c,d] Desic. (%)	Calculated Defoliant Efficacy Index[c,e,f]	Seed Cotton Yield, Calculated in Pounds per Planted Acre[c,f]
1 Sept.	15 Sept.	5	5	48	5	0.47 bc	14.8 b
4 Sept.	15 Sept.	7	5	70	5	0.72 a	14.4 b
7 Sept.	15 Sept.	7	5	55	5	0.55 b	14.6 b
10 Sept.	15 Sept.	6	5	43	5	0.41 cd	16.4 a
11 Oct.	26 Oct.	7	5	28	5	0.24 ef	17.7 a
14 Oct.	26 Oct.	5	5	34	5	0.33 de	17.4 a
17 Oct.	26 Oct.	9	5	25	5	0.31 de	16.2 a
20 Oct.	26 Oct.	8	5	23	6	0.18 f	17.7 a

[a] Defoliant: 2.25 lb./ac. DEF 6, 0.13 lb./ac. endothall, 0.5% (v/v) surfactant X-77

[b] The late harvest was delayed one day due to excessive moisture

[c] Averages of six replications

[d] Visual estimates. The term "desiccation" applies to leaf blades

[e] Efficacy Index = $\frac{\text{(\% after treatment - \% before treatment)}}{\text{(100 - \% before treatment)}}$

[f] Values based on defoliation plus desiccation

[f] Values followed by a common letter are not significantly different at the 5% level, according to Duncan's Multiple Range Test.

Table 3. Comparative Efficacy of Early and Late Application of Four Harvest-Aid Chemical Treatments at Yuma, 1978[a].

Treatment	Before Treatment[b,c] Defol. (%)	Before Treatment[b,c] Desic. (%)	After Treatment[b,c] Defol. (%)	After Treatment[b,c] Desic. (%)	Calculated Efficacy Index[c,d,e]
2.25 lb./ac. DEF 6, 0.13 lb./ac. endothall, 0.5% (v/v) surf. X-77. Applied 1 Sept.	5	5	48	5	0.47 c
0.2 lb./ac. Bromoxynil, 0.5% (v/v) Adjuvant A. Applied 1 Sept.	6	6	8	68	0.73 ab
0.2 lb./ac. Metribuzin, 0.5% (v/v) Adjuvant A Applied 1 Sept.	7	8	17	61	0.74 ab
0.2 lb./ac. Nor-Am SN 49537, 0.5% (v/v) Atlas AL-411F. Applied 1 Sept.	5	7	78	5	0.82 a
2.25 lb./ac. DEF6, 0.13 lb./ac. endothall, 0.5% (v/v) Surf. X-77. Applied 11 Oct.	6	6	28	5	0.25 e
0.3 lb./ac. Bromoxynil, Adjuvant B Applied 11 Oct.	7	6	33	9	0.34 de
0.3 lb./ac. Metribuzin, Adjuvant B Applied 11 Oct.	9	6	40	12	0.44 cd
0.2 lb./ac. Nor-Am SN 49537, 0.5% (v/v) Atlas AL-411 F. Applied 11 Oct.	8	6	63	5	0.64 b

[a] Final evaluations were on 15 Sept. for the early series and 25 Oct. for the late series
[b] Visual estimates. The term "desiccation" applies to leaf blades
[c] Averages of six replications
[d] Efficacy Index = $\frac{\text{(\% after treatment - \% before treatment)}}{\text{(100 - \% before treatment)}}$ Values based on defoliation plus desiccation
[e] Values followed by a common letter are not significantly different at the 5% level, according to Duncan's Multiple Range Test.

Table 4. Evaluation of Eleven Cotton Harvest-Aid Chemical Treatments at Yuma, 1978[a].

Treatment	Before Treatment[b,c] Defol. (%)	Before Treatment[b,c] Desic. (%)	After Treatment[b,c] Defol. (%)	After Treatment[b,c] Desic. (%)	Calculated Efficacy Index[c,d,e]
Untreated check	5	5	5	5	0 f
0.4 lb./ac. Paraquat, 0.5% (v/v) surfactant X-77	6	5	24	30	0.50 d
0.3 lb./ac. Paraquat, 0.5% (v/v) surfactant X-77	5	5	23	33	0.50 d
0.4 lb./ac. Metribuzin, 0.5% (v/v) surfactant X-77	6	7	29	57	0.84 a
0.3 lb./ac. Metribuzin, 0.5% (v/v) surfactant X-77	7	6	28	56	0.82 a
0.3 lb./ac. Metribuzin, 0.5% (v/v) Atlas AL-411F	5	5	34	57	0.90 a
0.3 lb./ac. Metribuzin, Adjuvant A	8	6	30	58	0.86 a
0.3 lb./ac. Metribuzin, Adjuvant A plus Solvent II	5	5	19	45	0.61 c
0.4 lb./ac Bromoxynil, 0.5% (v/v) surfactant X-77	6	6	25	58	0.81 ab
0.3 lb./ac. Bromoxynil, 0.5% (v/v) Atlas AL 411F	8	6	26	48	0.71 bc
0.3 lb./ac. Bromoxynil, Adjuvant A	6	6	18	28	0.39 e
0.3 lb./ac. Bromoxynil, Adjuvant A plus Solvent I	7	6	18	30	0.39 e

[a] The treatments were applied on 14 Sept. 1978. Final evaluation was on 29 Sept. 1978.
[b] Visual estimates. The term "desiccation" applies to leaf blades.
[c] Averages of six replications.
[d] Efficacy Index = $\frac{\text{(\% after treatment - \% before treatment)}}{\text{(100 - \% before treatment)}}$ Values based on defoliation plus desiccation.
[e] Values followed by a common letter are not significantly different at the 5% level, according to Duncan's Multiple Range Test.

Table 5. Evaluation of Pre-Conditioning and Harvest-Aid Chemical Treatments at Yuma, 1978[a].

Treatment		Before any Treatment[b,c]		Before Defoliant[b,c]		Calcul. Pre-Cond.	After Defoliant[b,c]		Calcul. Defoliant	Calculated Efficacy Index
Pre-Conditioner[f]	Defoliant[g]	Defol. (%)	Desic. (%)	Defol. (%)	Desic. (%)	Efficacy Index[c,d,e]	Defol. (%)	Desic. (%)	Efficacy Index[c,d,e]	Pre-Conditioner Plus Defoliant[c,d,e]
None	None	27	7	27	7	0 d	27	7	0 d	0 e
None	A	28	7	28	7	0 d	74	4	0.68 bc	0.68 d
None	B	20	5	20	5	0 d	79	5	0.81 abc	0.81 abcd
None	C	20	6	20	6	0 d	88	6	0.93 a	0.93 a
0.33 lb./ac. Penn. TD-1123[1]	A	18	5	23	5	0.07 c	82	4	0.82 abc	0.83 abcd
0.67 lb./ac. Penn. TD-1123[1]	A	13	6	27	5	0.18 bc	84	4	0.84 ab	0.86 abc
0.1 lb./ac. Nor-Am SN49537[2]	A	29	8	77	5	0.62 a	91	3	0.67 bc	0.89 ab
0.05 lb./ac. Nor-Am SN49537[2]	A	15	9	60	5	0.55 a	89	4	0.79 abc	0.91 a
0.1 lb./ac. Nor-Am SN49537[2]	D	13	6	59	5	0.57 a	87	4	0.80 abc	0.90 ab
0.05 lb./ac. Nor-Am SN49537[2]	D	15	7	59	5	0.55 a	83	5	0.65 c	0.84 abcd
0.08 lb./ac. Metribuzin[3]	B	23	7	42	5	0.29 b	73	4	0.68 bc	0.73 bcd
0.04 lb./ac. Metribuzin[3]	B	13	7	24	5	0.15 bc	75	5	0.73 bc	0.76 abcd
0.02 lb./ac. Metribuzin[3]	B	13	7	18	6	0.06 c	71	5	0.70 bc	0.71 cd
0.08 lb./ac. Bromoxynil[3]	B	21	6	23	5	0.02 c	73	5	0.70 bc	0.73 bcd
0.04 lb./ac. Bromoxynil[3]	B	14	7	18	7	0.09 c	78	5	0.77 abc	0.79 abcd

[a] Application dates: Pre-Conditioners: 9-10 October. Defoliants: 25 October. Final Evaluation: 8 November, 1978.
[b] Visual estimates. The term "Desiccation" applies to leaf blades.
[c] Averages of six replications.
[d] Efficacy Index = $\frac{\text{(\% after treatment - \% before treatment)}}{\text{(100 - \% before treatment)}}$ Values based on defoliation plus desiccation.
[e] Values followed by a common letter are not significantly different at the 5% level, according to Duncan's Multiple Range Test.
[f] Adjuvants used in pre-conditioning treatments: [1]Surfactant X-77; [2]Atlas AL-411F; [3]Adjuvant A.
[g] Defoliant A: 2.25 lb./ac. DEF 6, 0.13 lb./ac. Endothall, 0.5% (v/v) Surfactant X-77.
Defoliant B: 2.25 lb./ac. DEF 6, 0.13 lb./ac. Endothall, Adjuvant B.
Defoliant C: 0.15 lb./ac. Nor-Am SN49537, Adjuvant B.
Defoliant D: 0.15 lb./ac. Nor-Am SN49537, 0.5% (v/v) Atlas AL-411F.

Table 6. Effect of Adjuvants and Solvents on the Performance of Nor-Am SN49537 at Yuma, 1978[d].

Treatment[d]	Before Treatment[b,c] Defol. (%)	Before Treatment[b,c] Desic. (%)	After Treatment[b,c] Defol. (%)	After Treatment[b,c] Desic. (%)	Calculated Efficacy Index[c,e,f]
Untreated check	23	7	23	7	0 e
No adjuvant or Solvent	21	9	48	6	0.40 d
0.5% (v/v) Atlas AL-411F	25	6	79	7	0.82 abc
Adjuvant A	23	7	87	6	0.91 ab
Adjuvant B	26	6	89	8	0.95 a
Adjuvant C	23	5	93	5	0.97 a
Adjuvant D	29	6	92	7	0.96 a
0.5% (v/v) Atlas AL-411F, Solvent I	23	6	73	8	0.73 c
Adjuvant B, Solvent I	30	8	95	4	0.98 a
0.5% (v/v) Atlas AL-411F, Solvent III	27	8	82	6	0.84 abc
Adjuvant B, Solvent III	25	8	87	6	0.90 ab
0.5% (v/v) Atlas AL-411F, Solvent IV	13	6	73	7	0.77 bc

[a]The treatments were applied on 22-23 Sept. 1978. Final evaluation was on 6 and 7 Oct. 1978.
[b]Visual estimates. The term "desiccation" applies to leaf blades.
[c]Averages of six replications.
[d]Nor-AM SN49537 was applied at the rate of 0.15 lb./ac., except in the untreated check.
[e]Efficacy Index = $\frac{\text{(\% after treatment - \% before treatment)}}{\text{(100 - \% before treatment)}}$ Values based on defoliation plus desiccation.
[f]Values followed by a common letter are not significantly different at the 5% level, according to Duncan's Multiple Range Test.

Table 7. Effect of Adjuvants and Solvents on the Performance of Metribuzin and Bromoxynil at Yuma, 1978[a].

Treatment[d]	Before Treatment[b,c] Defol. (%)	Before Treatment[b,c] Desic. (%)	After Treatment[b,c] Defol. (%)	After Treatment[b,c] Desic. (%)	Calculated Efficacy Index[c,e,f]
Untreated check	26	10	26	10	0 e
Metribuzin[1]. No adjuvant or solvent	12	5	32	43	0.69 d
Metribuzin[2] 0.5% (v/v) Atlas AL-411F	20	7	56	28	0.80 abc
Metribuzin[2] Adjuvant A	22	6	58	31	0.86 ab
Metribuzin[2] Adjuvant C	18	6	66	25	0.89 a
Metribuzin[2] Adjuvant D	21	5	63	27	0.87 ab
Metribuzin[2] 0.5% (v/v) Atlas AL-411F, Solvent III	23	7	53	34	0.82 abc
Metribuzin[2] Adjuvant B, Solvent III	18	7	53	30	0.77 bcd
Metribuzin[2] 0.5% (v/v) Atlas AL-411F, Solvent II	16	6	52	35	0.83 abc
Metribuzin[2] Adjuvant B, Solvent II	14	8	47	34	0.77 bcd
Bromoxynil[3] Adjuvant C	17	5	43	37	0.73 cd
Bromoxynil[4] Adjuvant C	22	6	44	32	0.66 d

[a]The treatments were applied on 28 Sept. 1978. Final evaluation was on 12 Oct. 1978.
[b]Visual estimates. The term "desiccation" applies to leaf blades.
[c]Averages of six replications.
[d]Rates of application in lb./ac.: Metribuzin[1] 0.4, Metribuzin[2] 0.3, Bromoxynil[3] 0.4, Bromoxynil[4] 0.3.
[e]Efficacy Index = $\frac{\text{(\% after treatment - \% before treatment)}}{\text{(100 - \% before treatment)}}$
[f]Values based on defoliation plus desiccation.
[f]Values followed by a common letter are not significantly different at the 5% level, according to Duncan's Multiple Range Test.