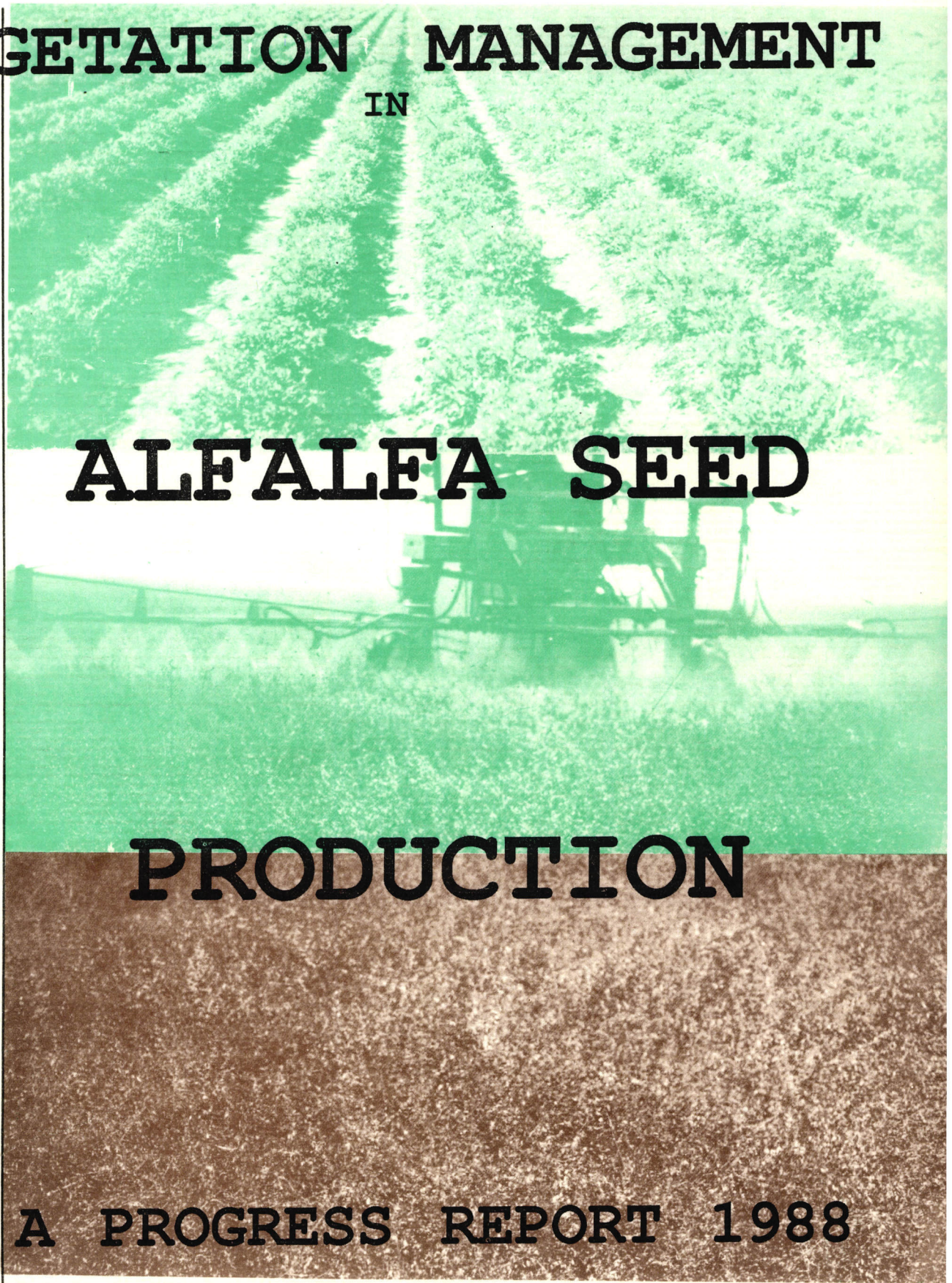
RUNCINA

VOL. 38

VEGETATION MANAGEMENT IN ALFALFA SEED PRODUCTION



A PROGRESS REPORT 1988

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION FRESNO CO.

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ACKNOWLEDGEMENTS

The studies summaried in this progress report were generously supported by the California Seed Production Research Board. Their encouragement, confidence and generosity is greatly appreciated.

This is but a progress report. It contains no recommendations for the use of herbicides or desiccants in the production of alfalfa seed. It was prepared to inform members of the Research Board, alfalfa seed growers, seed processors and all those interested in our studies.

We wish to acknowledge the assistance of Richard Schetter, Acting Superintendent, and other members of the West Side Field Station staff.

The cooperation of Bruce Robert, Farm Advisor in Kings County, and agronomists of J. G. Boswell Co., in superimposing different desiccation treatments on their irrigation study is greatly appreciated.

We are grateful to Sharon Mueller and Jane E. Fischer for their editorial assistance. Without the able secretarial help of Ms. Nancy Shaw and her untiring labor in compiling the data, this report could not have been prepared. We thank James Caughell for his artwork and printing.

The herbicides and desiccants used in these studies were supplied gratis by their respective manufacturers; their generosity is gratefully acknowledged.

Respectfully,



BILL B. FISCHER
Farm Advisor

Runcina is the title of progress reports of applied research studies of weeding conducted in Fresno County. It contains no recommendations for the use of herbicides.

Runcina was the goddess of weeding worshipped during the Augustinian period. Variations such as runco, erunco and runciato acquired the meaning of weeding.

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VEGETATION MANAGEMENT IN ALFALFA SEED PRODUCTION

Bill B. Fischer and Kurt Hembree*

Synopsis:

Pursuit (imazethatir) and Tough (pyridate) effectively controlled chickweed when treated in the seedling stage. Neither herbicide controlled volunteer barley and other grasses. Both herbicides were less effective on older weeds. Used in combination with Butoxone ester (2,4D-B ester) or Buctril (bromoxynil) they controlled a broader spectrum of broadleaved weeds, but they caused temporary reduction of the alfalfa vigor, especially when treated in their 2 to 3 trifoliolate stage. Excellent volunteer barley control was obtained when Poast (sethoxydim) was used in combination and as sequential application with these herbicides. Goal (oxyfluorfen) severely injured 6-to 8-inch tall alfalfa. Velpar (hexaninone) applied three months following planting, when the alfalfa was 6 to 8 inches tall and had 5-to 7-inch long roots, did not provide adequate weed control and reduced the vigor of the alfalfa.

Introduction:

Vegetation management in alfalfa seed production encompasses all aspects of growing and harvesting the crop. It requires that the cultural practices pursued insure the uniform vigorous growth of the crop, encourage uniform flowering, good pollination and protection of the seeds from insect damage.

A second very important aspect of vegetation management is the prevention and/or control of the unwanted competing vegetation. Effective weed control needs to be pursued from the time the crop is planted through the life of the stand. Modern seed cleaning equipment is available to remove all weed seeds from alfalfa seed, but in the process a significant quantity of alfalfa seed can be lost. In the production of certified seed, volunteer alfalfa can become a serious, intolerable weed problem. Volunteer alfalfa that becomes established from natural shattering of the pod or from seed lost during harvest must be controlled in order to maintain the purity of the variety.

*Farm Advisor and Research Assistant, University of California Cooperative Extension, Fresno County

Another essential aspect of vegetation management is the timely scheduling of irrigations. Adequate water needs to be applied to ensure the growth of the plants. However, vigorous vegetative growth must be avoided, especially late in the season. Precise moisture control is essential in order to mature the seed as well as the plants and to make sure that effective desiccation can be achieved for efficient direct combining.

During 1988, applied research trials were conducted to evaluate the tolerance of newly planted alfalfa, at different stages of its growth, to postemergence applied herbicides and combinations of herbicides. Two additional trials were conducted to study the effectiveness of herbicides, desiccants, defoliants and adjuvants to efficiently desiccate the alfalfa prior to harvest. A detailed summary of earlier desiccation studies was published in December, 1987, in Runcina Vol. 35 [1].

The herbicide residue and plant-back studies initiated March 30, 1987 were completed. A summary of the evaluations from all plantings is included in this progress report.

In the two desiccation trials, Ignite (glufosinate) provided the most effective desiccation followed by Diquat and Des-I-Cate (endothall). C-4242, Folex (merphos), Harvest-Aid (sodium chlorate) and Sharpshooter II (80% fatty acids) were ineffective.

WEED CONTROL STUDIES 1988

Procedures Used:

Alfalfa variety CUF-101 was planted on 40-inch rows at the West Side Field Station in Panoche clay loam soil on November 2, 1987. The organic matter content of the soil was 0.6%. The field was furrow irrigated. Following the emergence of the alfalfa, the field was divided into three areas and 30 ft plots were staked out in each one. Herbicides were applied at different stages of the growth of the alfalfa with a constant pressure sprayer. Each treatment was replicated four times in a randomized block design. The herbicides, rates per acre, dates of treatments and the alfalfa growth are given in the tables following the narrative section of this report.

1/ Weed Control and Desiccation Studies in Alfalfa Seed Production, U.C. Coop. Extension, Fresno County, Dec. 1987

Weed control, alfalfa vigor and injury ratings were made periodically. The vigor and injury ratings were based on a 0 to 10 scale. In the vigor rating, "10" indicates vigorously growing alfalfa seedlings, whereas "0" denotes very severe growth retardation or death. When rating for alfalfa injury, "0" means no injury and "10" denotes that the plants were killed. Weed control ratings are based on a 0 to 100% scale.

Observations and Discussions

In the many trials conducted in years past, the susceptibility of commonly occurring weeds to numerous herbicides have been studied in alfalfa. The two charts, presented on pages 10 and 11 summarize the information developed on those herbicides that are presently registered by the Environmental Protection Agency (EPA). Since the cancellation of the registration of Dinitro Selective (dinoseb), the control of certain species of weeds cannot be obtained with the presently registered postemergence applied herbicides.

During 1988, our effort was concentrated on evaluating newly introduced postemergence applied herbicides and combinations of herbicides to obtain the broadest spectrum of weed control. The data collected in the trials are summarized in the following four tables. The observations made and results obtained can be outlined as follows:

.. Pursuit (imazethatir) provided effective control of a number of broadleaf weed species including chickweed when treated in the seedling stage. Sowthistle and prickly lettuce were not controlled adequately.

.. Pursuit caused some chlorosis and retardation of the alfalfa on the earliest date of treatment when the alfalfa had 2 to 3 trifoliolate leaves.

.. Applied in combination with Butyrac ester (2,4D-B ester) or Buctril (bromoxynil), Pursuit provided excellent control of a larger spectrum of broadleaved weeds, although some adverse effect on the alfalfa vigor was observed; but, this was short lived.

.. Pursuit applied alone or in combination with Butyrac ester or Buctril did not control volunteer barley and other grasses.

.. Poast (sethoxydim) plus Dash (a blend of paraffin-based adjuvants), applied in combination with Pursuit or sequentially, provided very good control of volunteer barley and other grasses except annual bluegrass.

.. Additional studies are warranted to study the tolerance of seedling alfalfa, in the 1 to 3 trifoliolate stage, to Pursuit.

.. Tough (pyridate) effectively controlled chickweed and certain other broadleaved weeds in their seedling stage of growth. The young alfalfa exhibited good tolerance.

.. Tough did not provide adequate control of London rocket and shepherd's purse and it was ineffective on volunteer barley and other grasses.

.. In combination with Buctril, Tough provided excellent control of broadleaved weeds, but it caused a reduction in the vigor of the alfalfa treated in the 2 to 3 trifoliate stage (see Table 1).

.. Tough in combination with Poast provided good volunteer barley control (see Table 2).

.. Goal (oxyfluorfen) applied when the alfalfa was 6 to 8 inches tall severely injured the plants and they were very slow in recovering. The phytotoxicity and vigor reduction were evident for an extended time after treatment.

.. The further evaluation of Goal in newly planted alfalfa is not warranted.

.. Velpar (hexaninone) applied 3-1/2 months after planting when the alfalfa was 6 to 8 inches tall and had 5 to 7 inche long roots exhibited good selectivity at 0.125 and 0.25 lbai/A rate of application.

.. Velpar at 0.33 and 0.5 lbai/A caused injury and reduction in vigor.

.. Velpar did not provide adequate weed control. This may be attributed to the advanced stage of the weed growth at the time of treatment.

CONCLUSIONS:

Pursuit and Tough, two newly introduced herbicides, have the potential of significantly improving the control of broadleaf weeds in newly planted alfalfa. Since neither one controlled all species of weeds infesting alfalfa, additional studies are needed to evaluate their effectiveness when used in combination with Butyrac ester, Buctril and Poast.

The recent registration of Velpar for use in newly planted alfalfa may have limited usefulness. By the time the alfalfa reaches the stage of growth, 6 to 8 inches, when Velpar can be safely applied, the weeds may be too large to obtain effective control.

The use of Goal alone and in combination with other herbicides was evaluated this year and as in earlier trials, the alfalfa injury observed was too severe to warrant its further evaluation in newly planted alfalfa.

The susceptibility of commonly occurring annual weeds to herbicides registered 1/ for use in alfalfa is summarized in Chart I on the following page. In Chart II conditions that influence the performance of the herbicides are also summarized.

1/Buctril is listed in the chart but when this progress report was prepared it was not labeled for use in California.

TABLE I EFFECT OF POSTEMERGENCE APPLIED HERBICIDES ON WEED CONTROL AND VIGOR OF ALFALFA

02-42, 425, 94, 10, 88-2

LOCATION: West Side Field Station
SOIL TYPE: Panoche clay loam
PLANTED: 11/2/87
VARIETY: CUF-101

IRRIGATION: Furrow
PLOT SIZE: 40" x 30', REPS 4
TREATED: 1/12/88
EVALUATED: 2/4/88

		WEED CONTROL AND VIGOR EVALUATIONS - AVERAGE OF 4 REPS			
Herbicide	Lbai/ Acre	% Brdlf. Control	%Vol.Bar. Control	Weeds Present*	Alfalfa Vigor 1/
A Pursuit	0.25	87	1	Lr,S,Sp	6.2
B Pursuit	0.50	92	14	S,Sp	5.2
C Pursuit	0.30	92	0	Chw	8.7
D Pursuit Buctril	0.12 0.30	97	22	Chw	7.5
E Pursuit Buctril	0.25 0.30	100	16	Chw	6.7
F Pursuit Poast Dash	0.25 0.30 1 qt.	96	94	Chw,Lr,S,Sp	5.2
G Pursuit Butyrac ester	0.125 0.75	96	2	Sp	6.2
H Pursuit Butyrac ester	0.25 0.75	96	0	Sp	5.7
J Tough	1.0	96	0	Lr,Sp	9.2
K Tough	2.0	96	0	Lr,Sp	9.5
L Tough Poast Dash Pursuit	1.0 0.3 1 qt. 0.125	93	87	Lr,Sp	8.0
M Buctril Poast Dash	0.3 0.3 1 qt.	98	92	Chw	7.2
N Pyridate Buctril	1.0 0.3	100	0		4.7
P Untreated	---	0	0	Chw,Lr,S,Spl	10.0
STAT. NOTATION - LSD 5%		5.94	18.07		0.94
C.V.		4.69%	53.61%		9.12%

*Weeds Present: Lr=London rocket, S=sowthistle, Sp=shepherd's purse, Chw=chickweed
1/-Vigor based on a rating of 0 to 10; 0=dead , 10=vigorously growing plants

TABLE 2 - EFFECT OF POSTEMERGENCE APPLIED HERBICIDES ON WEED CONTROL AND VIGOR OF ALFALFA

02, 42, 425, 94, 10, 88-2

LOCATION: West Side Field Station
SOIL TYPE: Panoche sandy loam
PLANTED: 11/2/87
VARIETY: CUF-101
EVALUATED: 3/5/88

IRRIGATION: Furrow
PLOT SIZE: 40" x 30', REPS 4
TREATED: 1/12, 1/25, 2/19/88
ALFALFA GROWTH: 1/12, 2 to 3 trifoliate lvs.
1/25, 3 to 4 trifoliate lvs.
2/19, 6 to 8 inches tall

		WEED CONTROL AND VIGOR EVALUATIONS - AVERAGE OF 4 REPS				
Herbicide	Lbai/ Acre	Date Appld.	% Brdlf. Control	%Vol.Bar. Control	Weeds Present**	Alfalfa Vigor 1/
A Pursuit	0.25	1/12	85	74	A,P,S,Sp	6.2
Poast*	0.30	2/19				
B Pursuit	0.50	1/12	85	87	P,S	5.5
Poast*	0.30	2/19				
C Buctril	0.30	1/12	85	100	Chw,F,P,Sp	9.5
Poast*	0.30	1/25				
D Pursuit	0.125	1/12				
Buctril	0.30	1/12	100	77	---	8.8
Poast*	0.30	2/19				
E Pursuit	0.25	1/12				
Buctril	0.30	1/12	99	88	P	6.5
Poast*	0.30	2/19				
F Pursuit	0.25	1/12	90	99	P,S	6.5
Poast*	0.30	1/12				
G Pursuit	0.125	1/12				
Butoxane ester	0.75	1/12	100	86	---	8.0
Poast*	0.30	2/19				
H Pursuit	0.25	1/12				
Butoxane ester	0.75	1/12	100	83	---	6.8
Poast*	0.30	2/19				
J Tough	1.00	1/12	83	100	Lr,Sp	10.0
Poast*	0.30	1/25				
K Tough	2.00	1/12	88	100	Lr,O,Sp	10.0
Poast*	0.30	1/25				
L Touch	1.00	1/12				
Poast*	0.30	1/12	80	74	Lr,P,S,Sp	9.5
Pursuit	0.125	1/12				
M Buctril	0.30	1/12	99	99	Chw,Sp	8.8
Poast*	0.30	1/12				
N Tough	1.00	1/12				
Buctril	0.30	1/12	96	79	Chr,S,Sp	7.8
Poast*	0.30	2/19				
P Untreated	----	----	0	100	A,Chw,Mono,Lr, P,S,Sp	9.8
STAT. NOTATION - LSD 5%			6.05	16.22		0.98
C.V.			4.98%	12.64%		8.43%

*Dash added at 1 qt./acre

**WEEDS PRESENT: A=annual bluegrass, Chw=chickweed, F=filaree, Lr=London rocket, Mono=monolopis, O=groundsel, P=prickly lettuce, S=sowthistle, Sp=shepherd's purse

1/-Vigor based on a rating of 0 to 10; 0=dead, 10=vigorously growing plants.

TABLE 3 - EFFECT OF POSTEMERGENCE APPLIED HERBICIDES ON WEED CONTROL AND VIGOR OF ALFALFA

02, 42, 425, 94, 10, 88-3

LOCATION: West Side Field Station
PLOT SIZE: 40" x 30', REPS 4
VARIETY: CUF-101

IRRIGATION: Furrow
PLANTED: 11/2/87
EVALUATED: 3/5/88

SOIL TYPE: Panoche sandy loam
TREATED: 1/28, 2/8/88
ALF. GROWTH: 1/28, 3 to 4 trif.lvs.
2/8, 4 to 5 trif.lvs.

				WEED CONTROL AND VIGOR EVALUATIONS - AVG. OF 4 REPS.			
Herbicide	Lbai/ Acre	Date Appld.	% Brdlf. Control	%Vol.Bar. Control	Weeds Present 1/	Alfalfa Vigor 2/
A Pursuit*	0.125	1/28	85	99	P,S,Sp	9.7
Poast**	0.30	2/8				
B Pursuit*	0.25	1/28	86	99	Lr,P,S,Sp	8.3
Poast**	0.30	2/8				
C Pursuit*	0.125	1/28	89	100	P,S,Sp	9.7
Select**	0.25	2/8				
D Pursuit*	0.25	1/28	95	100	P,S,Sp	8.0
Select**	0.30	2/8				
E Poast**	0.30	1/28	82	99	O,P,S,Sp	10.0
Pursuit*	0.125	2/8				
F Poast**	0.30	1/28	85	100	O,P,S,Sp	10.0
Pursuit*	0.25	2/8				
G Poast**	0.30	1/28	81	98	Chw,Lr,S,Sp	8.7
Buctril	0.50	2/8				
H Poast**	0.30	1/28	91	99	Chw,O,P,S,Sp	9.8
Buctril	0.30	1/28				
J Tough	1.00	1/28	81	92	Chw,Lr,O,Sp	8.5
Poast**	0.30	2/8				
K Pursuit*	0.125	1/28	100	5	----	9.0
Butoxone ester	0.75	1/28				
L Tough*	1.00	1/28	94	45	Lr,O,P,S,Sp	8.5
Buctril	0.30	1/28				
M Pursuit	0.125	1/28	81	84	P,S	9.5
Poast**	0.30	1/28				
N Poast**	0.30	1/28				
Buctril	0.30	2/8	92	97	Lr,P,S,Sp	9.2
Pursuit	0.125	2/8				
P Poast	0.30	1/28				
Surfel	1 qt.	1/28	79	91	Chw,Lr,P,S,Sp	9.0
Buctril	0.30	2/8				
Tough	1.00	2/8				
		LSD .05	N.S.	20.36		1.13
		C.V.	10.33%	16.39%		8.67%

*X-77 added @0.25% **Dash added @ 1 qt./A

1/WEEDS PRESENT: Chw=chickweed; Lr=London rocket; O=groundsel; P=prickly lettuce; S=sowthistle; Sp=shepherd's purse.

2/Vigor rating based on a scale of 0 to 10; 10=vigorously growing plants, 0=dead plants.

TABLE 4 - EFFECT OF POSTEMERGENCE APPLIED HERBICIDES ON WEED CONTROL, INJURY AND VIGOR OF ALFALFA

02, 42, 425, 94, 10, 88-4

LOCATION: West Side Field Station
SOIL TYPE: Panoche clay loam
PLANTED: 11/2/87
VARIETY: CUF-101

IRRIGATION: Furrow
PLOT SIZE: 40" x 30', REPS 4
TREATED: 2/19/88
ALFALFA GROWTH: 6"-8" tall, roots 5"-7" long
EVALUATED: See Below

		WEED CONTROL, INJURY* AND VIGOR** EVALUATIONS-AVERAGE OF 4 REPLICATIONS							
		2/21	3/5		3/17			3/22	
HERBICIDE	Lbai/ Acre	Injury Rating	Injury Rating	%Brdlf. Control	Injury Rating	Vigor Rating	%Brdlf. Control	Injury Rating	Vigor Rating
A Velpar 90WP	0.125	0	0.5	10	0	10.0	42	1.0	9.5
B Velpar	0.25	0	1.0	42	0.8	9.3	60	2.2	9.0
C Velpar	0.33	0	2.2	41	1.8	9.0	74	2.7	7.7
D Velpar	0.50	0	3.2	40	2.0	8.0	89	3.2	7.0
E Goal Buctril	0.125 0.25	6.0	7.5	86	5.3	4.0	96	3.0	5.2
F Goal X-77	0.25 1/2%	6.0	7.5	80	6.0	3.0	93	4.2	4.2
G Goal	0.25	6.0	7.8	82	6.3	3.5	88	3.5	4.2
H Tough EC	1.00	2.0	1.5	8	1.3	9.3	32	0.2	9.3
J Tough WP X-77	2.00 0.50	1.0	1.3	8	0.8	9.3	69	1.0	9.2
K Tough EC Buctril X-77	1.00 0.50 1/2%	7.0	6.8	75	4.8	4.3	88	3.0	5.5
L Tough WP X-77	1.0 1/2%	1.0	1.5	10	0	9.5	45	1.0	9.5
M Untreated	----	0	0	0	0	10.0	0	0	10.0

*Injury rating based on a scale of 0 to 10; 0 = no injury, 10 = severe injury.

**Vigor rating based on a scale of 0 to 10; 0 = dead plants, 10 = vigorously growing plants.

NOTE: WEEDS PRESENT: Chw=chickweed, Gr=groundcherry, La=lambsquarter, Lr=London rocket, Mono=monolepis, P=prickly lettuce, S=sowthistle, Sp=shepherd's purse

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SUSCEPTIBILITY OF WEEDS TO HERBICIDES EVALUATED IN ALFALFA PRODUCTION

▓ = EFFECTIVELY CONTROLLED

▨ = PARTIALLY OR ERADICALLY CONTROLLED

□ = NOT CONTROLLED

BROADLEAF WEEDS		PREPLANT INCORPORATED		POSTEMERGENCE				ESTABLISHED STAND				
		BALAN (benefin)	EPTAM / GENAP (EPTC)	BUCTRIL* (bromoxinil)	BUTYRAC ESTER (2,4-db ester)	KERB (pronamide)	POAST (sethoxydim)	EPTAM / GENAP (EPTC)	FURLOE (CIPC)	KARMEX (diuron)	TREFLAN (trifluralin)	VELPAR (hexazinone)
CHEESEWEED	S			▨						▨		▨
CHICKWEED	S	▓	▓		▨	▓		▓	▓	▓	▓	▨
COCKLEBUR	S			▓						▨		
CUDWEED	W +S		▨	▨				▓		▨		
CLOVERS	W									▨		
FIDDLENECK	W	▓	▓	▓	▨	▓		▓	▓			
FILAREE	W		▨	▨	▨			▨				
FLAXLEAF FLEABANE	S		▨	▓	▓			▓	▓	▓		
GOOSEFOOT	S	▓	▓	▓	▓	▓		▓	▨			
GROUNDCHERRY	S		▓	▓	▓	▓		▓	▓			
GROUNDSEL	S		▓	▓	▨			▓	▨			
HENBIT	W		▓		▨	▓		▓	▨	▓		
HORSEWEED (MARESTALE)	S		▓	▓	▓			▓	▓			
KNOTWEED	W + S	▓	▨	▨	▨	▓		▨	▓			
LAMBSQUARTER	S	▓	▓	▓	▓	▓		▓	▨	▓		
LONDON ROCKET	W		▨	▓	▓	▓		▨	▓	▓		
MINERS LETTUCE	W	▓	▨	▓		▨		▨	▓	▓	▓	
MUSTARD	W			▓	▓	▓		▓	▓	▓		
NETTLE	W + S		▓		▓	▨		▓	▓	▓		
NIGHTSHADE	S		▓	▓	▓	▓		▓	▨	▓	▓	
PIGWEED	S	▓	▓	▓	▓	▓		▓	▨	▓	▓	
PINEAPPLEWEED	W		▨	▓	▓	▓		▨	▓	▓	▓	
PRICKLY LETTUCE	W + S		▓	▓	▓	▓		▓	▨	▓	▓	
PUNCTUREVINE	S	▨		▓	▓	▓		▓	▓	▓	▨	
PURSLANE	S	▓	▓		▨	▓		▓	▨	▓	▓	
RED MAIDS	W	▓	▓		▓	▓		▓	▨	▓	▓	
RUSSIAN THISTLE	S	▨	▨	▓	▨	▨		▨	▓	▓	▨	▨
SHEPHERD'S PURSE	W		▨	▓	▓	▓		▓	▓	▓	▓	▓
SOWTHISTLE	W + S		▓	▓	▓			▓	▨	▓		
SPURGE	S			▓	▓			▓	▓			
SPEEDWELL	S			▓				▨	▨		▨	
WILD RADISH	W			▓	▓	▓						▓

W = WINTER ANNUAL
S = SUMMER ANNUAL

GRASSY WEEDS												
ANNUAL BLUEGRASS	W	▓	▓			▓	▓	▓	▓	▓	▓	▓
BARNYARDGRASS	S	▓	▓			▓	▓	▓		▓	▓	▨
BROMEGRASS	S	▓	▓			▓	▨	▓	▨	▓	▓	▨
CANARYGRASS	W	▓	▓			▓	▓	▓	▓	▓	▓	▨
CRABGRASS	W	▓	▓			▓	▓	▓	▨	▓	▓	▓
FESCUES	S	▓	▓			▓	▓	▓	▨	▓	▓	▨
FOXTAIL (BRISTLEGRASS)	W	▓	▓			▓	▓	▓	▓	▓	▓	▓
LOVEGRASS	S	▓	▓			▓	▓	▓	▨	▓	▓	▨
RABBITFOOTGRASS	W + S	▓	▓			▓	▓	▓	▓	▓	▓	▓
RYEGRASS	W	▓	▓			▓	▓	▓	▓	▓	▓	▓
SANDBUR	S	▓	▓			▨	▓	▓	▨	▨	▓	▨
WILD BARLEY	W	▓	▓			▓	▓	▓	▓	▓	▓	▨
WILD OATS	W		▓			▓	▓	▓	▓	▨		▨
WITCHGRASS	S	▓	▓			▓	▓	▓	▨	▓	▓	▨

*** NOT LABELED FOR USE IN CALIFORNIA**

This chart is not a recomendation for the use of herbicides. Check the label whether they are registered and their rate of application. Proper timing and accurate application is imperative. The information in this chart is tentative, additional studies may warrent changes.

SUMMARY OF HERBICIDE PERFORMANCE EVALUATED IN ALFALFA PRODUCTION IN THE CENTRAL SAN JOAQUIN VALLEY*

METHOD OF APPLICATION	HERBICIDE	CONDITIONS THAT RESULTED IN MOST EFFECTIVE CONTROL	CONDITIONS THAT RESULTED IN POOR CONTROL OR INJURY
PREPLANT INCORP-ORATED	Balan® (benefin)	Shallow incorporated in well prepared seed bed. When temperature was favorable for rapid seedling growth. Only susceptible weeds were present.	Cool temperature, deep incorporation, volunteer cereals and other resistant weed species were present.
	Eptam® Genap® (EPTC)	Thorough incorporation early fall or in spring planted fields. Where nutsedge was present; where 4 to 8 weeks control was needed.	Winter application, cloddy seed bed and resistant weeds present. Where longer than 6 weeks of residual control was needed.
POST-EMERGENCE	Butyrac ester® (2,4DB ester)	When broadleaf weeds in their seedling stage were the only weeds present.	Broadleaf weeds beyond their seedling stage were present.
	Kerb® (pronamide)	When alfalfa had two trifoliate leaves and weeds were not emerged or in their seedling stage; rainfall or sprinkler irrigation was applied following treatment.	When alfalfa was in the seedleaf or unfoliate leaf stage of growth severe injury occurred. When weeds were beyond their seedling stage. When water was not applied soon after treatment.
	Buctril®** (bromoxynil)	When the alfalfa had 2 to 3 trifoliate leaves and the broadleaf weeds were in their seedling stage. Applied in 60 gallons of water per acre and the alfalfa and broadleaf weeds were growing vigorously.	When grasses, chickweed and redmaids were prevalent. Weeds were beyond their seedling stage and air application in 10 gpa was used. When the temperature was above 80°F temporary yellowing of the alfalfa was observed.
	Poast® (sethoxydim)	When grasses are in their seedling stage and growing vigorously.	Grasses beyond their seedling stage and moisture stressed.
	Velpar® (hexazinone)	Alfalfa well established with a well developed root system 6" long or or longer with a top growth that is 6" to 8". Most effective on weeds in their seedling stage. Sprinkler irrigation or rainfall shortly after application is desirable for most effective control.	Conditions resulted in injury or control. Alfalfa seedlings not having 6" long roots. Weeds predominantly grasses and broadleaf weeds 5" to 6" or older. No rainfall or irrigation following treatment.
ESTABLISHED STANDS	Eptam® Genap® (EPTC)	Applied in the irrigation water and only when thorough wetting of the bed top was obtained. Timely repeated application was made.	Poor water distribution and not wetting the bed top. Repeated application was not made.
	Furloe® (CIPC)	Applied on wet soil immediately following irrigation provided dodder control if applied prior to attachment and repeated applications were made.	Applied on dry soil and/or repeated applications were not made. Dodder attached prior to treatment.
	Karmex® (diuron)	When applied on soil free of clods and volunteer alfalfa seed germination. Addition of dintro general and weed oil improved weed control when groundsel was present.	Applied on trashy or cloddy soil. Applied after Feb. 1st on non-dormant varieties resulted in injury.
	Treflan® (trifluralin)	Thoroughly incorporated with rolling cultivators in fields free of established weeds. Summer annual grasses, pigweeds and lambsquarter, the only weeds present.	Not incorporated thoroughly or when resistant weed species predominated.
	Velpar® (hexazinone)	Alfalfa was established one year or longer. Applied during December and January when the alfalfa growth was short (4 to 6 inches). Rainfall occurred shortly after application and weeds were 2 to 4 inches tall.	Established grasses were the predominant weeds. Broadleaf weeds 8 to 10 inches tall or taller. Applied after the middle of February.

* This is not a recommendation for the use of herbicides. It is a progress report of observations made in applied research trials conducted in Fresno County.

** As of December, 1988, registered by EPA but not labeled for use in California.

ALFALFA DESICCATION STUDY - 1988

INTRODUCTION

In studies conducted during 1986 and 1987 the effectiveness of Des-I-Cate (endothall), in combination with methylated carboxylate and emulsifiers, to desiccate alfalfa seed fields was demonstrated. However, it was not used extensively because of its higher cost and slower desiccation than can be obtained with the use of Diquat and weed oil.

In early 1988 the restrictions placed on the use of weed oil in California, approximately a year after the cancellation of dinoseb by the EPA, created additional problems for alfalfa seed growers.

During 1988, growers were concerned whether they would be able to dry their fields sufficiently for harvest. Many adjusted their irrigation schedule to deplete the moisture sufficiently to enhance desiccation. Through astute management and very favorable climatic conditions, late in the season, most alfalfa seed fields were adequately desiccated with one or two applications of Diquat. In fact, during 1988 the harvesting of alfalfa seed fields in the Central San Joaquin Valley began and was completed earlier than in previous years.

There is concern about effective desiccation in years when weather conditions may be less favorable. Therefore, there is an urgent need for the evaluation of chemical compounds that could be used to effectively desiccate alfalfa seed fields.

PROCEDURES USED

Two trials were conducted at the West Side Field Station. The alfalfa variety in both trials was CUF-101. One trial was conducted in a field planted November 2, 1986. The second trial was in a first-year stand, planted November 2, 1987. The chemicals used, rates and dates of application, individual plot sizes and other pertinent information are given in the following four tables that contain a summary of the data collected.

The desiccants were applied in 23.5 gallons of water per acre with a high clearance sprayrig with CO_2 used as a propellent. Two or three days following treatment, samples were taken from each plot at 2 to 3 day intervals. They were dried artificially to determine their moisture content and the effectiveness of the desiccant. Visual ratings were also made based on a 0 to 10 scale. A rating of 10 indicated that excellent desiccation was attained, see Table D-2 and D-4.

The two trials at the West Side Field Station were located about 300 feet apart in the same field. The vigorous growth of the alfalfa and the very poor seed set prompted us to investigate the rooting depth and the water table. With the use of a back-hoe we found that the roots of the alfalfa extended to the water table. This may explain the high moisture content of the samples, as shown in Tables D-1 and D-3, the poor desiccation and rapid regrowth.

OBSERVATIONS AND DISCUSSION

The moisture content of the alfalfa samples and the visual ratings made are summarized in the following four tables. A summary of the evaluations and the observations made can be outlined as follows:

.. The most effective desiccation was obtained with Ignite (glufosinate).

.. Ignite in combination with Ad-It (methylated alkyl carboxylate and emulsifiers) provided rapid desiccation. Regrowth from the crown in the Ignite treated plots was delayed.

.. Diquat (diquat) with Ad-It or X-77 provided the most rapid desiccation of the leaves but not the stems.

.. Regrowth from the crown was evident 5 to 6 days following treatment with Diquat.

.. Des-I-Cate (endothall) plus Ad-It, included in both trials as a standard treatment, provided effective desiccation but it was slower acting than Ignite and Diquat.

.. C-4243 did not provide adequate desiccation. Only the leaves on the upper part of the alfalfa plants were affected.

.. Neither of the formulations of Sharpshooter II (40% and 80% fatty acids) evaluated provided effective desiccation. Only the upper leaves on the alfalfa plants were desiccated.

.. Harvest Aid Liquid (sodium chlorate, 6 lb/gal) in combination with Ad-It was not as effective as when it was applied in combination with Diquat or as a sequential application.

.. Folex (merphos), widely used for cotton defoliation, was not effective as a desiccant.

.. Folex in combination with Diquat did not provide more effective desiccation than Diquat plus X-77.

OBSERVATIONS MADE IN COMMERCIAL FIELDS

The restrictions placed on the use of weed oil and the consequent concern with effective desiccation may have taught us all a lesson in the management of alfalfa seed fields. Early termination of irrigation raised concern that it would adversely affect yields. However, this did not occur [1/]; instead, it resulted in more efficient desiccation and very early harvest. It would be risky to generalize from the observations made during one year, but it has been well known that desiccation can be enhanced by good water management.

A large percentage of the alfalfa seed acreage was effectively desiccated with a single application of Diquat at 0.5 lbai/A plus adjuvants. In some fields a second application was required. In a majority of fields the desiccants were applied with airplanes, but a considerable acreage was treated with ground sprayers.

In an irrigation study conducted by Bruce Roberts, Farm Advisor in Kings County, a desiccation trial was superimposed on an irrigation trial. Prior to, as well as following the application of the desiccants, replicated samples were taken for moisture determination. A detailed report of the study is being prepared by Mr. Roberts. A very brief summary is presented in the following table.

. . . . . .

1/National Agricultural Statistics Service report, Oct. 14, 1988.

It is interesting to note that effective desiccation was obtained with all the treatments regardless of the level of water depletion in the soil.

EFFECT OF DESICCATION ON DIFFERENTIALLY IRRIGATED ALFALFA
CONDUCTED BY: BRUCE ROBERTS, FARM ADVISOR KINGS COUNTY

			NONSTRESSED-25% DEPLETION			NORMAL-50-55% DEPLETION			STRESSED-80% DEPLETION			EARLY TERMINATION-50% DEPLETION		
			% MOISTURE			% MOISTURE			% MOISTURE			% MOISTURE		
TREATMENT	RATE/A	DATE	PRE TREAT	AT HVST	YLD lb/ A	PRE TREAT	AT HVST	YLD lb/A	PRE TREAT	AT HVST	YLD lb/A	PRE TREAT	AT HVST	YLD lb/A
A. DIQUAT	0.5	8/18	66.35	16.5	682	77.5	16.5	765	84.4	17.2	863	---	---	---
X-77	*													
DIQUAT	0.5	8/21												
X-77	*													
B. DIQUAT	0.25	8/18	66.35	17.6	743	77.5	18.7	827	84.4	20.8	857	---	---	---
X-77	*													
DES-I-CATE	0.78	8/21												
AD-IT	1.5 gl													
C. DIQUAT	0.5	8/9	---	---	---	---	---	---	---	---	---	65.5	22.9	725
X-77	*													

* 2 qt PER 100 gl SPRAY SOLUTION

SAMPLING DATES: TREATMENTS A, B - 8/16 AND 8/26, TREATMENT C - 8/8 AND 8/17
HARVEST DATES: TREATMENTS A, B - 8/28 AND 8/31, TREATMENT C - 8/17

A large number of alfalfa seed fields were visited while they were being harvested. Talking with persons responsible for adjusting the harvester, it was obvious that with proper adjustment of the combine, alfalfa with relatively high moisture content can be harvested efficiently. The most important adjustment required, in fields where the moisture content of the alfalfa stems was 50% or higher, was to slow down the forward speed and control the amount of plant material fed through the combine.

In the past, most alfalfa seed fields were desiccated with two or three applications of dinoseb plus weed oil. Little attention was directed to determining the exact moisture content of the alfalfa required to obtain maximum efficiency in harvesting. Studies should be undertaken to develop this information.

A well desiccated field in which the moisture content of the straw is 30% or lower, can be harvested most effectively. However, effective desiccation does not insure the efficiency of harvest or prevent excessive loss of seed. Only proper adjustment of the harvester and the operator of the combine can do that.

TABLE D-1 EFFECT OF VARIED CHEMICALS ON DESICCATION ALFALFA

02, 42, 425, 94, 10, 88-6

LOCATION: West Side Field Station
SOIL TYPE: Panoche clay loam
PLANTED: 11/2/86
VARIETY: CUF-101

IRRIGATION: Furrow
PLOT SIZE: 10' x 60', Reps 3
TREATED: 8/5, 8/8/88
EVALUATED: See below

CHEMICAL	Lb.ai/ Acre	Date Appld.	PERCENT MOISTURE ON 6 SAMPLING DATES 8/8	8/10	8/12	8/15	8/17	8/19
A Des-I-Cate Ad-It	1.04 2 gal.	8/5	61.6	52.9	56.6	54/3	52.1	54.0
B Diquat X-77	0.50 1 qt.	8/5	56.1	51.2	58.0	49.4	51.1	52.3
C Diquat Ad-It	0.50 2 gal.	8/5	57.5	55.5	54.2	51.6	51.2	57.3
D Diquat X-77 Diquat X-77	0.25 1 qt. 0.25 1 qt.	8/5 8/8	62.0	56.0	57.2	56.4	55.4	52.0
E Harvest Aid Liq.* Ad-It	12.0 2 gal.	8/5	59.5	58.9	60.2	58.5	50.8	56.4
F Harvest Aid Liq.* Diquat X-77	12.0 0.50 1 qt.	8/5	63.6	55.9	58.3	56.3	54.2	53.2
G C-4243 10EC Activator 90	0.125 1 qt.	8/5	61.4	58.0	59.3	55.7	55.1	56.0
H C-4243 10EC Activator 90	0.50 1 qt.	8/5	58.7	54.4	51.4	51.8	51.4	53.7
J Sharpshooter II 40%	4 gal.	8/5	55.1	51.6	55.9	55.1	55.6	56.2
K Ignite Ad-It	0.90 1 qt.	8/5	60.7	49.7	48.0	42.4	42.1	35.4
L Folex X-77	1.125 1 qt.	8/8	----	57.5	60.1	59.0	56.2	57.6
M Folex X-77	2.25 1 qt.	8/8	----	66.4	65.9	65.1	60.1	61.8
N Folex Diquat X-77	1.125 0.25 1 qt.	8/8	----	58.6	62.1	55.8	56.8	57.2
X Untreated	-----	---	----	59.5	60.8	60.9	60.4	61.3
STAT. NOTATION LSD @5%			----	8.032	6.235	6.284	7.644	5.064
C.V.			----	8.52%	6.44%	6.79%	8.46%	5.53%

*Sodium Chlorate, 6 lb/gal.

8673A

TABLE D-2 EFFECT OF VARIED CHEMICALS ON DESICCATION OF ALFALFA

02, 42, 425, 94, 10, 88-6

LOCATION: West Side Field Station
SOIL TYPE: Panoche clay loam
PLANTED: 11/2/86
VARIETY: CUF-101

IRRIGATION: Furrow
PLOT SIZE: 10' x 60', Reps 3
TREATED: 8/5, 8/8/88
EVALUATED: 8/10, 8/19/88

Treatment	Lb.ai/ Acre	Date Appld.	VISUAL RATING OF EFFECTIVENESS OF DESICCATION* 8/10/88 - Overall Appearance of Plant	8/19/88 - Overall Appearance of Plant
A Des-I-Cate Ad-It	1.04 2 Gal.	8/5	4.7 BC	6.0 CD
B Diquat X-77	0.50 1 qt.	8/5	4.7 BC	7.0 BC
C Diquat Ad-It	0.50 2 gal.	8/5	7.3 A	5.3 DE
D Diquat X-77 Diquat X-77	0.25 1 qt. 0.25 1 qt.	8/5 8/5	4.7 BC	4.3 E
E Harvest Aid Liq.** Ad-It	12.0 2 gal.	8/5	2.7 CD	2.7 F
F Harvest Aid Liq.** Diquat X-77	12.0 0.50 1 qt.	8/5	4.0 BC	6.3 CD
G C-4243 10 EC Activator 90	0.125 1 qt.	8/5	4.7 BC	6.7 C
H C-4243 10 EC Activator 90	0.50 1 qt.	8/5	.53 B	8.0 AB
J Sharpshooter II 40%	4 gal.	8/5	4.0 BC	6.0 CD
K Ignite Ad-It	0.90 1 qt.	8/5	7.3 A	8.7 A
L Folex X-77	1.125 1 qt.	8/8	0.7 EF	2.0 F
M Folex X-77	2.25 1 qt.	8/8	0 F	2.0 F
N Folex Diquat X-77	1.125 0.25 1 qt.	8/8	2.0 DE	2.3 F
X Untreated	-----	----	0 F	0 G

STATISTICAL NOTATION: Values followed by the same letter are not statistically significant at the 5% level.

*Visual rating based on a 0-10 scale; 0=not effective, 10-excellent desiccation.

**Sodium chlorate, 6 lb.ai/gal.

9430A

TABLE D-3 EFFECT OF VARIOUS CHEMICALS ON DESICCATION OF ALFALFA

02, 42, 425, 94, 10, 88-7

LOCATION: West Side Field Station
SOIL TYPE: Panoche clay loam
PLANTED: 11/2/87
TREATED: 8/17, 8/22/88

IRRIGATION: Furrow
PLOT SIZE: 13.3' x 60', Reps. 3
VARIETY: CUF-101
EVALUATED: See below

TREATMENT	Lb.ai/ Acre	Date Appld.	PERCENT MOISTURE ON 7 SAMPLING DATES 8/19	8/22	8/24	8/26	8/29	8/31	9/2
A Des-I-Cate Ad-It	1.04 2 Gal.	8/17	51.5	49.6	56.3	49.0	50.2	52.4	50.9
B Diquat Ad-It Diquat Ad-It	0.25 1 Gal. 0.25 1 Gal.	8/17 8/22	56.5	55.2	55.7	48.1	48.9	48.1	49.7
C Diquat Ad-It	0.5 1 Gal.	8/17	53.1	51.0	48.4	45.9	48.0	48.9	46.1
D Ignite Ad-It	0.5 1 Gal.	8/17	63.4	55.2	53.6	40.7	43.1	41.0	38.3
E Ignite Ad-It	1.0 1 Gal.	8/17	61.1	53.4	50.0	31.0	32.0	35.2	33.7
F Ignite Ad-It	2.0 1 Gal.	8/17	54.0	46.7	46.2	29.4	31.1	30.0	29.5
G Sharpshooter 80%	2 Gal.	8/17	60.2	58.6	55.9	48.7	56.5	46.9	44.0
H Sharpshooter 80%	4 Gal.	8/17	57.1	61.1	59.5	52.9	58.0	52.6	50.9
J Harvest Aid* Diquat Ad-It	12.0 0.25 1 Gal.	8/17	60.5	57.8	57.2	54.8	52.1	54.0	51.8
K Harvest Aid* Diquat Ad-It	12.0 0.25 1 Gal.	8/17	53.0	49.3	47.3	43.0	47.7	44.2	44.8
L Diquat Ad-It Diquat Ad-It	0.5 1 Gal. 0.5 1 Gal.	8/17 8/22	53.1	48.7	46.8	41.3	40.6	40.7	41.5
M Diquat Ad-It Harvest Aid* Ad-It	0.5 1 Gal. 12.0 2 Gal.	8/17 8/22	52.1	46.2	46.2	39.1	38.0	40.9	43.9
N Untreated	-----	----	59.5	61.3	62.7	57.2	59.2	59.5	55.0
STATISTICAL NOTATION LSD @5%			4.916	7.734	NS	13.292	8.815	5.265	6.259
C.V.			5.15	8.63	12.46	17.61	11.28	6.94	8.37

*Sodium chlorate, 6 lb./Gal.

9430A

TABLE D-4 EFFECT OF VARIOUS CHEMICALS ON DESICCATION OF ALFALFA

02, 42, 425, 94, 10, 88-7

LOCATION: West Side Field Station
SOIL TYPE: Panoche clay loam
PLANTED: 11/2/87
TREATED: 8/17, 8/22/88

IRRIGATION: Furrow
PLOT SIZE: 13.3' x 60', Reps. 3
VARIETY: CUF-101
EVALUATED: 8/22, 8/29/88

TREATMENT	Lb.ai/ Acre	Date Appld.	VISUAL RATING ON DESICCATION OF ALFALFA[1] 8/22/88 Overall Plant Appearance	8/22/88 Stems Only	8/29/88 Overall Plant Appearance	8/29/88 Stems Only
A Des-I-Cate Ad-It	1.04 2 Gal.	8/17	5.3	2.0	7.0	3.7
B Diquat Ad-It Diquat Ad-It	0.25 1 Gal. 0.25 1 Gal.	8/17 8/22	5.0	2.0	6.0	2.7
C Diquat Ad-It	0.5 1 Gal.	8/17	5.3	2.6	7.7	4.0
D Ignite Ad-It	0.5 1 Gal.	8/17	5.3	2.0	8.0	6.3
E Ignite Ad-It	1.0 1 Gal.	8/17	6.7	4.0	10.0	8.3
F Ignite Ad-It	2.0 1 Gal.	8/17	7.3	4.0	10.0	8.7
G Sharpshooter 80%	2 Gal.	8/17	2.3	1.0	2.7	0.7
H Sharpshooter 80%	4 Gal.	8/17	1.3	1.0	3.7	2.3
J Harvest Aid* Diquat Ad-It	12.0 0.25 1 Gal.	8/17	3.7	1.7	3.7	2.3
K Harvest Aid* Diquat Ad-It	12.0 0.25 1 Gal.	8/17	5.0	2.0	7.3	6.3
L Diquat Ad-It Diquat Ad-It	0.5 1 Gal. 0.5 1 Gal.	8/17 8/22	4.7	2.0	8.3	6.0
M Diquat Ad-It Harvest Aid* Ad-It	0.5 1 Gal. 12.0 2 Gal.	8/17 8/22	6.0	2.6	8.7	4.3
N Untreated	-----	----	0	0	0	0
STATISTICAL NOTATION LSD @5%			1.687	1.614	2.157	2.425
C.V.			22.57	46.10	20.04	33.60

*Sodium chlorate, 6 lb./Gal.
1/Visual rating based on 0-10 scale; 0=no desiccation, 10=excellent desiccation.

HERBICIDE PERSISTENCE AND PLANT-BACK STUDIES

To control the unwanted competing vegetation in the many annual and perennial crops grown in central California, selective herbicides are used extensively. An ideal herbicide would be one that would effectively control all weeds without adversely affecting the growth of the crop and would disappear from the soil by harvest. However, such herbicides are not available and most probably will not be developed in the near future.

The herbicides used today in the production of crops have different residual properties. Some dissipate from the soil or degrade quite rapidly, others may remain in the soil for a longer period of time, in other words, have long residual properties. Small quantities of some herbicides remaining in the soil may adversely affect the growth of certain crops planted in rotation with the crop in which that herbicide was used. Therefore, before herbicides are used in any crop it is essential to know their residual properties and develop information regarding safe cropping sequences. This is especially important in central California where a large number of different annual crops are grown in rotation on the same acreage.

During the past years many trials were conducted at the West Side Field Station to study the residual properties of a large number of herbicides, and to determine safe cropping sequences. All the studies were replicated bioassay field trials. The purpose was not to determine minute quantities (parts per million or parts per billion), of herbicides in the soil, rather to learn how rapidly they dissipate from the soil to a level where they will not adversely affect the germination and growth of crops that are planted following their use.

Most Recently Conducted Study

The trial was established March 30, 1987, on Panoche clay loam soil with an organic matter content of 0.6%. Eight different herbicides were included, generally at two rates. The low rate is the anticipated commercial use rate and the high rate is four times the low rate. Each treatment was replicated four times. Individual plots were 20 ft. by 30 ft. with 5 ft. of untreated area between plots. This accommodated eight 30 inch beds. Each bed was planted with a different crop.

The herbicides were applied with a constant pressure, compressed air sprayer in 35 gallons of water per acre. They were incorporated into the soil to a depth of 2-1/2 inches with power-driven rotary tillers except one herbicide (pyridate) that was applied postemergence. The herbicides included in the trial and their rates of application are given in the tables that summarize the results obtained. Following the application and incorporation of the herbicides, eight different crops (listed in the tables) were planted in each plot, one on each of the 30-inch beds. The field was furrow irrigated.

Stand counts, crop vigor and weed control evaluations were made. The early evaluations of the first planting indicate the selectivity of the herbicides on the crop and the weeds they control. In later plantings the crop vigor and stand evaluations reflect the residual activities of the herbicides.

Following the last evaluation from each planting date the crops were mowed and incorporated into the soil. The beds were reshaped for the next planting. Care was taken to preserve the integrity of each plot and avoid cross-contamination. This sequence of planting, evaluation and replanting was

pursued through the summer of 1988 when most herbicides included in the study dissipated sufficiently not to exhibit any evidence of phytotoxicity or any adverse effects on the growth of the crops planted.

The evaluations are summarized in the tables following the narrative section of this report. Stand counts are given in number of plants per foot of row. The vigor ratings were based on a 0 to 10 scale: 0 represents no surviving plants and 10 indicates that the plants were growing vigorously. Weed control ratings were based on a scale of 0% to 100%. The surviving weeds are listed in the tables.

The evaluations summarized in the tables can be outlined as follows:

... BAS-514 (quinclorac) exhibited good selectivity on several crops. The stand of millet and blackeye beans were reduced. The vigor of the cantaloupe and tomato seedlings at the higher rates were adversely affected. Sugar beets, tomatoes, cantaloupe and blackeye beans exhibited symptoms of curled and cupped leaves with veinal constrictions; symptoms not unlike those caused by phenoxy herbicides such as 2,4-D. Very poor weed control was obtained even at the highest rate used (see Tables 1 through 4). BAS-514 has relatively short residual activity as illustrated by the evaluations obtained from the second plantings on June 26, 1987. Only the vigor of the tomato plants were reduced, see Table 7.

... Matrix® (DPX-9674) was least tolerated by sugar beets. Stand reduction was observed in blackeye beans and millet. The vigor of the cantaloupes was severely reduced and the emerged sugar beets all died. Matrix exhibited good selectivity on tomatoes, wheat, blackeye beans, sorghum as well as cotton. Matrix, at the rates evaluated in this

trial, 0.03125 and 0.125 lbai/A, appears to have short residual activity. Sugar beets appear to be the most sensitive to residual Matrix as shown in the June and September plantings.

... Harmony® (DPX-M6316), at the low rates used in this study, exhibited good selectivity on tomatoes, wheat, blackeye beans, cotton and sorghum. The vigor of cantaloupes, millet and sugar beets were the most adversely affected as shown in Table 3. The residual activity of Harmony is short-lived. Three months after its application it exhibited no adverse effect on the crops planted 6/26/87, see Tables 6 and 7.

... ER-40855 (Benchmark®) caused severe stand and vigor reduction of all crops except cotton and sorghum. Only cotton exhibited tolerance to Benchmark at 3.0 lbai/A. Its residual activity on the susceptible crops may extend 4 to 6 months. Because its activity on tomatoes it would be desirable to evaluate Benchmark in combinations with dinitroaniline herbicides in cotton for the control of weeds in the nightshade family.

... Prefar® (bensulide) is not a new herbicide. It was included in this trial to gather additional information about its residual activity at high rates of application. Sugar beets, sorghum, millet and wheat were the least tolerant crops when planted one day after its application. The growth of tomatoes, cotton, cantaloupes and blackeye beans were not adversely affected in the 16.0 lbai/A treated areas. Sugar beets were the most severely affected crop when planted three months after its application. Six months following the application of Prefar, the vigor of the onion seedlings were reduced. No adverse effect on stand or vigor was observed on any crop planted 9 months following the application of 16.0 lbai/A.

... EL-107 (isoxaben) was the most persistent and least selective herbicide included in the trial. Only cotton exhibited some tolerance to EL-107 at 0.5 lbai/A, the lowest rate used. Sixteen months after its application, tomatoes and sugar beets were severely retarded in their growth. In the last evaluation, 7/8/88, cotton and blackeye beans were the only crops that were growing vigorously in the plots treated with 3.0 lbai/A.

... SC-0774 was selective on sugar beets, millet and wheat. It caused chlorosis and bleaching of the leaves on cotton, blackeye beans and cantaloupe. The residual activity of SC-0774 was relatively short, it did not extend beyond 3 months except on sugar beets in areas treated with 2.0 lbai/A.

... Pyridate (Tough ®) was the only herbicide applied post-emergence to the crops. Eleven days following its application the monocots (wheat, millet, sorghum) appeared the most tolerant. Among the dicots, tomatoes and blackeyes exhibited some degree of tolerance at the lower, 0.9 lbai/A, rate used (see Tables 3 and 4). The soil residual activity of pyridate is short lived. No stand or vigor reduction was observed on any of the crops planted two months after its application at 3.6 lbai/A, the highest rate used.

CONCLUDING REMARKS

Information developed in field bioassay studies, such as the one summarized in this report, can enable one to answer the innumerable questions asked regarding the residual properties of herbicides and what crops can be planted sequentially following their use in a crop. The data gathered in these studies were also used in obtaining registration and for the development of information required to label herbicides.

It is important to emphasize that the degradation of herbicides in the soil, hence their residual properties, are influenced by many factors, the more important ones being:

..their rate of application,
..the time of application as related to harvest,
..frequency and method of irrigation of the crop in which it is used,
..method of application, such as preplant, preemergence or whether applied broadcast or in a narrow band,
..chemical properties of the herbicide,
..its adsorbtive capacity, its solubility and its mode of degradation,
..soil type and salinity,
..cultivation of the soil after harvest and prior to planting the following crop,
..climatic conditions, and,
..temperature of the soil and air.

These are but a few factors that enhance or impede the breakdown of herbicides in the soil. Herbicides can be very useful in the production of crops, however, only the user can make it an effective and safe tool for the selective control of the unwanted vegetation.

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TABLE 1 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987

08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 3/31/87
EVALUATED: 4/20/87

HERBICIDE	Lb.ai/ Acre	STAND COUNT PER FOOT OF ROW - 4/20/87*							
		Tomato	Wheat	Millet	Canta-loupe	Sugar Beets	Blackeye Beans	Cotton	Sorghum
A BAS-514	0.25	13.6	1.6	4.4	4.7	6.7	2.0	6.5	4.6
B BAS-514	1.00	20.5	3.2	5.0	4.2	6.2	1.9	5.5	5.1
C BAS-514	2.00	18.6	1.1	4.7	2.9	8.6	1.7	6.5	4.3
D Matrix	0.03125	17.9	2.9	2.6	3.8	3.7	2.3	7.3	6.1
E Matrix	0.125	17.7	2.1	4.7	3.8	3.8	1.9	5.2	3.9
F Harmony	0.03125	17.0	1.8	4.0	2.9	5.8	2.1	6.9	5.2
G Harmony	0.125	18.6	6.2	6.2	5.6	6.1	1.8	7.7	4.4
H ER-40885	0.75	1.9	0.7	0.7	3.8	0.2	1.9	8.1	4.4
J ER-40885	3.00	0	0.7	0.7	1.9	0	1.8	8.8	4.0
K Prefar	4.00	18.0	2.6	2.6	5.2	1.5	1.4	7.4	1.1
L Prefar	16.00	18.7	0.7	1.7	4.3	0	2.1	8.1	0
M EL-107	0.50	0.6	0.4	2.2	0.6	0	0.8	5.2	1.2
N EL-107	2.00	0	0.8	1.0	0	0	0	0.1	0
P SC-0774	0.50	14.0	1.1	5.6	5.2	3.9	1.9	8.4	4.9
Q SC-0774	2.00	14.8	1.1	0.3	4.2	0	2.1	8.6	4.3
R Pyridate 1/	0.90	17.3	2.3	5.9	3.5	6.5	2.1	6.9	6.7
S Pyridate 1/	3.60	18.9	2.9	3.8	5.1	7.2	2.2	5.3	7.4
T Untreated	---	16.2	2.4	6.1	4.0	5.1	3.4	5.7	4.5

*-Counts made in 6" x 4' area in the center of each plot.

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TABLE 2 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' 30', Reps 4
PLANTED: 3/31/87
EVALUATED: 4/20/87

HERBICIDE	Lb.ai/ Acre	STAND COUNT AS PERCENT OF UNTREATED - 4/20/87*							
		Tomato	Wheat	Millet	Canta-loupe	Sugar Beets	Blackeye Beans	Cotton	Sorghum
A BAS-514	0.25	84	66	72	100	100	59	100	100
B BAS-514	1.00	100	100	97	100	100	96	100	100
C BAS-514	2.00	100	47	77	72	100	50	100	96
D Matrix	0.03125	100	100	43	95	73	69	100	100
E Matrix	0.125	100	89	77	95	75	58	91	88
F Harmony	0.03125	100	77	66	72	100	63	100	100
G Harmony	0.125	100	100	100	100	100	54	100	99
H ER-40885	0.75	4	32	12	95	4	56	100	99
J ER-40885	3.00	0	32	12	47	0	54	100	89
K Prefar	4.00	100	100	43	100	29	43	100	2
L Prefar	16.00	100	32	29	100	0	63	100	0
M EL-107	0.50	.04	16	36	15	0	24	92	3
N EL-107	2.00	0	35	16	0	0	0	2	0
P SC-0774	0.50	87	47	93	100	77	58	100	100
Q SC-0774	2.00	85	47	5	100	0	61	100	96
R Pyridate 1/	0.90	100	98	98	87	100	61	100	100
S Pyridate 1/	3.60	100	100	63	100	100	65	93	100
T Untreated	---	100	100	100	100	100	100	100	100

*-Counts made in 6" x 4' area in the center of each plot. Values represent the average of 4 replications and expressed as % of Untreated.

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TABLE 3 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 3/31/87
EVALUATED: 4/30/87

VIGOR RATING2/ - AVERAGE OF 4 REPLICATIONS - 4/30/87

HERBICIDE	Lb.ai/ Acre	Tomato	Wheat	Millet	Cant.	Sgr. Bts.	Blkeye Beans	Cotn.	Sorg.	Weeds Present
A BAS-514	0.25	9.5	9.5	7.7	7.7	10	8.5	9.5	9.5	B,Gf,I,Ni,S,Sp
B BAS-514	1.00	5.5	9.2	7.0	3.5	5.7	7.2	6.0	8.7	I,La,Pl,Sp
C BAS-514	2.00	5.0	8.7	5.5	2.7	5.5	7.5	7.0	8.7	O,Lr,Ni,Sp
D Matrix	0.03125	9.0	9.5	7.0	2.7	0	9.5	9.2	9.0	I,S
E Matrix	0.125	6.2	8.5	6.2	3.5	0	8.7	8.7*	9.3	I
F Harmony	0.03125	10	9.5	7.7	7.2	5.7	9.7	9.7	9.2	I,La,S,Sp
G Harmony	0.125	9.7	9.0	7.0	6.7	7.2	10	10	9.2	I
H ER-40885	0.75	0	0	0	0	0	7.7*	9.2	6.0*	I,Vol.Corn
J ER-40885	3.00	0	0	0	0	0	1.1*	4.0	0	Vol.Corn*
K Prefar	4.00	9.2	3.2	4.2	9.5	2.2	9.0	9.5	0	I
L Prefar	16.00	9.2	0.5	1.5	8.2	0	9.7	10	0	No Weeds
M EL-107	0.50	0	2.5	1.7	0	0	4.2	5.7	4.0	No Weeds
N EL-107	2.00	0	0	0	0	0	0	1.1	0	Vol.Corn
P SC-0774	0.50	9.5	8.0	6.0	6.2	7.5*	9.2	8.0*	9.0	I,Sp
Q SC-0774	2.00	8.2	3.2*	0.7	1.1	0	7.5*	5.2*	5.5	I
R Pyridate1/	0.90	6.5	8.0	8.0	0	0	5.0	2.2	9.5	I
S Pyridate1/	3.60	0	5.2	2.5	0	0	1.7	0.7	6.2*	No Weeds
T Untreated	---	9.7	9.0*	7.5	8.0	10	9.2	9.2	9.2*	I,La,Ni,S,Sp

*-Chlorotic/necrotic
2/VIGOR RATING - 10 = vigorously growing plants, 0 = dead
WEEDS PRESENT: B=barnyardgrass, Gf=goosefoot, I=pigweed, La=lambsquarter, Lr=London rocket, Ni=nightshade, Pl=purslane, S=sowthistle, Sp=shepherd's purse

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TABLE 4 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 3/31/87
EVALUATED: 5/23/87

VIGOR RATING-AVERAGE OF 4 REPLICATIONS 2/ - 5/23/87

HERBICIDE	Lb.ai/ Acre	Tomato	Wheat	Millet	Cant.	Sgr. Bts.	Blkeye Beans	Cotn.	Sorg.	WEED CONTROL % Weed Control	WEED CONTROL Weeds 3/ Present
A BAS-514	0.25	9.0**	9.7	10	8.0	9.2	9.2*	7.7	10	0	B,Gr,I,Jr, Pl,C,Sp
B BAS-514	1.00	4.2**	8.0	9.7	4.7	6.5**	8.0	3.2	8.0	0	B,I,Jr,Lr, P,Pl,SC
C BAS-514	2.00	2.5**	7.7	6.0*	3.5*	6.2**	7.5	3.7	9.0	0	I,Lr,O,Pl, Sp
D Matrix	0.03125	9.7	9.7	10	6.5*	1.0	10	9.7	8.3	49	B,Ga,I,Jr, Lr,O,Pl,S, Sp
E Matrix	0.125	9.0	9.5	8.2	6.7*	0	9.7	8.3	8.3	86	B,Ch,Gr,Gr I,La,Lr,Ni S,Sp
F Harmony	0.03125	10	9.5	10	8.7	6.7	9.7	9.5	10	56	Gf,Gr,I,Lr O,S,Sp
G Harmony	0.125	10	10	8.2*	9.2	7.2	9.7	9.2*	8.7*	81	B,Gf,I,Jr, Ni,Pl,S
H ER-40885	0.75	0	0	1.5	0	0	9.5*	9.7	7.0	94	I,O
J ER-40885	3.00	0	0	0	0	0	1.2	8.0	0	99	O
K Prefar	4.00	9.7	2.0	6.0*	10	1.0*	10	10	0	87	Gf,I,Lr,O, S,Sp,Ss
L Prefar	16.00	9.7	0	1.7	10	0.2	10	10	0	96	Gr,I,O,Sp, Ss
M EL-107	0.50	0	2.5	5.5	1.0	0	4.7*	6.5*	3.0*	98	B
N EL-107	2.00	0	0	0	0	0	0.2	2.5	0	100	
P SC-00774	0.50	9.5	7.5	7.0	8.7	7.2	9.7	9.5	9.5	66	B,I,Jr
Q SC-00774	2.00	9.2**	3.2	2.5	4.7	0.2	9.2*	6.2*	7.7	75	B,I,Jr
R Pyridate 1/	0.90	6.7	9.5	9.2	1.2	0	8.0	4.5	9.7	84	B,Gr,I,Jr Lr,Sp
S Pyridate 1/	3.60	1.0	7.7	8.0	0	0	2.0*	1.0	9.0	92	I,Jr,Sp,Spr Vol.Corn
T Untreated	---	10	9.7	10	10	10	10	10	10	0	B,Gf,Gr,I,

*-Retarded in growth **-Cupped, curled leaves similar to 2,4-D symptoms
2/-VIGOR RATING: 10 = vigorously growing plants, 0 = dead
3/-WEEDS PRESENT: B=barnyardgrass, Gf=goosefoot, Gr=groundcherry, I=pigweed, Jr=jungle rice, La=lambsquarter, Lr=London rocket, Ni=nightshade, O=groundsel, Pl=purslane, S=sowthistle, Sp=shepherd's purse, Ss=spotted spurge, Spr=sprangletop

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TABLE 5 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 6/36/87
EVALUATED: 7/16/87

HERBICIDE	Lb.ai/ Acre	STAND COUNT PER FOOT OF ROW - 7/16/87*						
		Tomato	Millet	Honey-dew	Sugar Beets	Blackeye Beans	Cotton	Sorghum
A BAS-514	0.25	3.1	7.4	4.5	5.1	4.0	13.1	1.8
B BAS-514	1.00	3.5	7.0	3.0	5.2	2.8	10.7	1.7
C BAS-514	2.00	3.6	6.7	3.6	4.9	3.1	10.4	2.4
D Matrix	0.03125	2.9	6.5	4.6	5.0	2.7	12.5	1.9
E Matrix	0.125	3.4	6.2	3.8	6.9	2.2	10.6	3.0
F Harmony	0.03125	3.7	7.7	4.2	5.5	2.4	10.8	2.5
G Harmony	0.125	4.6	7.1	3.0	7.1	3.4	11.1	2.1
H ER-40885	0.75	2.6	5.9	4.4	0.6	3.4	10.9	2.0
J ER-40885	3.00	1.5	1.0	2.4	0.5	2.3	12.9	2.3
K Prefar	4.00	5.0	6.7	4.0	5.6	3.0	10.0	1.9
L Prefar	16.00	4.7	5.4	3.7	4.6	3.1	11.1	2.4
M EL-107	0.50	0	6.3	4.0	0	2.2	11.1	1.9
N EL-107	2.00	0	1.9	0	0	0.8	4.8	0.9
P SC-0774	0.50	3.5	6.6	4.0	3.3	1.8	12.5	2.4
Q SC-0774	2.00	4.9	7.1	2.4	6.4	3.1	10.3	2.3
R Pyridate 1/	0.90	5.8	6.7	3.9	6.6	3.1	11.6	2.0
S Pyridate 1/	3.60	3.8	5.6	5.5	4.7	2.8	13.4	2.4
T Untreated	---	3.3	6.8	3.2	5.2	3.4	12.6	2.1

*-Plants counted in 4' by 6" area in the center of the plot. Values represent average number of plants per foot of row.

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TABLE 6 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 6/26/87
EVALUATED: 7/16/87

HERBICIDE	Lb.ai/ Acre	STAND COUNT AS PERCENT OF UNTREATED - 7/16/87*						
		Tomato	Millet	Honey-dew	Sugar Beets	Blackeye Beans	Cotton	Sorghum
A BAS-514	0.25	94	100	100	98	100	100	86
B BAS-514	1.00	100	100	100	100	82	85	81
C BAS-514	2.00	100	99	100	94	91	83	100
D Matrix	0.03125	88	96	100	96	79	99	90
E Matrix	0.125	100	91	100	100	65	84	100
F Harmony	0.03125	100	100	100	100	71	86	100
G Harmony	0.125	100	100	100	100	100	88	100
H ER-40885	0.75	79	87	100	12	100	87	95
J ER-40885	3.00	45	15	75	10	68	100	100
K Prefar	4.00	100	99	100	100	88	79	90
L Prefar	16.00	100	79	100	88	91	88	100
M EL-107	0.50	0	94	100	0	65	88	90
N EL-107	2.00	0	28	0	0	23	38	43
P SC-0774	0.50	100	94	100	63	53	99	100
Q SC-0774	2.00	100	100	75	100	91	82	100
R Pyridate 1/	0.90	100	99	100	100	91	92	95
S Pyridate 1/	3.60	100	82	100	90	82	100	100
T Untreated	---	100	100	100	100	100	100	100

*-Counts made in 6" x 4' area in the center of each plot. Values represent the average of 4 replications and expressed as % of Untreated.

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TABLE 7 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem.- 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 6/26/87
EVALUATED: 7/23/87

HERBICIDE	Lb.ai/ Acre	VIGOR RATING-AVERAGE OF 4 REPLICATIONS 2/ - 7/23/87							WEED CONTROL	
		Tomato	Melon	Millet	Sug. Beets	Cot-ton	Sorg-hum	Blkeye. Beans	% Weed Control	Weeds 3/ Present
A BAS-514	0.25	7.3	9.7	9.5	9.7	10	8.2	9.7	20	I,Jr,Pl
B BAS-514	1.00	7.2	7.7	7.2	7.7	7.2	7.0	9.5	0	B,I,Jr,Pl,S,Sp
C BAS-514	2.00	3.5	6.2	8.2	3.7	5.7	7.5	9.0	17	B,Gr,I,Pl,S
D Matrix	0.03125	9.7	9.5	8.7	8.7	9.7	8.5	10	55	I,Pl
E Matrix	0.125	10	10	8.7	8.5	10	8.7	10	71	B,Gr,I,Jr,Pl
F Harmony	0.03125	9.5	10	9.0	8.7	10	9.0	9.6	63	B,Gr,I,Jr,Pl,S
G Harmony	0.125	9.5	9.7	7.2	9.7	10	8.0	10	88	Gr,I,Jr,Pl,Sp
H ER-40885	0.75	7.3	10	7.7	1.0	9.5	9.5	10	91	Gr,I,Pl
J ER-40885	3.00	0.7	6.0	2.2	0	9.7	8.2	8.7	99	I
K Prefar	4.00	10	10	7.7	7.5	10	8.0	10	88	Gr,I,Pl
L Prefar	16.00	8.7	9.2	9.0	4.7	10	7.0	8.7	93	I
M EL-107	0.50	0	1.2	5.5	0	8.2	6.5	6.6	100	
N EL-107	2.00	0	0	0.7	0	2.7	0.7	2.0	100	
P SC-00774	0.50	7.0	9.0	9.2	2.2	9.7	7.7	10	88	B,I,Jr,Pl
Q SC-00774	2.00	8.7	9.0	9.0	7.2	9.7	8.0	8.7	89	B,Gr,I,Pl
R Pyridate 1/	0.90	9.7	9.7	9.0	8.5	10	8.5	10	76	B,Gr,I,Jr,Pl
S Pyridate 1/	3.60	9.0	9.7	9.0	10	9.7	8.7	10	93	Cu,I,Jr,Pl
T Untreated	---	9.6	10	10	9.6	10	10	10	0	B,Gc,I,Jr,Pl

2/-VIGOR RATING: 10 = vigorously growing plants, 0 = dead

3/-WEEDS PRESENT: B=barnyardgrass, Cu=cudweed, Gr=groundcherry, I=pigweed, Jr=jungle rice, Pl=purslane, S=sowthistle, Sp=shepherd's purse.

TABLE 8 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 9/15/87
EVALUATED: 10/27/87

HERBICIDE	Lb.ai/ Acre	STAND COUNT PER FOOT OF ROW - 10/27/87*						
		Wheat	Sugar-beet	Lettuce	Onion	Broccoli	Alfalfa	Rye Grass
A BAS-514	0.25	3.1	3.4	0.4	1.6	3.3	4.7	3.1
B BAS-514	1.00	9.5	2.1	0.3	1.4	3.8	5.1	2.3
C BAS-514	2.00	9.8	1.8	0.6	1.4	3.4	6.2	2.3
D Matrix	0.03125	8.5	1.8	0.9	1.6	4.1	3.8	2.7
E Matrix	0.125	10.3	1.4	0.3	1.6	3.4	6.2	3.4
F Harmony	0.03125	9.4	2.7	0.5	0.6	3.1	5.6	2.4
G Harmony	0.125	10.3	1.6	0.4	1.3	3.6	7.9	2.9
H ER-40885	0.75	9.3	3.2	0.9	1.6	3.1	7.6	1.3
J ER-40885	3.00	9.5	3.2	0.8	1.9	2.7	6.5	3.0
K Prefar	4.00	8.0	2.4	0.4	1.5	3.4	7.0	2.8
L Prefar	16.00	10.3	2.3	0.7	1.4	2.1	6.8	2.7
M EL-107	0.50	10.3	1.8	0.3	1.8	2.1	5.3	2.2
N EL-107	2.00	9.5	1.3	0.6	0.8	3.3	3.7	1.8
P SC-00774	0.50	9.6	4.1	0.8	1.3	3.1	8.1	3.5
Q SC-00774	2.00	9.7	3.2	0.9	2.1	3.7	5.9	3.3
R Pyridate[1]	0.90	8.4	2.5	0.4	2.1	3.1	4.8	2.9
Q Pyridate[1]	3.60	8.1	1.9	0.2	1.3	2.1	4.9	2.6
T Untreated	---	8.6	2.5	0.2	1.4	1.9	4.4	2.4

*-Plants counted in 4' by 6" area in the center of the plot. Values represent average number of plants per foot of row.

7150/2

TABLE 9 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 9/15/87
EVALUATED: 10/27/87

HERBICIDE	Lb.ai/ Acre	STAND COUNT AS PERCENT OF UNTREATED - 10/27/87*						
		Wheat	Sugar-beet	Lettuce	Onion	Broccoli	Alfalfa	Rye Grass
A BAS-514	0.25	36	100	100	100	100	100	100
B BAS-514	1.00	100	84	100	100	100	100	96
C BAS-514	2.00	100	72	100	100	100	100	96
D Matrix	0.03125	99	72	100	100	100	86	100
E Matrix	0.125	100	56	100	100	100	100	100
F Harmony	0.03125	100	100	100	43	100	100	100
G Harmony	0.125	100	64	100	93	100	100	100
H ER-40885	0.75	100	100	100	100	100	100	54
J ER-40885	3.00	100	100	100	100	100	100	100
K Prefar	4.00	93	96	100	100	100	100	100
L Prefar	16.00	100	92	100	100	100	100	100
M EL-107	0.50	100	72	100	100	100	100	92
N EL-107	2.00	100	52	100	57	100	84	75
P SC-0774	0.50	100	100	100	93	100	100	100
Q SC-0774	2.00	100	100	100	100	100	100	100
R Pyridate 1/	0.90	98	100	100	100	100	100	100
S Pyridate 1/	3.60	94	76	100	93	100	100	100
T Untreated	---	100	100	100	100	100	100	100

*-Plants counted in 4' by 6" area in the center of the plot. Values represent the average of 4 replications and expressed as % of untreated.

7150A/1

TABLE 10 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 9/15/87
EVALUATED: 11/6/87

HERBICIDE	Lb.ai/ Acre	VIGOR RATING* - AVERAGE OF 4 REPS - 11/6/87						
		Wheat	Sugar-beet	Lettuce	Onion	Broccoli	Alfalfa	Rye Grass
A BAS-514	0.25	8.3	8.8	10.0	8.5	9.3	9.8	9.3
B BAS-514	1.00	9.3	7.5	9.0	9.3	9.3	7.5	9.3
C BAS-514	2.00	9.0	7.0	9.7	8.3	9.5	4.8	8.3
D Matrix	0.03125	8.8	6.3	6.5	8.3	9.3	7.0	8.0
E Matrix	0.125	9.5	8.3	9.5	10.0	9.0	8.3	7.8
F Harmony	0.03125	9.5	7.3	9.3	7.5	9.8	8.0	6.3
G Harmony	0.125	8.3	7.8	10.0	8.8	8.8	9.5	9.0
H ER-40885	0.75	9.5	8.8	10.0	9.3	9.5	10.0	9.3
J ER-40885	3.00	9.5	7.5	10.0	8.0	9.8	9.3	7.3
K Prefar	4.00	9.3	9.3	10.0	7.8	8.5	9.3	9.3
L Prefar	16.00	8.5	7.8	8.0	8.0	7.8	8.3	8.8
M EL-107	0.50	9.0	1.3	0	5.3	1.5	3.8	8.3
N EL-107	2.00	8.0	0.5	0	1.0	0.3	1.0	5.5
P SC-00774	0.50	9.3	8.8	9.3	7.3	7.0	7.3	7.3
Q SC-00774	2.00	9.3	9.0	9.5	9.5	9.0	8.5	9.3
R Pyridate[1]	0.90	9.3	9.3	9.7	8.8	7.5	5.8	9.5
Q Pyridate[1]	3.60	8.5	7.3	5.5	5.8	6.5	6.5	5.3
T Untreated	---	9.0	7.8	7.3	9.5	7.5	8.0	8.8

*-Vigor rating based on a 0 to 10 scale; 0=dead, 10=vigorously growing plants.

7150/4

TABLE 11 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 11/16/87
EVALUATED: 1/11/88

HERBICIDE	Lb.ai/ Acre	STAND COUNT PER FOOT OF ROW* - 1/11/88						
		Wheat	Sugar-beet	Lettuce	Onion	Broccoli	Alfalfa	Rye Grass
A BAS-514	0.25	4.2	5.5	2.6	6.1	7.0	5.5	6.0
B BAS-514	1.00	3.9	6.4	3.9	3.9	7.4	7.3	5.0
C BAS-514	2.00	3.3	3.3	2.2	4.4	6.7	4.5	5.6
D Matrix	0.03125	5.1	4.4	1.7	4.7	5.3	4.3	5.2
E Matrix	0.125	4.3	5.7	3.9	4.6	6.1	5.7	5.5
F Harmony	0.03125	5.6	4.4	1.3	4.9	5.4	6.4	4.8
G Harmony	0.125	3.8	5.4	2.9	4.2	5.2	5.6	5.5
H ER-40885	0.75	3.4	5.0	3.1	4.3	7.8	4.3	4.0
J ER-40885	3.00	3.8	6.3	2.1	4.7	6.7	5.0	3.9
K Prefar	4.00	2.6	4.3	2.4	4.7	4.9	5.1	4.6
L Prefar	16.00	2.9	5.1	2.4	4.2	6.1	4.9	5.4
M EL-107	0.50	4.1	2.3	2.1	5.7	5.5	5.9	4.8
N EL-107	2.00	2.9	2.0	0.3	3.8	4.2	3.7	5.4
P SC-00774	0.50	4.3	5.7	1.9	5.9	4.0	4.9	5.9
Q SC-00774	2.00	3.7	3.8	2.6	4.6	3.2	5.3	5.8
R Pyridate[1]	0.90	3.3	3.8	1.5	4.6	5.6	5.3	4.0
Q Pyridate[1]	3.60	3.0	3.9	1.0	3.8	5.9	3.9	5.2
T Untreated	---	3.5	3.9	1.6	4.9	4.4	4.4	4.8

*-Plants counted in 4' by 6" area in the center of the plot. Values represent average number of plants per foot of row.

7150/5

TABLE 12 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987

08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 11/16/87
EVALUATED: 1/11/88

HERBICIDE	Lb.ai/ Acre	STAND COUNT AS PERCENT OF UNTREATED* - 1/11/88						
		Wheat	Sugar-beet	Lettuce	Onion	Broccoli	Alfalfa	Rye Grass
A BAS-514	0.25	100	100	100	100	100	100	100
B BAS-514	1.00	100	100	100	80	100	100	100
C BAS-514	2.00	94	85	100	90	100	100	100
D Matrix	0.03125	100	100	100	96	100	98	100
E Matrix	0.125	100	100	100	94	100	100	100
F Harmony	0.03125	100	100	81	100	100	100	100
G Harmony	0.125	100	100	100	86	100	100	100
H ER-40885	0.75	97	100	100	88	100	98	83
J ER-40885	3.00	100	100	100	96	100	100	81
K Prefar	4.00	74	100	100	96	100	100	96
L Prefar	16.00	83	100	100	86	100	100	100
M EL-107	0.50	100	59	100	100	100	100	100
N EL-107	2.00	83	51	19	78	95	84	100
P SC-00774	0.50	100	100	100	100	91	100	100
Q SC-00774	2.00	100	97	100	94	73	100	100
R Pyridate[1]	0.90	94	97	94	94	100	100	83
Q Pyridate[1]	3.60	86	100	63	78	100	89	100
T Untreated	---	100	100	100	100	100	100	100

*-Plants counted in 4' by 6" area in the center of the plot. Values represent the average of 4 replications and expressed as % of untreated.

7150/6

TABLE 13 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987

08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 11/16/87
EVALUATED: 1/11/88

HERBICIDE	Lb.ai/ Acre	VIGOR RATING* - AVERAGE OF 4 REPS - 1/11/88						
		Wheat	Sugar-beet	Lettuce	Onion	Broccoli	Alfalfa	Rye Grass
A BAS-514	0.25	8.8	10.0	10.0	9.5	9.3	9.8	8.0
B BAS-514	1.00	7.5	8.3	8.8	8.3	10.0	9.5	8.5
C BAS-514	2.00	6.5	7.3	9.0	9.0	9.8	8.5	9.0
D Matrix	0.03125	9.8	10.0	7.3	8.8	9.5	6.8	8.8
E Matrix	0.125	8.8	9.3	9.8	9.0	10.0	9.3	8.0
F Harmony	0.03125	9.0	9.3	9.0	9.5	9.8	9.5	9.0
G Harmony	0.125	9.8	9.5	8.5	8.3	9.7	9.3	9.0
H ER-40885	0.75	7.8	9.8	9.5	8.3	10.0	9.8	8.5
J ER-40885	3.00	6.8	9.8	9.3	9.0	9.5	8.5	8.8
K Prefar	4.00	9.4	9.8	10.0	9.3	10.0	10.0	8.3
L Prefar	16.00	7.8	9.0	8.8	9.0	9.5	10.0	9.5
M EL-107	0.50	8.8	2.3	2.0	4.8	4.0	6.3	7.0
N EL-107	2.00	5.5	3.3	0.8	3.5	0.8	4.0	8.0
P SC-00774	0.50	7.5	9.5	6.5	6.8	6.0	6.3	7.0
Q SC-00774	2.00	7.8	8.8	9.0	9.3	6.5	9.8	8.8
R Pyridate[1]	0.90	9.3	9.3	8.3	10.0	7.8	7.0	7.0
Q Pyridate[1]	3.60	9.3	7.5	7.3	7.3	7.5	6.8	6.0
T Untreated	---	7.3	8.8	9.3	7.0	10.0	9.3	8.0

*-Vigor rating based on a 0 to 10 scale; 0=dead, 10=vigorously growing plants.

7150/3

TABLE 14 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987

08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. 3/30/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 4/4/88
EVALUATED: 4/28/88

HERBICIDE	Lb.ai/ Acre	AVERAGE NUMBER OF PLANTS PER FOOT OF ROW - 4/28/88*								
		Wheat	Cotton	Sugar Beets	Tomato	Beans	Melon	Onion	Sorghum	Avg.# Weeds
A BAS-514	0.25	2.4	2.1	10.1	5.0	1.0	1.0	7.4	3.9	2.4
B BAS-514	1.00	1.6	2.1	7.6	7.2	0.4	3.0	6.3	4.3	2.9
C BAS-514	2.00	1.9	1.6	8.4	6.7	0.7	3.2	5.4	4.1	1.4
D Matrix	0.03125	2.0	2.1	9.6	5.6	1.0	4.0	8.8	4.6	1.6
E Matrix	0.125	2.8	1.8	11.1	8.2	0.6	3.9	8.0	6.3	1.8
F Harmony	0.03125	1.9	4.4	9.9	6.9	1.1	4.6	6.3	4.6	1.7
G Harmony	0.125	3.3	1.8	8.4	7.0	0.9	2.6	6.6	5.1	0.4
H ER-40885	0.75	2.3	2.2	11.8	6.1	0.8	3.3	8.9	3.4	0.5
J ER-40885	3.00	2.6	2.3	10.4	7.6	0.9	5.1	7.8	4.4	0.2
K Prefar	4.00	2.3	2.1	10.4	6.5	0.9	3.5	6.1	4.1	0.4
L Prefar	16.00	2.4	2.8	9.4	7.4	1.0	3.7	9.8	3.7	0.1
M EL-107	0.50	2.3	2.4	7.8	9.3	1.8	6.4	8.4	5.6	0.0
N EL-107	2.0	3.2	2.0	0.0	2.0	0.4	1.9	6.6	3.0	0.0
P SC-0774	0.50	2.6	2.3	10.2	6.8	0.8	3.0	7.6	3.5	0.4
Q SC-0774	2.00	2.5	4.3	9.1	6.3	1.1	4.9	6.0	2.8	0.6
R Pyridate 1/	0.90	2.1	1.9	9.1	5.3	1.1	4.0	8.1	4.3	0.8
S Pyridate 1/	3.60	2.2	2.0	8.8	6.1	0.6	4.6	8.4	4.1	0.6
T Untreated	---	2.1	2.0	8.6	4.9	0.9	2.1	6.3	3.6	2.9

*-Plants counted in 4' by 6" area in the center of the plot. Values represent average number of plants per foot of row.

7150A/1

TABLE 15 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 4/4/88
EVALUATED: 4/28/88

HERBICIDE	Lb.ai/ Acre	VIGOR RATING* - AVERAGE OF 4 REPS - 4/28/88							
		Wheat	Cotton	Sugar Beet	Tomato	Bean	Melon	Onion	Sorghum
A BAS-514	0.25	9.0	9.0	9.5	9.8	9.0	8.0	9.0	8.3
B BAS-514	1.00	8.5	7.5	7.8	9.0	8.0	8.7	8.3	8.3
C BAS-514	2.00	9.8	8.5	9.5	9.3	9.3	9.0	9.3	9.0
D Matrix	0.03125	9.5	9.3	8.3	9.3	7.3	9.3	9.8	9.5
E Matrix	0.125	9.8	9.3	9.5	9.5	9.8	9.5	8.0	9.5
F Harmony	0.03125	9.8	8.7	9.3	9.5	9.3	9.3	7.8	8.7
G Harmony	0.125	9.3	8.7	9.3	10.0	10.0	9.3	8.5	9.3
H ER-40885	0.75	9.5	9.8	9.5	9.8	10.0	9.3	8.8	8.0
J ER-40885	3.00	9.8	9.5	10.0	9.8	9.0	9.0	8.7	9.8
K Prefar	4.00	10.0	9.8	10.0	10.0	9.5	10.0	8.3	9.0
L Prefar	16.00	9.8	9.8	10.0	10.0	10.0	9.5	9.5	8.8
M EL-107	0.50	8.7	9.5	5.5	8.5	9.5	8.7	7.8	9.0
N EL-107	2.00	9.8	8.0	0	1.8	3.0	5.5	6.8	6.8
P SC-00774	0.50	9.5	10.0	9.0	9.3	9.0	9.3	8.3	8.7
Q SC-00774	2.00	9.8	9.8	9.8	9.8	9.5	9.8	9.0	9.5
R Pyridate[1]	0.90	9.8	9.3	8.3	8.7	10.0	9.8	9.3	8.3
Q Pyridate[1]	3.60	8.8	9.5	8.5	9.0	9.3	9.5	9.5	8.5
T Untreated	---	8.5	9.0	9.5	10.0	9.8	9.5	8.5	9.0

*-Vigor rating based on a 0 to 10 scale; 0=dead, 10=vigorously growing plants.

7150A

TABLE 16 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 4/4/88
EVALUATED: 5/12/88

HERBICIDE	Lb.ai/ Acre	VIGOR RATING* AND WEED CONTROL EVALUATION - AVG. OF 4 REPS. - 5/12/88									
		Wheat	Cottn.	Sgr. Beet	Tom.	Bean	Melon	Onion	Sorg.	% Wd. Contr.	Wds.** Present
A BAS-514	0.25	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	6	Chw,I,Pl
B BAS-514	1.00	10.0	9.7	10.0	10.0	10.0	10.0	10.0	10.0	0	B,I,Pl,Sp
C BAS-514	2.00	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	0	B,Chw,I,Pl
D Matrix	0.03125	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	0	B,Chw,I,Pl,Sp
E Matrix	0.125	10.0	9.7	10.0	10.0	10.0	10.0	10.0	10.0	0	I
F Harmony	0.03125	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	0	B,I,La,Pl,Rg
G Harmony	0.125	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	19	Chw,I,La,Pl, Sp
H ER-40885	0.75	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	41	Chw,I,Pl,S
J ER-40885	3.00	10.0	10.0	10.0	10.0	9.0	9.5	10.0	10.0	70	Chw,I,La,Pl, Sp
K Prefar	4.00	10.0	10.0	10.0	10.0	10.0	10.0	9.2	10.0	44	B,I,La,Pl,Sp
L Prefar	16.00	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	77	Chw,I,La,O, Pl,Sp
M EL-107	0.50	10.0	10.0	3.5	4.7	9.7	8.2	9.5	10.0	91	A,B,I,Pl,Rg
N EL-107	2.00	10.0	9.7	0	0.7	6.5	3.2	7.7	9.2	95	I,Pl,Rg
P SC-00774	0.50	10.0	10.0	9.5	9.5	9.5	10.0	10.0	10.0	20	A,B,Chw,I, Pl,S
Q SC-00774	2.00	10.0	10.0	10.0	9.5	10.0	10.0	10.0	10.0	39	B,I,Pl,Sp
R Pyridate[1]	0.90	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	21	A,B,I,La, Pl,S
Q Pyridate[1]	3.60	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	37	B,I,La,Pl,Rg
T Untreated	---	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	12	B,I,La,Pl

*Vigor rating based on a 0 to 10 scale; 0=dead, 10=vigorously growing plants.

**A=annual bluegrass, B=bermudagrass, Chw=chickweed, I=pigweed, La=lambsquarter, O=groundsel, Pl=purslane, Rg=ryegrass, S=sowthistle, Sp=shepherd's purse

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TABLE 17 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' 30', Reps 4
PLANTED: 6/23/88
EVALUATED: 7/8/88

HERBICIDE	Lb.ai/ Acre	STAND COUNT PER FOOT OF ROW - 7/8/88* Sorgm.	Cotn.	Tom.	Sgr. Bts.	Melon	Blkeye. Beans	Eggpl.	# Bdlf.	# Grass	WEEDS PRESENT**
A BAS-514	0.25	1.6	3.0	9.1	5.9	1.7	2.4	3.5	6.8	1.1	B,I
B BAS-514	1.00	2.2	1.7	8.9	7.1	1.6	3.2	4.6	12.1	0.6	B,I,Ns,Ps
C BAS-514	2.00	1.7	2.2	9.2	7.2	1.7	2.4	4.3	7.2	0.1	B,I,Ps
D Matrix	0.03125	1.5	2.5	8.9	6.4	1.5	2.9	2.6	17.7	0.4	B,I,M,Ns,Ps
E Matrix	0.125	1.6	2.7	13.6	6.7	1.4	2.9	4.6	4.1	0.6	B,I,Ps
F Harmony	0.03125	1.5	2.5	8.9	5.4	1.4	2.4	2.7	4.9	0.8	B,I,M,Ps
G Harmony	0.125	1.4	2.3	10.5	5.9	1.9	3.2	4.1	2.5	0.4	B,I,Ps
H ER-40885	0.75	1.4	2.2	9.1	6.9	2.2	3.2	3.0	1.7	0.2	B,I,Ps
J ER-40885	3.00	1.7	2.3	8.6	7.9	2.3	2.9	2.7	1.0	0	I,La,M
K Prefar	4.00	1.9	2.4	9.9	7.0	1.9	2.4	3.2	1.4	0.06	B,I,Ps,S
L Prefar	16.00	1.9	2.2	9 9	7.1	2.0	2.6	3.2	0.4	0.2	B,I,Ps
M EL-107	0.50	1.7	1.8	9.5	7.0	1.4	2.2	3.6	0.06	0.5	B,I
N EL-107	2.00	1.0	2.6	6.0	1.4	1.9	2.7	2.0	0.6	0.8	B,Ps
P SC-0774	0.50	1.3	2.4	8.7	5.0	2.0	3.1	2.7	2.1	1.4	B,I,Ns,Ps
Q SC-0774	2.00	1.2	2.6	8.7	6.1	1.8	2.6	2.8	3.3	4.5	B,I,Ps,S
R Pyridate 1/	0.90	1.2	1.9	10.0	5.9	2.2	3.0	2.9	3.5	2.2	B,I,Ps,S
S Pyridate 1/	3.60	1.8	2.3	7.7	6.9	1.5	2.7	3.8	1.5	0.5	B,I,Ps
T Untreated	----	1.6	2.1	8.7	4.9	1.4	2.5	3.0	8.2	0.4	B,I,Ps,S

*Plants counted in 4' by 6" area in the center of the plot. Values represent average number of plants per foot of row.

**WEEDS PRESENT: B = barnyardgrass; I = pigweed; La = lambsquarter; M = marestail; Ns = nightshade; Ps = purslane; S = sowthistle

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TABLE 18 - EVALUATION OF HERBICIDE PERSISTENCE STUDY - 1987
08, 425, 453, 10, 87-1

LOCATION: West Side Field Station
IRRIGATION METHOD: Furrow
HERBICIDES APPLIED: PPI - 3/30/87
Postem. - 4/20/87 1/

SOIL TYPE: Panoche clay loam
PLOT SIZE: 20' x 30', Reps 4
PLANTED: 6/23/88
EVALUATED: 7/8/88

HERBICIDE	Lb.ai/ Acre	VIGOR RATING2/ - AVERAGE OF 4 REPLICATIONS - 7/8/88						
		Sorghum	Cotton	Tomatoes	Sugar Beets	Melon	Blackeye Beans	Eggplant
A BAS-514	0.25	9.0	10.0	10.0	9.5	9.5	10.0	9.5
B BAS-514	1.00	10.0	8.2	10.0	9.2	10.0	10.0	10.0
C BAS-514	2.00	9.2	9.7	9.7	9.2	9.5	9.7	9.7
D Matrix	0.03125	7.0	9.5	10.0	10.0	10.0	10.0	10.0
E Matrix	0.125	9.0	10.0	10.0	9.0	9.7	10.0	10.0
F Harmony	0.03125	9.5	9.5	10.0	9.7	9.0	10.0	9.7
G Harmony	0.125	7.2	9.5	10.0	9.7	10.0	10.0	10.0
H ER-40885	0.75	7.7	9.5	9.5	9.5	10.0	10.0	9.5
J ER-40885	3.00	7.0	9.7	10.0	9.7	9.7	10.0	10.0
K Prefar	4.00	9.5	9.7	10.0	10.0	10.0	10.0	9.7
L Prefar	16.00	10.0	9.5	10.0	10.0	10.0	10.0	9.7
M EL-107	0.50	8.7	9.2	5.7	2.0	8.5	10.0	9.0
N EL-107	2.00	6.7	9.5	4.0	0.5	7.0	9.0	6.5
P SC-0774	0.50	8.0	9.2	9.7	9.2	10.0	10.0	9.7
Q SC-0774	2.00	7.2	9.5	10.0	9.7	10.0	10.0	9.7
R Pyridate 1/	0.90	9.7	9.7	10.0	9.7	9.5	9.7	9.2
S Pyridate 1/	3.60	9.5	9.5	9.7	9.0	9.7	10.0	10.0
T Untreated	----	9.7	9.0	9.7	9.2	9.7	10.0	9.7

2/- Vigor rating based on a scale of 0 to 10; 10=vigorously growing plants, 0=dead plants.

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TOWARD MORE EFFECTIVE WEED CONTROL

Without knowledge of the weed infestation it isn't possible to intelligently plan an economical weed control program.

To help identify weeds, the University of California's "Growers Weed Identification Handbook" may be helpful. It contains colored photographs and descriptions of 231 commonly occurring weeds in different stages of their growth. The pictures in a sturdy, 3-ring binder, can be purchased from Agricultural and Natural Resources, 6701 San Pablo, Oakland, California 94608.

Being able to identify weeds is but the first step. Keeping records of their presence is essential to use selective herbicides intelligently. Cards, such as the one illustrated below, can be used to keep records of weed infestations. They are available from Cooperative Extension offices, from pest control advisors and distributors of herbicides.

WEED INFESTATION RECORD

FIELD LOCATION _____ CROP _____ HERBICIDE USED _____

DATE PLANTED _____ DATE NOTES TAKEN _____ PREVIOUS CROP _____

BROADLEAF ANNUALS	Anise	Atriplex	Bassia Five Hook	Black Bindweed	Bristly Oxtongue	Burweed	Carpetweed	Cat's Ear	Cheeseweed
Chickweed	Clover	Cocklebur	Corn Spurry	Cudweed	Dandelion	Dock	Dodder	Fat Hen	Fiddleneck
Filaree	Flaxleaved Fleabane	Ground-cherry	Groundsel	Hemlock	Henbit	Jimson Weed	Knotweeds	Lambsquarters	Lettuce Wild
London Rocket	Mare's Tail	Mayweed	Milk Thistle	Minerslettuce	Morning Glory	Mustard	Nettle	Nettleleaf Goosefoot	Nightshade
Nuttalls Monolepis	Phacelia	Pigweed	Pineapple Weed	Plantain	Puncture Vine	Purslane	Red Maids	Russian Thistle	Scarlet Pimpernel
Shepherd's Purse	Sow Thistle	Spiny Clotbur	Spurge	Sunflower, Common	Tarweed	Telegraph-plant	Toadflax	Turkey Mullein	Velvet Leaf
Venice Mallow	Veronica	Willow Herb	Yellow Starthistle						
GRASSES ANNUAL	Annual Bluegrass	Barley, Volunteer	Barnyard-grass	Bromegrass	Canarygrass	Cupgrass	Dallisgrass	Diffuse Lovegrass	Feather Finger-grass
Foxtails (Bristle-grass)	Jungle Rice	Orcutts Lovegrass	Rabbitfootgrass	Ripgut Brome	Ryegrass	Sandbur	Sprangletop	Wild Barley (Foxtails)	Wild Oats
Witchgrass									
PERENNIALS	Alkali Sida	Bermudagrass	BINDWEED (Morning Glory)	Cattail	Chickory	Heliotrope	Hoary Cress	Johnsongrass	Nutsedge, Purple
Nutsedge, Yellow	Russian Knapweed	Saltgrass	SILVERLEAF NIGHTSHADE (Horsenettle)	Swamp Smart-weed (Kelp)	Tolgoucha	Tule			

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