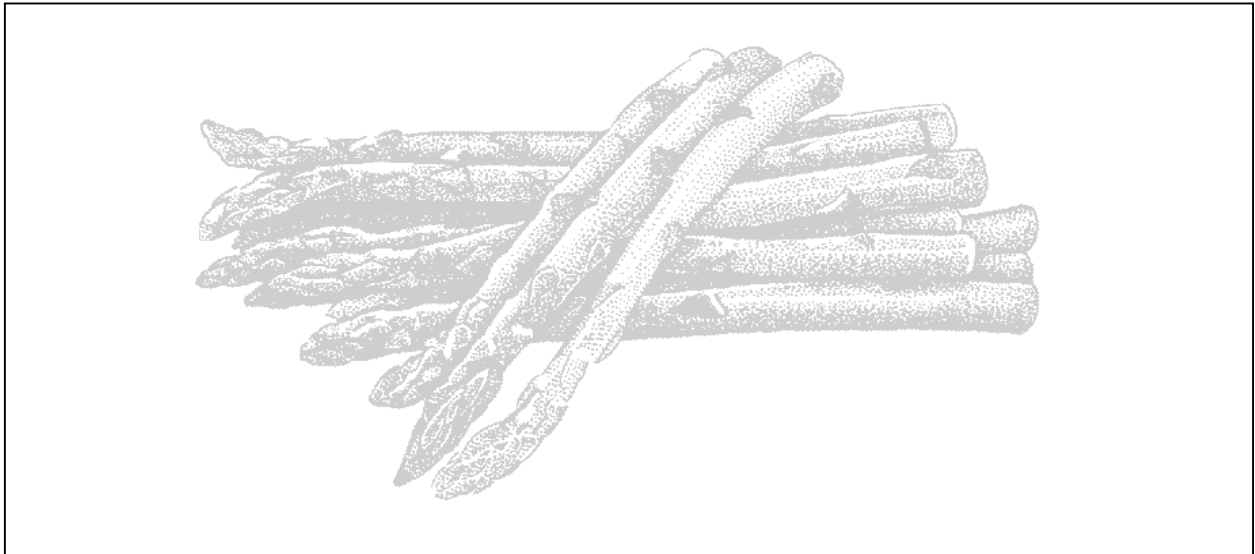


ASPARAGUS

Variety Evaluation & Pest Management
in San Joaquin County



2003 Research Progress Report

University of California Cooperative Extension
420 South Wilson Way
Stockton, California 95205-6243

**2003 ASPARAGUS VARIETY EVALUATION
AND PEST MANAGEMENT TRIALS**

RESEARCH PROGRESS REPORT

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The asparagus variety evaluation and pest management research program in San Joaquin County is conducted with the cooperation and management assistance of the following growers and managers: Bill Zech, Tony Piazza and Alan Carlisle, Ed Zuckerman, Ken Jochimsen, and Troy Elliott as well as the California Asparagus Commission. It is their fine cooperation, financial and in-kind support and patience that benefits all asparagus growers in San Joaquin County and elsewhere. Great appreciation and many thanks are extended to these individuals for their contributions and interest.

CAUTION

This publication is a research progress report of asparagus cultivar evaluation trials and pest management studies conducted in San Joaquin County during 2003. This report presents results of asparagus weed management trials conducted with local grower cooperators. They should not, in any way, be interpreted as a recommendation of the University of California. Chemical or common names of pesticides are used in this report instead of the more common trade names of those products. No endorsement of products mentioned or criticism of similar products is intended. The rates of pesticides in this report are always expressed as active ingredients (A.I.) of the material per treated acre, unless otherwise indicated.

<u>Trade Name</u>	<u>Common or Chemical Name</u>	<u>Manufacturer</u>
Devrinol (2E)	napropamide	Zeneca Ag Products
Authority (75DF)	sulfentrazone	FMC Corporation
Karmex (80DF)	diuron	DuPont Ag Products
Lorox (50DF)	linuron	DuPont Ag Products
Solicam (80DF)	norflurazon	Syngenta Crop Protection
Sandea (75WG)	halosulfuron	Gowan Chemical Co.
Prowl (3.3E)	pendimethalin	BASF Corporation
Sencor (75DF)	metribuzin	Bayer Ag Chemicals
Valor (50WP)	flumioxazin	Valent U.S.A. Corporation
Stinger (3.0 E)	clopyralid	Dow AgroSciences
Prism (0.94E)	clethodim	Valent U.S.A. Corporation
Roundup Ultra (5L)	glyphosate	Monsanto Chemical Co.

CULTIVAR EVALUATION TRIALS

UC Asparagus Cultivar Evaluation Trial (Victoria Island Farms) – This trial, planted with one-year-old crowns in 1998, was harvested 32 times over a 75 day period. Drip irrigation is being used to supply the majority of the moisture requirements of the trial field as well as serving as a fertilizer delivery system to the plant stand. The trial contains 12 replicated cultivars with another 13 in single replication observation plots. Cultivars in the trial are from Dr. Mikeal Roose’s breeding program at UC Riverside, Brian Benson’s private breeding program near Davis, California, and Dr. Marc Darbonne’s private breeding enterprise in France. Some stand loss in a couple of the slower growing varieties occurred, during the 1998 trial establishment season, from excessive early filling of the planted trenches with soil, causing smothering of some crowns. As in the three previous cutting seasons, excellent production in a number of replicated and observation cultivars occurred during the 2003 harvest season. Yields were down 10 to 20% from the 2002 trial results however, due to cool conditions that prevailed over a good portion of the cutting period. The highest yielding line in the replicated trial was UCR 115 at 9,373 Lbs/Acre, followed by Atlas (8,311 Lbs/Acre), Grande (7,007 Lbs/Acre), UCR 65 (6,963 Lbs/Acre), UC 157F₁ (5,805 Lbs/Acre), and UCR 112 (5,596 Lbs/Acre). Best spear quality was attained by UCR 115 and UCR 87, followed by UCR 60, UCR 65, UC 157F₁ and UCR 112. Largest spear size occurred with Atlas, followed by Apollo, Grande, UCR 112, UCR 87 and UCR 88. Spear size was down considerably from last year’s trial and this was true for the Sacramento-San Joaquin Delta production area as a whole in 2003, while spear number per acre was up in 2003 over the 2002 season. There has been concern in the past that plant spacing (12 inches between crowns in this trial), fertilization and drip irrigation might result in spear sizes too large for the current market demand by buyers and consumers. Complete replicated trial data is given in **Table 1**.

In the 13-line observation cultivar block, greatest yield was achieved by UCR 96 at 6,309 Lbs/Acre, followed by UCR 122 (5,929 Lbs/Acre), UCR 79 (5,924 Lbs/Acre), PLA 2232 (5,853 Lbs/Acre) and Cipres (5,731 Lbs/Acre). Best spear quality was demonstrated by UCR 69 and UCR 107, followed by UCR 122 and UCR 66. Spear size, like the replicated trial, was smaller in 2003 compared to 2002. Largest spear size occurred with UCR 96, followed by Cipres, UCR 107 and PLA 2232. Complete observation trial data is shown in **Table 2.**

UC Asparagus Cultivar Evaluation Trial (Zuckerman-Heritage Farms).

A new asparagus cultivar evaluation trial was established at Zuckerman-Heritage Farms on McDonald Island using one-year-old crowns grown by California Vegetable Specialties (Rich Collins) near Delhi, California, and some provided by Ed Zuckerman and Ken Jochimsen from their crown nursery. The trial was planted, in a field of UC 157F₁ that was set up for drip irrigation, on February 7, 2002. The trial contains 12 replicated varieties and another 29 observation lines in single or two replication plots. Advanced cultivars from Dr. Mikeal Roose's breeding program at UC Riverside, Dr. Steve Garrison's breeding program at Rutgers University in New Jersey and the private asparagus variety development program from Brian Benson's California Asparagus Seed and Transplant near Davis, California make up the trial. The trial was harvested 14 times over a 30-day period during 2003. In the replicated trial block, the best yield came from Grande at 2,490 Lbs/Acre, followed by Atlas (2,121 Lbs/Acre), Apollo (2,064 Lbs/Acre), NJ 953 (2,058 Lbs/Acre), Jersey Supreme (1,950 Lbs/Acre), UC 157F₁ (1,850 Lbs/Acre), NJ 977 (1,826 Lbs/Acre) and UCR 115 (1,576 Lbs/Acre). Largest spear size occurred with Grande, followed by Atlas, Dulce Verde, F586 x M256, Purple Passion, NJ 977, and UC 157F₁. Purple Passion and Dulce Verde had weak stands in 2003 even though the establishment stands of these two lines in 2002 was fair to good. Complete replicated trial data is presented in **Table 3.**

In the 29 cultivar observation trial, excellent yields were attained, led by NJ 982 at 4,010 Lbs/Acre and followed by F82-2 x M256 (3,184 Lbs/Acre), NJ 956 (3,143 Lbs/Acre), NJ 978 (2,964 Lbs/Acre), FCE3 x M256 (2,889 Lbs/Acre), F172 x M256 (2,819 Lbs/Acre), FCE7 x M256 (2,784 Lbs/Acre), FCE1 x M256 (2,781 Lbs/Acre) and F177 x M256 (2,728 Lbs/Acre). Best spear quality was shown by FCE7 x M256, followed by F82-2 x M256, FCE3 x M256, FCE1 x M256, F177 x M256, F137 x MCE4, FCE1 x M120 and F133 x M256. Largest spear size occurred with F82-2 x M256, NJ 956, NJ 976, FCE7 x M256, F133 x M256 and NJ 937. Complete observation trial data is contained in **Table 4.**

One of the constant problems observed in local asparagus stand establishment is the use of one-year-old crowns from grower nurseries in the San Joaquin-Sacramento Delta area. Most of these nurseries are located in fields with a recent history of asparagus culture and consequently have high inoculum levels of Fusarium wilt (Fusarium oxysporum, f.sp. asparagi and Fusarium moniliforme). Because the disease is the most serious pathogen affecting asparagus production, growers are encouraged to put their crown nursery plantings in soils without a crop history of asparagus and to fumigate the nursery site ensuring good healthy crowns for planting in new production beds. The final planting sites for new

production beds ideally should also be in ground without an asparagus crop history to reduce chances of asparagus infection from Fusarium.

When the new asparagus cultivar evaluation trial was established at Zuckerman-Heritage Farms in 2002, a separate mini-trial was also planted comparing crowns of four UC cultivars (UC 157F₁, UCR 115, F141 x M256 and F586 x M256) from different nursery sites – one a grower nursery in the Delta with previous asparagus crop history and the other a non-asparagus crop history nursery site that was on fumigated ground in Delhi, California. Initial growth of the crowns at the Zuckerman-Heritage Farms site was superior for all four varieties from the Delhi nursery over the same four varieties from the grower nursery site in the Delta. Yields of these plots were taken for 30 days during the 2003 season. Once again, all four of the varieties from the Delhi fumigated nursery site outyielded the same four varieties from Delta nursery site, where Fusarium had been present. Yield increases for the Delhi source crowns ranged from 275 to 1,652 pounds higher, depending on variety, over the Delta source crowns. The take-away lesson here would be to locate asparagus crowns away from Fusarium infested Delta soils. Fumigation on these highly organic soils has only been partially effective at best. A nursery located on a mineral soil with no asparagus history plus a fumigation would give the best payback to produce healthy, disease free crowns for planting. Complete data on the results of the asparagus nursery comparison are presented in **Table 5**.

Table 1. 2003 DRIP IRRIGATED ASPARAGUS CULTIVAR EVALUATION TRIAL
Victoria Island Farms – Victoria Island
32 Harvests – Cut For 75 Days
(Replicated Varieties)

Cultivar	Yield ¹ Lbs/Acre	No. Spears ¹ per Acre	Average Spear ¹ Wt. (g.)	Spear Quality	Spear Quality Rank
UCR 115	9,373	180,617	23.6	Good – Very Good	1
Atlas	8,311	118,048	32.0	Fair – Some Good	7
Grande	7,007	116,392	27.3	Fair – Some Good	8
UCR 65	6,963	131,725	24.0	Fair – Good	4
UC 157F ₁	5,805	123,536	21.3	Fair – Good	5
UCR 112	5,596	94,787	26.8	Fair – Good	6
Apollo	5,381	89,298	27.4	Marginally Fair	12
UCR 88	5,320	91,824	26.3	Fair – Some Good	9
UCR 60	4,818	88,862	24.6	Good	3
UCR 87	4,519	77,101	26.6	Good – Very Good	2
UCR 82	3,849	79,018	22.1	Marginally Fair	11
UCR 62	2,757	48,874	25.6	Fair	10
LSD @ 5%:	2,236	31,983			
C.V. =	26.7%	21.5%			

¹ Average of four replications

Table 2. 2003 DRIP IRRIGATED ASPARAGUS CULTIVAR EVALUATION TRIAL
Victoria Island Farms – Victoria Island
32 Harvests – Cut For 75 Days
(Observation Varieties)

Cultivar	Yield ¹ Lbs/Acre	No. Spears per Acre ¹	Average Spear ¹ Wt. (g.)	Spear Quality	Spear Quality Rank
UCR 96	6,309	115,695	24.8	Fair	7
UCR 122	5,929	119,180	22.6	Fair – Good	3
UCR 79	5,924	125,453	21.4	Fair –Some Good	5
PLA 2232	5,853	113,256	23.5	Fair –Some Good	6
Cipres	5,731	107,680	24.2	Poor – Fair	10
UCR 69	5,311	127,195	19.0	Good	2
UCR 107	4,605	88,514	23.6	Good	1
UCR 64	4,080	95,832	19.3	Fair	8
UCR 66	3,761	77,363	22.1	Fair – Good	4
DA 909	3,658	82,590	20.1	Fair	9

¹ Average of only one replication

Table 3. 2003 ASPARAGUS CULTIVAR EVALUATION TRIAL *
Zuckerman – Heritage Farms; McDonald Island
(14 harvests – 30 days)
Replicated Lines

Cultivar	Yield ¹ Lbs/Acre	No. Spears ¹ per Acre	Average Spear Wt. (g.)	Spear Quality
Grande	2,490	34,500	32.8	Fair to Good
Atlas	2,121	30,056	32.0	Fair to Good
Apollo	2,064	33,977	27.6	Poor to Fair
NJ 953	2,058	36,678	25.5	Poor to Fair
Jersey Supreme	1,950	33,715	26.3	Poor
UC 157F ₁	1,850	30,056	27.9	Good
NJ 977	1,826	29,534	28.1	Fair
UCR 115	1,576	27,269	26.2	Good
F586 x M256	1,373	20,560	30.3	Poor to Fair
F141 x M256	1,349	23,435	26.1	Marginally Fair
Purple Passion	420	6,534	29.2	Poor to Fair
Dulce Verde	293	4,356	30.5	Poor
LSD @ 5%:	415	7,864		
C.V. =	17.8%	21.1%		

¹ Average of four replications

* Trial was planted with one-year-old crowns in 2002 and is drip irrigated

Table 4. 2003 ASPARAGUS CULTIVAR EVALUATION TRIAL *
Zuckerman – Heritage Farms; McDonald Island

(14 harvests - 30 days)
Observation Lines

Cultivar	Yield ¹ Lbs/Acre	No. Spears ¹ per Acre	Average Spear Wt. (g.)	Spear Quality
NJ 982	4,010	70,044	26.0	Poor to Fair
F82-2 x M256	3,184	47,393	30.5	Fair to Good
NJ 956	3,143 ²	48,439 ²	29.5	Fair
NJ 978	2,964	54,363	24.8	Fair
FCE3 x M256	2,889 ²	51,749 ²	25.3	Fair to Good
F172 x M256	2,819 ²	48,787 ²	26.2	Fair
FCE7 x M256	2,784	44,954	28.1	Good
FCE1 x M256	2,781	50,878	24.8	Fair to Good
F177 x M256	2,728	47,045	26.3	Fair to Good
NJ 990	2,589	44,605	26.4	Poor to Fair
F137 x MCE4	2,538 ²	47,742 ²	24.1	Fair to Good
FCE1 x M120	2,525 ²	43,037 ²	26.6	Fair to Good
NJ 937	2,521	41,469	27.6	Poor to Fair
NJ 1018	2,520	47,045	24.3	Marginally Fair
F133 x M256	2,345	38,333	27.8	Fair to Good
NJ 976	2,130	33,106	29.2	Poor to Fair
NJ 1021	2,053	37,984	24.5	Poor to Fair
NJ 963	1,858	37,287	22.6	Poor
FCE2 x HMJ	1,678 ²	29,795 ²	25.6	Poor to Fair
FCE1 x A1	1,613 ²	32,931 ²	22.2	Poor to Fair
F177 x MCE1	1,550	36,242	19.4	Fair
F177 x MCE2	1,428	26,833	24.2	Marginally Fair
F133 x HMJ	685	16,727	18.6	Poor to Fair

¹ Average of only one replication

² Average of two replications

*Trial was planted with one-year-old crowns in 2002 and is drip irrigated

Table 5.

2003 ASPARAGUS CULTIVAR EVALUATION TRIAL *
Zuckerman – Heritage Farms; McDonald Island

(14 harvests - 30 days)

SELECTED CULTIVAR COMPARISON OF CROWNS FROM TWO DIFFERENT NURSERIES

Cultivar	Yield Lbs/Acre	No. Spears per Acre	Average Spear Wt. (g.)	Spear Quality
UC 157F ₁ (Delhi)	2,991 ¹	51,401 ¹	26.4 ¹	Fair to Good
UC 157F ₁ (McDonald Island)	2,350 ²	36,590 ²	29.2 ²	Fair
UCR 115 (Delhi)	3,833 ³	57,848 ³	30.1 ³	Fair to Good
UCR 115 (McDonald Island)	2,181 ³	34,151 ³	29.0 ³	Fair to Good
F141 x M256 (Delhi)	2,817 ³	41,469 ³	30.8 ³	Poor
F141 x M256 (McDonald Island)	1,646 ³	27,878 ³	26.8 ³	Marginally Fair
F586 x M256 (Delhi)	1,591 ³	27,181 ³	26.6 ³	Poor to Fair
F586 x M256 (McDonald Island)	1,316 ³	18,121 ³	33.0 ³	Poor

¹ Average of four replications

² Average of two replications

³ Average of only one replication

*Trial was planted with one-year-old crowns in 2002 and is drip irrigated

Pest Management Research Trials

A preemergence weed control trial in newly planted one-year-old asparagus crowns.

Robert Mullen and Don Colbert

A preemergence weed control trial in newly planted one-year-old asparagus crowns, evaluating six herbicides and/or combination treatments, was established on March 6, 2003, at Victoria Island Farms on Victoria Island, west of Stockton, California. All treatments were applied after the asparagus crowns had been planted and covered with 3 to 4 inches of soil. A handheld CO₂ backpack sprayer was used with a spray volume of 30 gallons water per acre, 8002 nozzles and Roundup Ultra (glyphosate) added to each treatment at a rate of 1.00 Lb/Acre A.I. to remove any emerged weeds. Soil incorporation of the soil surface-applied herbicides was accomplished by winter rainfall. The soil type at the trial site was an Egbert muck/Staten peaty muck mix. Plot design was a randomized complete block. The field was planted to the asparagus cultivar UC 157F₁, as one-year-old crowns, in late February 2003. The trial was evaluated for weed control efficacy and crop fern vigor on April 10, 2003, and again on May 1, 2003. Best control of the major weeds present at the two rating dates – Jimson weed and wild radish – occurred with Valor (flumioxazin) at both rates tested, followed by the combination treatment of Solicam (norflurazon) plus Karmex (diuron), Authority (sulfentrazone) alone, the combination treatment of Solicam plus Devrinol (napropamide) and Prowl (pendimethalin) alone. All treatments exhibited very good crop safety.

2003 ASPARAGUS PREEMERGENCE WEED CONTROL
 (Newly Planted One-Year-Old Crowns)
 Victoria Island Farms, Victoria Island, California

Treatment	Rate Lb./Ac. A.I.	Weed Control ¹				Crop ¹ Fern Vigor	
		Jimson Weed		Wild Radish			
		<u>4/10</u>	<u>5/1</u>	<u>4/10</u>	<u>5/1</u>	<u>4/10</u>	<u>5/1</u>
Authority (75DF)	1.00	8.0	8.3	10.0	10.0	9.0	9.3
Valor (51WDG)	0.125	8.9	9.3	10.0	10.0	9.0	9.3
Valor	0.250	9.1	9.3	10.0	10.0	8.5	9.1
Prowl (3.8CS)	4.00	8.0	8.6	9.0	9.1	8.9	9.1
Prowl + Karmex (80DF)	4.00 + 2.00	7.8	8.3	9.4	8.8	9.1	9.0
Karmex + Devrinol (50DF)	2.00 + 2.00	7.4	6.5	9.8	8.5	9.0	9.0
Solicam (80DF) + Karmex	2.00 + 2.00	8.3	8.5	10.0	10.0	9.1	9.3
Solicam + Devrinol	2.00 + 2.00	8.1	8.0	9.0	8.9	8.6	9.0
Untreated Control	-----	1.7	0.8	1.8	1.0	8.9	9.3

¹ Average of four replications: Weed Control – 0 = no weed control; 10 = complete weed control
 Crop Fern Vigor – 0 = crop dead; 10 = crop growing vigorously

Notes:

1. Prowl alone was missing some swamp smartweed
2. The combination of Prowl + Karmex missing some common lambsquarter
3. The combination of Karmex + Devrinol missing some swamp smartweed
4. The combination of Solicam + Karmex missing a little common lambsquarter
5. Untreated Control contains swamp smartweed, common lambsquarter and some Italian ryegrass

A postemergence weed management trial in newly planted one-year-old asparagus crowns. Robert Mullen

A postemergence weed management trial in newly planted one-year-old asparagus crowns, evaluating five herbicides and/or combination treatments, was established on May 1, 2003, at Victoria Island Farms on Victoria Island west of Stockton, California. All treatments were applied with a handheld CO₂ backpack sprayer using 8002 nozzles and a spray volume of 30 gallons water per acre. The soil type at the trial site was an Egbert muck/Staten peaty muck mix and the asparagus field variety was UC 157F₁. The plot design was a randomized complete block. The field had been planted in late February 2003 with one-year-old asparagus crowns that were then covered with 3 to 4 inches of soil shortly after planting. Weeds present at the time of herbicide treatment included cotyledon to 8 inch tall Jimson weed, cotyledon to 5 inch tall wild radish, a few 3 to 5 true leaf yellow nutsedge, a few cotyledon to 8 inch tall swamp smartweed, a few 3 to 6 inch rosette common knotweed and a few 4 to 8 inch tall Italian ryegrass; the crop fern at treatment was 6 to 20 inches tall. Herbicides were applied over the top of the weeds and crop fern. The trial was evaluated for weed control efficacy and crop safety on 5/15/03. Best control of the two major weed species in the trial, Jimson weed and wild radish, occurred with the combination treatment of Lorox (linuron) plus Prism (clethodim) plus COC (Crop Oil Concentrate), followed by Sencor (metribuzin) alone and Lorox alone. Sandea (halosulfuron) plus COC gave good control of wild radish but was weak on Jimson weed. Stinger (clopyralid) plus Prism plus COC was poor on both Jimson weed and wild radish. All materials gave good safety to the crop with only slight temporary fern chlorosis occurring with the combination of Lorox plus Prism plus COC.

2002 ASPARAGUS POSTEMERGENCE WEED CONTROL
 (Newly Planted One-Year-Old Crowns)
 Victoria Island Farms, Victoria Island, California

Treatment	Rate Lb./Ac. A.I.	Weed Control ¹		Crop ¹ Fern Phyto
		Jimson Weed	Wild Radish	
Sencor (75DF)	1.00	9.8	9.6	1.1
Lorox (50DF)	1.00	9.1	8.1	0.8
Lorox + Prism (0.94E) + COC	1.00 + 0.188 + ½%	9.8	10.0	1.4
Sandea (75WG) + COC	0.031 + 1%	5.4	8.6	0.9
Stinger (3.0E) + Prism + COC	0.25 + 0.188 + ½%	3.5	5.5	1.0
Untreated Control	-----	0.0	0.0	0.8

¹ Average of four replications: Weed Control – 0 = no weed control; 10 = complete weed control
 Crop Fern Phyto – 0 = no crop injury; 10 = crop dead

Notes:

1. Sencor missing a small amount of yellow foxtail but giving 90+% control of a limited amount of swamp smartweed present
2. Lorox alone missing a little common knotweed
3. Lorox + Prism + COC giving partial burndown of a limited population of yellow nutsedge
4. Stinger + Prism + COC missing swamp smartweed and a limited amount of redroot pigweed present
5. Sandea + COC missing a limited population of common lambsquarter present
6. Untreated Control contains some swamp smartweed, a little yellow nutsedge, a little common lambsquarter, a few redroot pigweed and a limited population of Italian ryegrass.

This is a report of work in progress only. The chemicals and uses contained in this publication are experimental data and should not be considered as recommendations for use.

Until the products and their uses given in this report appear on a registered pesticide label or other legal, supplementary direction for use, it is illegal to use the chemicals as described.

WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in their original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Recommendations are based on the best information currently available, and treatments based on them should not leave residues exceeding the tolerance established for any particular chemical. Confine chemicals to the area being treated. **THE GROWER IS LEGALLY RESPONSIBLE** for residues on his crops as well as for problems caused by drift from his property to other properties or crops.

Consult your County Agricultural Commissioner for correct methods of disposing of leftover spray material and empty containers. Never burn pesticide containers.

PHYTOTOXICITY

Certain chemicals may cause plant injury if used at the wrong stage of plant development or when temperatures are too high or when overcast conditions occur. Injury may also result from excessive amounts or the wrong formulation or mixing incompatible materials. Inert ingredients such as wetters, spreaders, emulsifiers, diluents, and solvents, can cause plant injury. Since formulations are often changed by manufacturers, it is possible that plant injury may occur, even though no injury was noted in previous seasons.

No endorsement of named products is intended, nor is criticism implied of similar products which are not mentioned.

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