

ASPARAGUS

Variety Evaluation & Pest Management
in San Joaquin County



2002 Research Progress Report

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

**2002 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, Bill and Chip Salmon, Marc and Paul Marchini, 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 2002. 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
Milestone (80DF)	azafendin	DuPont Ag Products
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
Visor (2E)	thiazopyr	Dow AgroSciences
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 35 times over 82 days. 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 operation in France. Some stand loss in a couple of the slower growing varieties occurred during 1998 from excessive early filling of the planted trenches with soil, causing smothering of some crowns. As in the previous two cutting seasons, excellent production in a number of replicated and observation cultivars occurred during the 2002 harvest season, which started with a 3 to 4 week period of cool weather and limited rainfall. The highest yielding line in the replicated trial was UCR 115 at 10, 239 Lbs./Acre, followed by Atlas (8,482 Lbs./Acre), UCR 65 (8,321 Lbs./Acre), UC 157F₁ (7,810 Lbs./Acre), Grande (7,747 Lbs./Acre) and UCR 112 (6,763 Lbs./Acre). Best spear quality was attained by UCR 115, UC 157F₁, UCR 65, UCR 112, Atlas, UCR 87, UCR 88 and UCR 60; Grande and UCR 82 also gave good spear quality. Largest spear size occurred with Atlas, followed by Grande, UCR 87, Apollo, UCR 65, and UCR 82. The large spear size demonstrated in this trial is a function of plant spacing (12 inches between plants), fertilization and use of drip irrigation. This may create marketing problems with the current consumer and buyer demand for smaller spear sizes. Complete replicated trial data is given in **Table 1**.

In the 13-line observation cultivar block, greatest yield was achieved by UCR 122 at 9,070 Lbs./Acre, followed by PLA-2232 (8,638 Lbs./Acre), UCR 69 (8,377 Lbs./Acre), Cipres (7,911 Lbs./Acre), UCR 79 (7,682 Lbs./Acre) and UCR 107 (7,232 Lbs./Acre). Best spear quality was demonstrated by UCR 122, UCR 69, PLA-2232 and UCR 107; UCR 66, UCR

96 and Cipres also provided good spear quality. Largest spear size occurred with Cipres, followed by UCR 96, UCR 122 and UCR 107. The concern with large average spear size with many of the replicated and observation cultivars in this trial, due to plant spacing, drip irrigation and fertilization, needs to be considered. A reduction in all three cultural practices may bring spear size down to more desirable fresh market demand. Complete observation trial data is shown in **Table 2.**

International Asparagus Cultivar Evaluation Trial II (Augusta-Bixler Farms). The trial in its seventh year of harvest was harvested only 25 times over 61 days. Due to early cold weather conditions and the heavier texture of the trial field soil, trial harvest did not commence until late March – nearly 3 weeks later than normal for this trial. In addition to the weather, seepage from a nearby irrigation canal has caused significant reduction in plant stand vigor from garden symphytan (centipede) and wet soil conditions. Phytophthora and Fusarium infection have further reduced yields to the point that cutting the trial for an eighth year in 2003 is in serious doubt. The trial has 17 replicated lines with another 17 selections in a single replication observation block. Variety selections from Dr. Mikeal Roose's asparagus breeding program at UC Riverside, cultivars from Dr. Steve Garrison's breeding program at Rutgers University, lines from Brian Benson's private breeding program near Davis, California and additional selections from 7 foreign countries (Italy, France, Spain, Germany, Holland, New Zealand and Taiwan) have all been evaluated in the trial. Due to the above-mentioned weather and pest damage conditions in the trial, combined with a short harvest season due to depressed fresh market prices, yields in the trial were extremely low (up to 60 or 70 percent below the 2001 results). Highest yield in the replicated trial occurred with Atlas at 1,800 Lbs./Acre, followed by UCR 157F₁ (1776 Lbs./Acre), UC 157F₁ (crowns) – 1,664 Lbs./Acre, UCR 5 (1,636 Lbs./Acre), UCR 8 (1,534 Lbs./Acre), Purple Passion (1,487 Lbs./Acre), Grande (1,460 Lbs./Acre) and Gin Lim (1,409 Lbs./Acre). It should be noted that UC 157F₁ is reported twice for yield because 17 replicated lines were established in 1995 using 10-12 week old seedling transplants, while the site for an 18th line, for which seed did not become available, was filled by using UC 157F₁ again as one-year-old crowns. Largest spear size, considerably reduced from those attained in 2001, was led by Purple Passion, UCR 8, Grande, UC 157F₁ (crowns) and Atlas. Best spear quality, among the replicated lines, came from UC 157F₁ (seedling or crown-planted), UCR 5, UCR 7, Grande, Atlas and Apollo; UCR 8, Gin Lim, ASP 1, and Taramea provided fair to good spear quality. See **Table 3** for complete replicated trial results.

In the 17-line observation trial block (all planted with 10-12 week old seedlings), with one cultivar (UCR 115) repeated to fill out the 18 plots, harvest occurred 25 times over 61 days. Best yield, given the aforementioned weather and trial damage conditions, was achieved with 89P72 at 1,622 Lbs./Acre, followed by UCR 62 (1,597 Lbs./Acre), UCR 115 (1,457 Lbs./Acre), Eros (1,416 Lbs./Acre), Argo (1,411 Lbs./Acre), DA 911 (1,282 Lbs./Acre), and Tainan #2 (1,276 Lbs./Acre). Spear size, as in the replicated trial, was considerably reduced from 2001. Largest spear size occurred with UCR 115, Golia, UCR 84, UCR 88, Argo and DA 911. Best spear quality was demonstrated by UCR 115, Tainan #2, UCR 62 and Ven Lim; UCR 60, Jersey Knight, 89P58 and DA 911 provided fair to good spear quality. Complete observation trial results are presented in **Table 4.**

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 would be drip irrigated, on February 7, 2002. The trial contains 12 replicated cultivars 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 at Brian Benson's California Asparagus Seed and Transplant near Davis, California make up the trial. Stand establishment and growth have been excellent with all lines and harvest (5 to 8 weeks) will commence in Spring 2003. A listing of the cultivars to be evaluated and a plot diagram are included later in this Research Report after **Table 4.**

Table 1. 2002 DRIP IRRIGATED ASPARAGUS CULTIVAR EVALUATION TRIAL

Victoria Island Farms – Victoria Island
35 harvests--82 days
(Replicated Lines)

Cultivar	Yield Lbs/Acre ¹	No. Spears per Acre ¹	Average Spear Wt. (g.) ¹
UCR 115	10,239	150,369	30.9
Atlas	8,482	98,097	39.3
UCR 65	8,361	109,423	34.7
UCR 157F ₁	7,810	120,313	29.5
Grande	7,747	91,824	38.3
UCR 112	6,763	89,298	34.4
UCR 87	5,747	71,438	36.5
UCR 88	5,617	77,101	33.1
Apollo	5,091	63,423	36.4
UCR 82	5,073	66,473	34.6
UCR 60	4,814	69,173	31.6
UCR 62	3,197	49,310	29.4
LSD @ 5%:	1,962	26,023	
C.V. =	20.7%	20.5%	

¹ Average of four replications

Table 2. 2002 DRIP IRRIGATED ASPARAGUS CULTIVAR EVALUATION TRIAL

Victoria Island Farms – Victoria Island
35 harvests--82 days
(Observation Lines)

Cultivar	Yield Lbs/Acre ¹	No. Spears per Acre ¹	Average Spear Wt. (g.) ¹
UCR 122	9,070	116,392	35.4
PLA-2232	8,638	114,301	34.3
UCR 69	8,377	137,301	27.7
Cipres	7,911	95,135	37.8
UCR 79	7,682	126,847	27.5
UCR 107	7,232	92,696	35.4
UCR 96	7,076	89,559	35.9
DA 909	5,019	77,014	29.6
UCR 64	4,851	77,014	28.6
UCR 66	4,748	74,226	29.0
PLA 2332	2,238	45,302	22.4

¹ Average of only one replication

Table 3. 2002 INTERNATIONAL ASPARAGUS CULTIVAR EVALUATION
TRIAL II

Augusta Bixler Farms – Union Island

25 harvests--61 days
(Replicated Lines)

Cultivar	Yield Lbs/Acre ¹	No. Spears per Acre ¹	Average Spear Wt. (g.) ¹
Atlas	1,800	32,380	25.2
UC 157F ₁	1,776	33,919	23.8
UC 157F ₁ (crowns)	1,664	28,401	26.6
UCR 5	1,636	33,469	22.2
UCR 8	1,534	25,120	27.7
Purple Passion	1,487	18,368	36.8
Grande	1,460	24,466	27.1
Gin Lim	1,409	29,766	21.5
ASP 1	1,181	23,014	23.3
Tie Lim	1,161	23,450	22.5
UCR 7	1,153	23,522	22.3
Jersey Giant	1,095	26,572	18.7
Val Prima	1,084	22,506	21.9
Apollo	1,050	20,618	23.2
Dariana	884	17,569	22.8
Taramea	820	18,949	19.6
Jersey Gem	703	14,883	21.4
Andreas	527	11,108	21.5
LSD @ 5%:	738	14,849	
C.V. =	41.6%	43.6%	

¹ Average of four replications

Table 4. 2002 INTERNATIONAL ASPARAGUS CULTIVAR EVALUATION
TRIAL II

Augusta Bixler Farms – Union Island

25 harvests--61 days
(Observational Lines)

Cultivar	Yield Lbs/Acre ¹	No. Spears per Acre ¹	Average Spear Wt. (g.) ¹
89P72	1,622	33,977	21.7
UCR 62	1,597	31,363	23.1
UCR 115	1,457 ²	20,909 ²	31.6
Eros	1,416	31,363	20.5
Argo	1,411	26,717	24.0
DA 911	1,282	24,394	23.9
Tainan #2	1,276	25,265	22.9
89P58	1,090	22,361	22.1
Jersey Knight	1,020	21,490	21.5
UCR 60	971	21,199	20.8
UCR 88	920	17,134	24.4
UCR 84	830	15,101	24.9
Ven Lim	767	17,134	20.3
UCR 65	526	11,616	20.6
Cipres	478	10,454	20.8
Golia	441	7,841	25.5
Huchelsh	385	7,841	22.3

¹ Average of only one replication

² Average of two replications

2002 ASPARAGUS CULTIVAR EVALUATION TRIAL
Zuckerman-Heritage Farms; McDonald Island, California

REPLICATED LINES:

- | | | |
|--------------------------|----------------|--------------------|
| 1. F600 x M256 (UCR 115) | 5. Apollo | 9. Purple Passion |
| 2. F141 x M256 | 6. Atlas | 10. NJ 953 |
| 3. F586 x M256 | 7. Grande | 11. NJ 977 |
| 4. UC 157F ₁ | 8. Dulce Verde | 12. Jersey Supreme |

OBSERVATION LINES:

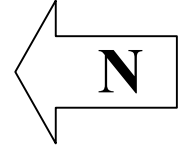
- | | | |
|------------------|----------------------|----------------------------------|
| 13. F133 x M256 | 26. NJ 963 | 39. F586 x M256 (MI) |
| 14. FCE1 x M120 | 27. NJ 976 | 40. F600 x M256 (Delhi) |
| 15. F133 x HMJ | 28. NJ 982 | 41. F141 x M256 (Delhi) |
| 16. F177 x MCE1 | 29. NJ 990 | 42. F586 x M256 (Delhi) |
| 17. F137 x MCE4 | 30. NJ 1018 | 43. F172 x M256 |
| 18. NJ 956 | 31. NJ 1021 | 44. FCE2 x HMJ |
| 19. NJ 978 | 32. FCE1 x M256 | 45. FCE1 x A1 |
| 20. F82-2 x M256 | 33. FCE7 x M256 | 46. FCE1 x M120 |
| 21. F172 x M256 | 34. FCE1 x A1 | 47. F137 x MCE4 |
| 22. FCE3 x M256 | 35. FCE2 x HMJ | 48. NJ 956 |
| 23. F177 x M256 | 36. F177 x MCE2 | 49. UC 157F ₁ (MI) |
| 24. FCE3 x M256 | 37. F600 x M256 (MI) | 50. UC 157F ₁ (Delhi) |
| 25. NJ 937 | 38. F141 x M256 (MI) | |

Date Planted: 2/7/02

Field Variety: UC 157F₁

Method of Irrigation: Buried Drip

2002 ASPARAGUS CULTIVAR EVALUATION TRIAL
 Zuckerman-Heritage Farms; McDonald Island, California



PLOT PLAN:

25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
13	14	15	16	17	18	19	20	21	22	23	24	40	41	42
7	10	12	1	11	2	9	3	5	4	6	8	43	44	45
9	6	10	5	7	12	4	2	11	8	1	3	46	47	48
4	8	11	9	12	10	1	6	3	7	2	5	49	49	49
1	2	3	4	5	6	7	8	9	10	11	12	50	49	50

Pest Management Research Trials

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

Robert Mullen.

A preemergence weed control trial in newly planted one-year-old asparagus crowns, evaluating eight herbicides and/or combination treatments, was established on February 12, 2002 at Zuckerman-Heritage Farms on McDonald 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 and Roundup Ultra (glyphosate) was added to each treatment at a rate of 1.00 Lb/Acre A.I. to remove emerged weeds, which included 3 to 6 inch rosette wild radish, 2 to 4 inch rosette shepherdspurse, 1 to 2 inch tall Poa annua, cotyledon to first true leaf common lambsquarter, one to three inch tall burning nettle and cotyledon to first true leaf swamp smartweed. Soil incorporation of the soil surface-applied herbicides was accomplished by winter rainfall. The soil type at the trial site was a Staten peaty muck. Plot design was a randomized complete block. The field was planted to the asparagus cultivar 157F₁, as one-year-old crowns, in late January 2002. The trial was evaluated for weed control efficacy and crop fern vigor on March 25, 2002 and again on April 10, 2002. Best control of the major weeds present at the two rating dates – common lambsquarter, Poa annua, swamp smartweed and barnyardgrass – occurred with Chateau (flumioxazin) at the high rate, followed by Milestone (azafenadin) alone, the low rate of Chateau, Authority (sulfentrazone) alone, Prowl (pendimethalin) alone, and the combination of Prowl plus Karmex (diuron). All treatments provided excellent crop safety, except for a slight crop fern vigor reduction by the high rate of Chateau at the early rating date.

2002 ASPARAGUS PREEMERGENCE WEED CONTROL
 (Newly Planted One-Year-Old Crowns)
 Zuckerman-Heritage Farms; McDonald Island, California

Treatment	Rate Lb/Ac. A.I.	Weed Control ¹								Crop ¹	
		Common		Poa annua		Swamp		Barnyardgrass		Fern Vigor	
		Lambsquarter				Smartweed					
		<u>3/25</u>	<u>4/10</u>	<u>3/25</u>	<u>4/10</u>	<u>3/25</u>	<u>4/10</u>	<u>3/25</u>	<u>4/10</u>	<u>3/25</u>	<u>4/10</u>
1 Visor (2E)	1.00	7.9	8.1	8.0	8.6	8.0	7.1	-----	8.5	8.8	8.9
2 Authority (75DF)	1.00	8.6	9.3	9.0	9.8	8.8	8.0	-----	8.9	9.0	8.9
3 Chateau (4F)	0.125	8.6	8.9	9.1	9.0	9.3	9.0	-----	8.0	9.0	9.0
4 Chateau	0.250	8.8	9.0	9.1	9.8	9.5	9.5	-----	8.9	8.1	8.8
5 Milestone (80DF)	0.50	8.4	9.0	9.3	9.8	9.1	8.8	-----	8.9	8.9	9.0
6 Prowl (3.8CS)	4.00	9.0	8.8	8.6	8.9	8.4	7.8	-----	9.6	8.9	9.0
7 Prowl + Karmex (80DF)	4.00 + 2.00	9.1	8.3	8.9	9.0	8.5	8.4	-----	9.4	9.0	9.1
8 Karmex + Devrinol (50DF)	2.00 + 4.00	8.1	7.0	9.3	9.0	8.3	7.3	-----	7.5	9.0	9.0
9 Untreated Control	-----	0.0	0.0	0.0	0.0	0.0	0.0		0.0	9.1	9.3

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

Notes:

- Treatment #1 – missed a small amount of wild radish, swine cress, common knotweed and redroot pigweed.
- Treatment #2 – missed a limited amount of swine cress, wild radish, redroot pigweed, burning nettle and common knotweed.
- Treatment #3 – missed a little redroot pigweed, common knotweed and chickweed.
- Treatment #4 – missed a little redroot pigweed and prickly lettuce.
- Treatment #5 – missed a limited amount of chickweed, common knotweed and wild radish.
- Treatment #6 – missed a little chickweed, swine cress, redroot pigweed, common knotweed and wild radish.
- Treatment #7 – missed a little swine cress, redroot pigweed and wild radish.
- Treatment #8 – missed a small amount swine cress, burning nettle, redroot pigweed and common purslane.
- Treatment #9 – has some redroot pigweed, wild radish, swinecress, chickweed, prickly lettuce, common knotweed, burning nettle and shepherdspurse.

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 four herbicides and/or combination treatments, was established on March 15, 2002 at Zuckerman-Heritage Farms on McDonald Island west of Stockton, California. All treatments were applied with a handheld CO₂ backpack sprayer in a spray volume of 30 gallons water per acre. The soil type at the trial site was a Staten peaty muck and the asparagus variety was UC 157F₁. The plot design was a randomized complete block. The field had been planted in late January 2002 with one-year-old asparagus crowns. Weeds present at the time of treatment included first to third true leaf common lambsquarter, one to two inch tall common knotweed, one to three inch rosette swinecress, one to two inch tall swamp smartweed and one to two inch tall Poa annua with a few one to two inch tall barnyardgrass and two to five inch rosette wild radish; the asparagus crop fern was 12 to 14 inches tall. Herbicide spray applications were made directly over the crop fern and weeds. The trial was rated for weed control efficacy and asparagus fern phytotoxicity on March 25, 2002. Best control of common lambsquarter, common knotweed, swinecress and Poa annua occurred with the combination of Lorox (linuron) plus Prism (clethodim) plus Crop Oil Concentrate (COC). Sandea (halosulfuron) plus COC gave commercial control of all the weed species and provided the highest level of swamp smartweed control. Sencor (metribuzin) provided very good control of common lambsquarter and swinecress but was weak on Poa annua, common knotweed and swamp smartweed. The combination treatment of Lorox plus Prism plus COC caused some temporary crop fern chlorosis and there was a little crop fern yellowing with Sencor, which later disappeared. Sandea plus COC and Lorox alone had excellent crop safety.

2002 ASPARAGUS POSTEMERGENCE WEED CONTROL
 (Newly Planted One-Year-Old Crowns)
 Zuckerman-Heritage Farms; McDonald Island, California

Treatment	Rate Lb./Ac. A.I.	Weed Control ¹					Crop ¹ Fern Phyto
		Common Lambsquarter	Common Knotweed	Swine Cress	Poa annua	Swamp Smartweed	
Sencor (75DF)	1.00	9.4	6.8	9.3	4.0	6.3	1.4
Lorox (50DF) + Prism (0.94E) + COC	1.00 + 0.188 + ½%	9.8	7.8	9.4	9.3	6.8	1.8
Lorox	1.00	7.4	5.5	7.3	3.5	6.1	0.9
Sandea (75WG) + COC	0.047 + 1%	7.5	8.3	8.3	7.5	8.0	1.1
Untreated Control	-----	0.0	0.0	0.0	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. The combination treatment of Lorox plus Prism plus Crop Oil Concentrate provided 90% control of the limited population of wild radish and barnyardgrass present.

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
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California and San Joaquin County Cooperating