SOLANO COUNTY
CROP & LIVESTOCK REPORT 2002

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California Department of Food and Agriculture

The Honorable Board of Supervisors of Solano County

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I am pleased to present the year 2002 crop report with statistical data on the acreage, production, and gross values for the agricultural commodities produced within Solano County. Net farm income is not reflected. The crop report only shows the gross values for agricultural production; the costs of production, harvesting, shipping, and marketing are not reflected. The crop report includes production (yield per acre) and crop prices (e.g. price/unit produced) as well as the total value for each commodity.

The 2002 gross value was the third highest amount ever in Solano County, with a total of $199,485,500, an increase of 7.4%. Agriculture continues to be a significant influence on the local economy, taking place on 65% of the land within Solano County.

The crop report for the year 2002 shows a total of 24 million dollar crops, those whose gross values exceed $1 million. Nursery stock continues as the #1 commodity produced in Solano County with a 3% increase in value. Field Crops values were down slightly as compared to the prior year, with fewer acres of corn and wheat, but increased acres of alfalfa and barley. Vegetable Crops, which includes processing tomatoes, continued to have a strong presence in Solano County with an increase in value overall of 12% and a new million dollar crop, Bell Peppers. Fruit and Nut Crops show a decrease of 2.5% with fewer acres of apricots and prunes. Almonds continue to be a strong crop and canning pears continue to suffer lack of markets for the fruit. Seed Crop acreage increased by 36%. Livestock products and production showed increases of 25%.

Much appreciation extends to the Agriculture Department staff who compiled this report, with special thanks and recognition to Lenny DaMassa, Supervising Agricultural Biologist, and Lora Hayes, Office Assistant II. The crop report reflects the hard work and dedication of the Solano County farmers and ranchers who maintain the businesses and lifestyle to create this bounty – Agriculture.

Susan Cohen

Susan Cohen
Solano County Agricultural Commissioner/Sealer of Weights and Measures

GENERAL INFORMATION

SOLANO COUNTY POPULATION (January 1,2003) 412,000
- Benicia 27,050
- Dixon 16,150
- Fairfield 102,500
- Rio Vista 5,725
- Suisun 26,850
- Vacaville 93,900
- Vallejo 120,100
- Unincorporated Area 19,650

STATE RANKING
- Solano County Rank by Gross Value of Agricultural Production (2001) 31st
- Solano County Rank for Leading Commodities – Gross Values of Production – (2001)
  ..... 2nd -- Sheep and Lambs
  ..... 5th -- Sudan Hay

AREA
- Total Land Area in California (Acres – 1997) ..... 100,000,000 Acres
- California Agricultural Land (Acres – 1997) ..... 27,698,779 Acres
- Area of County (Square Miles – Land) ..... 828.4 Sq. Miles
- Area of County (Acres – Land) ..... 530,188 Acres
- Area of County (Acres – Urban Land) ..... 53,809 Acres
- Area of County (Square Miles – Water) ..... 81.5 Sq. Miles
- Area of County (Acres – Water) ..... 52,182 Acres

FARM SIZE
- Average U.S. Farm Size (Acres – 1997) ..... 487 Acres
- Average California Size (Acres – 1997) ..... 374 Acres
- Average Size Of Solano Farm (Acres – 1997) ..... 455 Acres

TRANSPORTATION
- Solano County Total Road Miles (December 31, 2002) ..... 600 Miles
- Solano County Paved Road Miles ..... 471 Miles
- Solano County Gravel Road Miles ..... 129 Miles
- Number of Solano County Bridges 115
- Major Roadways ..... Interstates: 80, 505, 680, 780
  ..... Highways: 12, 29, 37, 84, 113, 220
- Railroads ..... Amtrak, California Northern, Southern
  ..... Pacific

Number of Full-Time Farms in Solano County (1997) ..... 403 Farms
Total Secured Assessed Value (2002-2003) $25,894,552,252

Farming Districts ..... Delta, Dixon Ridge, Elmira, Green
..... Valley, Jepson Prairie, Vaca/Lagoon
..... Valley, Maine Prairie, Montezuma Hills,
..... Pleasants Valley, Suisun Valley, Winters

Facilities ..... Travis Air Force Base, University of
..... California at Davis, California Maritime
..... Academy, Nut Tree Airport

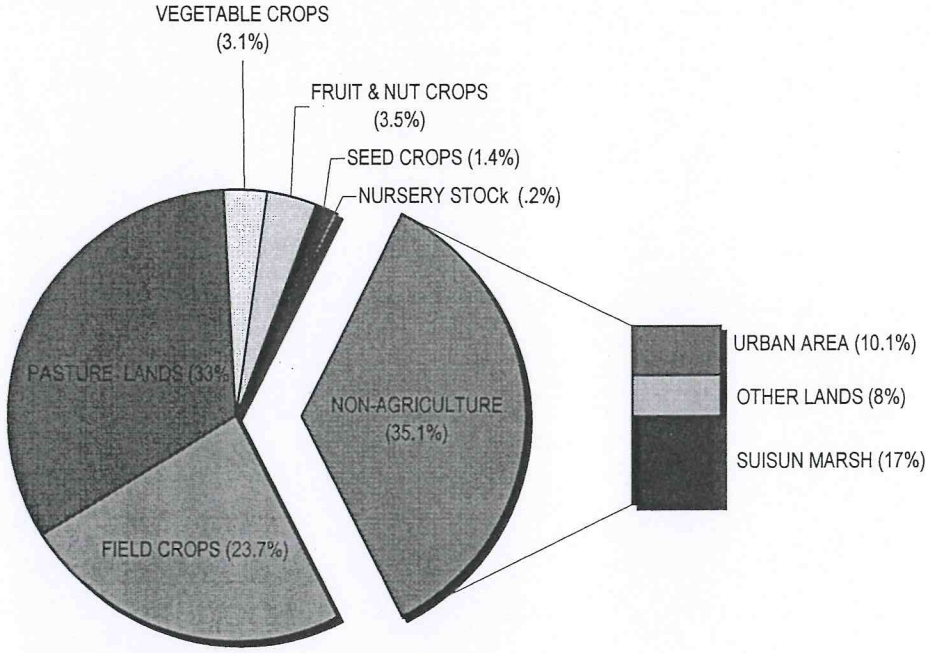
DISTRIBUTION OF FARM ACREAGE

	2002	2001
FIELD CROPS	125,773	121,460
FRUIT & NUT CROPS*	18,793	19,120
PASTURE LANDS	174,730	174,730
SEED CROPS	7,411	5,460
VEGETABLE CROPS	16,365	15,441
NURSERY STOCK	1,035	1,108
TOTALS	344,107	337,319

* Includes Non-bearing Acreage

COUNTY ACREAGE DISTRIBUTION

(% of Total)

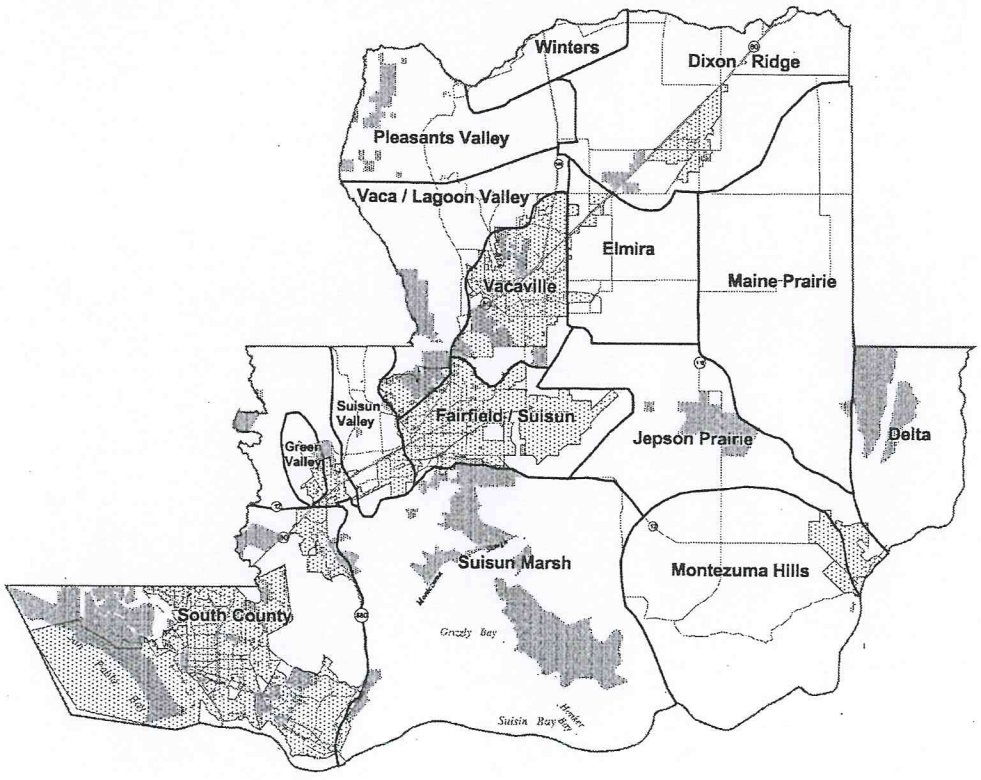


* Urban and built-up land as identified by the Department of Conservation

ACREAGE 2002

FRUIT & NUT CROPS

	BEARING ACREAGE	NON-BEARING ACREAGE	TOTAL ACREAGE
ALMONDS	1,714	437	2,151
APPLES	151	0	151
APRICOTS	200	4	204
CHERRIES	84	2	86
FIGS	2	0	2
GRAPES (WINE)	4,300	457	4,757
KIWI	26	1	27
NECTARINES	11	0	11
OLIVES	2	44	46
ORANGES	26	0	26
PEACHES (FREESTONE)	295	1	296
PEARS (BARTLETT)	965	93	1,058
(OTHERS)	40	71	111
PECANS	3	0	3
PLUOTS	0	9	9
PERSIMMONS	6	0	6
PISTACHIO NUTS	24	0	24
PLUMS	22	0	22
PRUNES	1,900	91	1,991
TANGERINES	13	0	13
WALNUTS (ENGLISH)	6,898	876	7,774
(BLACK)	25	0	25
TOTALS	16,707	2,086	18,793



GRAND TOTAL OF ALL AGRICULTURAL PRODUCTS

(U.S. DOLLARS)

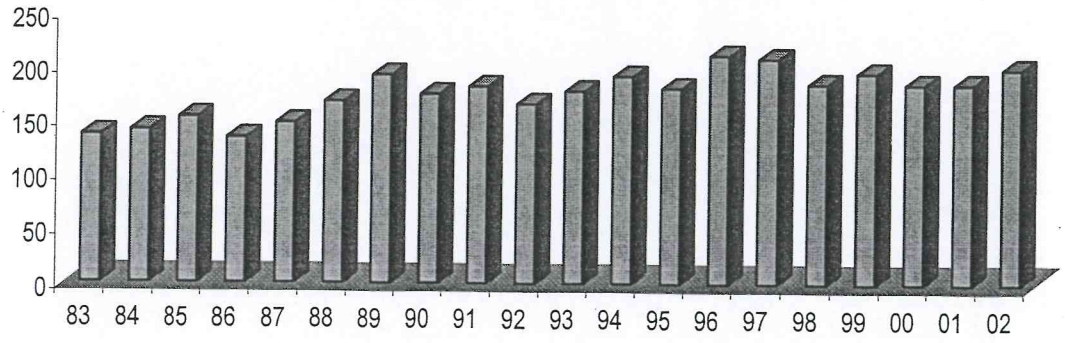
2002	$199,485,500
2001	$185,670,500

VALUE SUMMARY

YEAR	FIELD CROPS	NURSERY	FRUIT & NUT CROPS	SEED CROPS	VEGETABLE CROPS	ANIMAL PRODUCTION	YEAR TOTALS
1993	67,296,900	14,511,500	24,288,000	6,787,200	35,848,200	28,973,300	177,705,100
1994	76,853,300	17,344,700	24,293,800	5,934,400	43,054,700	24,446,800	191,927,700
1995	67,045,700	19,715,200	23,975,300	7,658,600	39,935,600	21,876,500	180,206,900
1996	79,077,700	22,347,700	31,591,600	8,674,200	44,472,200	25,467,300	211,630,700
1997	70,032,000	24,078,000	34,585,700	10,594,500	41,007,000	28,843,700	209,140,900
1998	61,301,200	26,408,000	22,998,900	9,318,000	36,775,400	28,377,000	185,178,500
1999	55,959,800	28,978,000	29,578,400	7,987,200	44,285,400	28,693,700	195,482,500
2000	47,493,400	35,044,700	29,801,800	5,075,100	33,893,900	34,265,500	185,574,400
2001	48,209,300	37,668,100	26,634,100	4,897,700	33,079,600	35,181,700	185,670,500
2002	47,901,800	38,781,200	25,974,800	5,739,700	37,155,000	43,933,000	199,485,500

AGRICULTURAL PRODUCTION
- 20 YEAR COMPARISON -

(Million U.S. Dollars)



MILLION DOLLAR CROPS

(U.S. Dollars)

		RANKING	
		2002	2001
NURSERY STOCK	$38,781,200.00	1	1
TOMATOES, PROCESSING	25,975,800.00	2	2
CATTLE & CALVES	25,266,700.00	3	4
ALFALFA	19,606,400.00	4	3
GRAPES, WINE	13,221,100.00	5	5
FEEDER LAMBS	8,375,700.00	6	6
WHEAT, IRRIGATED	5,886,600.00	7	7
WALNUTS	5,779,900.00	8	9
CORN, FIELD	5,430,400.00	9	8
MILK, MARKET	3,674,800.00	10	10
DAIRY COWS	3,131,900.00	11	11
PASTURE, RANGELAND	2,391,000.00	12	12
STOCK SHEEP	2,007,500.00	13	13
BEANS, EDIBLE DRY	1,890,200.00	14	18
SUDANGRASS	1,713,500.00	15	19
WHEAT, DRYLAND	1,600,400.00	16	15
ALMONDS	1,577,100.00	17	-
PASTURE, IRRIGATED	1,533,200.00	18	16
BELL PEPPERS	1,495,800.00	19	-
SORGHUM / MILO	1,445,300.00	20	20
RYEGRASS	1,270,000.00	21	-
PRUNES	1,248,700.00	22	-
PEARS	1,248,700.00	22	14
SAFFLOWER, OIL	1,171,100.00	24	17

ACREAGE, PRODUCTION & VALUE

FIELD CROPS

CROP	YEAR	HARVESTED ACRES	PER ACRE	TOTAL	UNIT	PER UNIT	TOTAL VALUE
BARLEY							
IRRIGATED	2002	4,510	1.76	7,938	Ton	96.00	762,000
	2001	3,120	2.30	7,176	Ton	90.00	645,800
DRYLAND	2002	3,078	1.11	3,417	Ton	96.00	328,000
	2001	2,506	1.27	3,183	Ton	90.00	286,500
BEANS, DRY	2002	3,927	0.83	3,259	Ton	580.00	1,890,200
EDIBLE, ALL CLASSES*	2001	2,911	0.76	2,212	Ton	555.00	1,227,700
CORN, FIELD	2002	10,900	5.30	57,770	Ton	94.00	5,430,400
	2001	13,677	4.97	67,975	Ton	83.00	5,641,900
HAY							
ALFALFA	2002	36,492	5.84	213,113	Ton	92.00	19,606,400
	2001	31,969	6.33	202,364	Ton	109.00	22,057,700
GRAIN	2002	2,509	3.25	8,154	Ton	68.00	554,500
	2001	3,500	3.18	11,130	Ton	80.00	890,400
GRASS	2002	3,500	3.56	12,460	Ton	75.00	934,500
	2001	3,500	2.70	9,450	Ton	75.00	708,800
OATS, GRAIN	2002	1,575	1.50	2,363	Ton	120.00	283,600
	2001	1,122	2.50	2,805	Ton	80.00	224,400
PASTURE, IRRIGATED	2002	15,332	-	-	Acre	100.00	1,533,200
	2001	15,332	-	-	Acre	100.00	1,533,200
PASTURE, RANGELAND	2002	159,398	-	-	Acre	15.00	2,391,000
	2001	159,398	-	-	Acre	15.00	2,391,000
RYEGRASS	2002	5,410	3.13	16,933	Ton	75.00	1,270,000
	2001	-	-	-	-	-	-
SAFFLOWER, OIL	2002	6,017	0.85	5,114	Ton	229.00	1,171,100
	2001	6,018	0.94	5,657	Ton	219.00	1,238,900

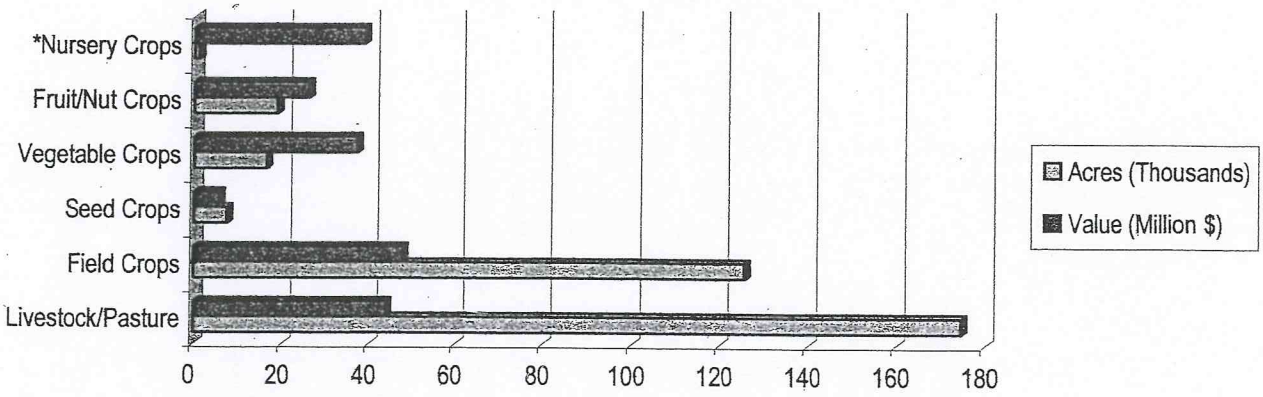
* Value and Yield Vary By Variety

ACREAGE, PRODUCTION & VALUE

FIELD CROPS (Cont'd)

CROP	YEAR	HARVESTED ACRES	PER ACRE	TOTAL	UNIT	PER UNIT	TOTAL VALUE
SORGHUM / MILO	2002	6,403	2.28	14,599	Ton	99.00	1,445,300
	2001	5,943	2.00	11,886	Ton	85.00	1,010,300
SUDANGRASS	2002	3,853	4.36	16,799	Ton	102.00	1,713,500
	2001	3,233	4.10	13,255	Ton	90.00	1,193,000
WHEAT							
IRRIGATED	2002	26,310	2.26	59,461	Ton	99.00	5,886,600
	2001	27,685	2.35	65,060	Ton	89.00	5,790,300
DRYLAND	2002	8,206	1.97	16,166	Ton	99.00	1,600,400
	2001	11,665	1.64	19,130	Ton	89.00	1,702,600
MISC. FIELD CROPS**	2002	3,083	-	-	-	-	1,101,100
	2001	4,611	-	-	-	-	1,666,800
TOTAL FIELD CROPS	2002	300,503					$ 47,901,800
	2001	296,190					$ 48,209,300

CROP PRODUCTION
(by Major Commodities for 2002)



** Misc. Field Crops include Sunflower, Silage, Stubble, etc.

ACREAGE, PRODUCTION & VALUE

FRUIT & NUT CROPS

CROP	YEAR	BEARING ACRES	PER ACRE	TOTAL	UNIT	PER UNIT	TOTAL VALUE
ALMONDS							
MEATS	2002	-	-	793.70	Ton	1,937	1,537,400
	2001	-	-	532.70	Ton	1,506	802,200
HULLS	2002	-	-	992.10	Ton	40	39,700
	2001	-	-	665.80	Ton	52	34,600
TOTAL ALMONDS	2002	1,714	0.463	793.70	Ton	-	1,577,100
	2001	1,688	0.315	532.70	Ton	-	836,800
APRICOTS							
DRIED (6.0:1)*	2002	-	-	3.58	Ton	7,760	27,800
	2001	-	-	13.40	Ton	6,400	85,800
FRESH MARKET	2002	-	-	29.40	Ton	1,638	48,200
	2001	-	-	41.70	Ton	828	34,500
TOTAL APRICOTS	2002	200	0.254	50.90	Ton	-	76,000
	2001	533	0.241	128.80	Ton	-	120,300
CHERRIES							
FRESH MARKET	2002	84	2.100	176.40	Ton	1,265	223,100
	2001	81	2.500	202.50	Ton	1,500	303,800
GRAPES, WINES**							
DARK VARIETIES	2002	-	-	7,545.50	Ton	949	7,160,700
	2001	-	-	7,508.10	Ton	991	7,440,500
WHITE VARIETIES	2002	-	-	8,645.40	Ton	701	6,060,400
	2001	-	-	8,771.40	Ton	743	6,517,200
TOTAL GRAPES	2002	4,300	3.765	16,190.90	Ton	-	13,221,100
	2001	4,072	3.997	16,279.50	Ton	-	13,957,700
KIWI	2002	26	6.000	156.00	Ton	1,000	156,000
	2001	26	6.000	156.00	Ton	1,000	156,000

* Drying Ratio

** Price Varies By Variety

ACREAGE, PRODUCTION & VALUE

FRUIT & NUT CROPS (Cont'd))

CROP	YEAR	BEARING ACRES	PER ACRE	TOTAL	UNIT	PER UNIT	TOTAL VALUE
PEACHES							
FREESTONE	2002	-	-	29.0	Ton	3,100	89,900
DRIED (6.9:1)*	2001	-	-	51.7	Ton	4,700	243,000
FRESH MARKET	2002	-	-	12.5	Ton	2,665	33,300
	2001	-	-	9.1	Ton	1,663	15,100
TOTAL PEACHES	2002	295	0.721	212.6	Ton	-	123,200
	2001	299	1.275	381.3	Ton	-	258,100
PEARS							
CANNED #1	2002	-	-	2,532.0	Ton	230	582,400
	2001	-	-	6,179.0	Ton	210	1,297,600
DRIED (6.8:1)*	2002	-	-	27.0	Ton	3,000	81,000
	2001	-	-	169.0	Ton	1,200	202,800
JUICE &	2002	-	-	268.0	Ton	30	8,000
FERMENTATION	2001	-	-	-	Ton	-	-
FRESH MARKET	2002	-	-	2,510.0	Ton	230	577,300
	2001	-	-	2,265.0	Ton	261	591,200
TOTAL PEARS	2002	965	5.693	5,494.0	Ton	-	1,248,700
	2001	968	9.823	9,509.0	Ton	-	2,091,600
PRUNES	2002	1,900	0.865	1,643.0	Ton	760	1,248,700
	2001	2,220	0.572	1,270.0	Ton	710	901,700
WALNUTS	2002	6,898	0.772	5,332.0	Ton	1,084	5,779,900
	2001	5,302	0.925	4,908.0	Ton	1,108	5,438,100
MISC. FRUITS & NUTS **	2002	392	-	-	-	-	2,321,000
	2001	293	-	-	-	-	2,570,000
TOTAL FRUIT & NUT CROPS	2002	16,774					$ 25,974,800
	2001	15,482					$ 26,634,100

* Drying Ratio

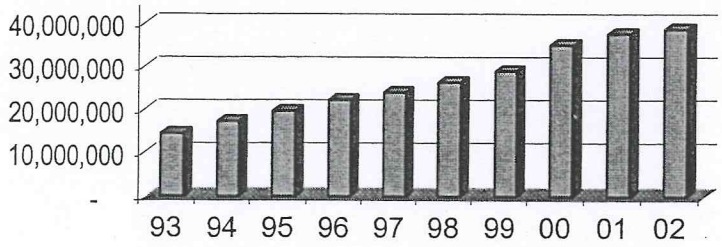
** Misc. Fruits and Nuts include Apples, Oranges, Other Pears, Plums, Persimmons, Strawberries, etc.

ACREAGE & VALUE
NURSERY STOCK

ITEM	YEAR	ACREAGE	AVERAGE VALUE
NURSERY STOCK*	2002	1,035	38,781,200
	2001	1,108	37,668,100
TOTAL NURSERY STOCK	2002	1,035	$ 38,781,200
	2001	1,108	$ 37,668,100

* Nursery Stock include cuttings, buds, scions, Christmas trees, turf, root-stock, greenhouse, timber, firewood, ornamental, etc.

NURSERY STOCK
10 YEAR VALUE SUMMARY
(Million U.S. Dollars)



ACREAGE, PRODUCTION & VALUE

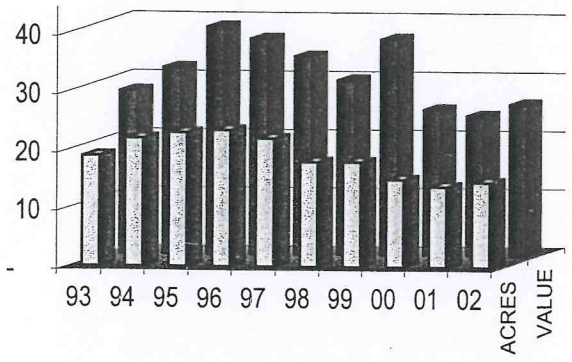
VEGETABLE CROPS

CROP	YEAR	HARVESTED ACRES	PER ACRE	TOTAL	UNIT	PER UNIT	TOTAL VALUE
TOMATOES, PROCESSING	2002	14,626	37.00	541,162	Ton	48.00	25,975,800
	2001	13,801	35.00	483,035	Ton	49.00	23,668,700
BELL PEPPERS	2002	419	17.00	7,123	Ton	210.00	1,495,800
	2001	354	12.00	4,248	Ton	206.00	875,100
MISC. VEGETABLES *	2002	1,320	-	-	-	-	9,683,400
	2001	1,286	-	-	-	-	8,535,800
TOTAL VEGETABLE CROPS	2002	16,365					$ 37,155,000
	2001	15,441					$ 33,079,600

* Misc. Vegetables include Bean Sprouts, Cucumbers, Daikon, Endive, Fresh Tomatoes, Peppers, Salad Greens, Squash, Sweet Corn, Tomatillo, Watermelon, etc.

PROCESSING TOMATOES
10 YEAR VALUE SUMMARY

(Acres in Thousands, Value in Millions of U.S. Dollars)



PRODUCTS & VALUE

LIVESTOCK, POULTRY & APIARY

ITEM	YEAR	PRODUCTION	UNIT	UNIT VALUE	TOTAL VALUE
BEES					
HONEY	2002	70,000	Lb.	1.25	87,500
	2001	9,400	Lb.	0.62	5,800
PACKAGES*	2002	2,700	Pkg.	31.00	83,700
	2001	2,650	Pkg.	32.00	84,800
POLLINATION**	2002	6,610	Colony	-	169,800
	2001	6,192	Colony	-	154,400
QUEENS	2002	16,000	Each	8.00	128,000
	2001	15,000	Each	9.25	138,800
WAX	2002	-	-	-	-
	2001	-	-	-	-
MILK					
MARKET	2002	308,032	Cwt.	11.93	3,674,800
	2001	311,159	Cwt.	14.95	4,651,800
MANUFACTURING	2002	544	Cwt.	10.96	6,000
	2001	1,160	Cwt.	10.34	12,000
WOOL	2002	449,952	Lb.	0.56	252,000
	2001	397,035	Lb.	0.25	99,300
TOTAL LIVESTOCK, POULTRY & APIARY	2002				$ 4,401,800
	2001				$ 5,146,900

* Packages include 2 lbs. bees plus a queen

** Pollination fee varies by crop. Crops pollinated include Almond, Kiwi, Prune, Safflower & Vine Seed.

PRODUCTION & VALUE

LIVESTOCK & POULTRY

ITEM	YEAR	NUMBER OF HEAD	TOTAL LIVEWEIGHT	UNIT	UNIT VALUE	TOTAL VALUE
CATTLE & CALVES	2002	33,300	399,600	Cwt	63.23	25,266,700
	2001	31,415	243,466	Cwt	68.96	16,789,400
DAIRY COWS	2002	1,800	20,700	Cwt	151.30	3,131,900
	2001	1,800	20,700	Cwt	139.13	2,880,000
HOGS & PIGS	2002	200	400	Cwt	34.20	13,700
	2001	200	400	Cwt	45.00	18,000
STOCK SHEEP	2002	49,385	74,076	Cwt	27.10	2,007,500
	2001	46,590	69,885	Cwt	30.10	2,103,500
FEEDER LAMBS	2002	120,687	120,687	Cwt	69.40	8,375,700
	2001	113,856	113,856	Cwt	67.90	7,730,800
GOATS	2002	494	419	Cwt	90.00	37,700
	2001	379	265	Cwt	85.00	22,500
MISCELLANEOUS*	2002					698,000
	2001					490,600
TOTAL LIVESTOCK & POULTRY	2002					$ 39,531,200
	2001					$ 30,034,800

* Miscellaneous includes Rabbit, Quail, Poultry, etc.

ACREAGE, PRODUCTION & VALUE

SEED CROPS

CROP	YEAR	HARVESTED ACRES	PER ACRE	TOTAL	UNIT	PER UNIT	TOTAL VALUE
BEANS, DRY							
ALL MARKET	2002	1,478	0.88	1,301	Ton	740.00	962,700
CLASSES*	2001	452	0.90	407	Ton	640.00	260,400
ALL MARKET	2002	733	1.00	733	Ton	740.00	542,400
CLASSES, CERTIFIED	2001	478	.78	373	Ton	640.00	238,600
TOTAL BEANS, DRY	2002	2,211	-	-	-	-	1,505,100
	2001	930	-	-	-	-	499,000
CANTALOUPE	2002	4	300.00	1,200	Lb.	2.50	3,000
	2001	20	300.00	6,000	Lb.	2.40	14,400
CUCUMBER	2002	197	250.00	49,250	Lb.	5.74	282,700
	2001	123	250.00	30,750	Lb.	6.50	199,900
SQUASH	2002	109	423.00	46,107	Lb.	5.30	244,400
	2001	71	375.00	26,625	Lb.	5.71	152,000
SUNFLOWER, CERTIFIED	2002	1,246	.54	673	Ton	1,080.00	726,800
	2001	1,191	.57	679	Ton	1,146.00	778,000
WATERMELON	2002	279	301.00	83,979	Lb.	3.11	261,200
	2001	243	283.00	68,769	Lb.	3.35	230,400
CERTIFIED	2002	45	395.00	17,775	Lb.	3.70	65,800
	2001	63	278.00	17,514	Lb.	3.10	54,300
TOTAL WATERMELON	2002	324	-	-	-	-	327,000
	2001	306	-	-	-	-	284,700
WHEAT, CERTIFIED	2002	696	2.50	1,740	Ton	100.00	174,000
	2001	1,297	2.50	3,243	Ton	100.00	324,300
MISC. SEED**	2002	2,624	-	-	-	-	2,476,700
	2001	1,522	-	-	-	-	2,645,400
TOTAL SEED CROPS	2002	7,411					$ 5,739,700
	2001	5,460					$ 4,897,700

* Yield and Value Vary By Variety

** Misc. Seed include Alfalfa, Flower, Grass, Onion, Pepper, Pumpkin, Safflower, Sudangrass, Sunflower, and Tomato.

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SUSTAINABLE AGRICULTURE REPORT

COUNTY BIOLOGICAL CONTROL

PEST	BIOCONTROL AGENT	SCOPE OF PROGRAM
Yellow Star Thistle *(Centaurea solstitialis)*	Bud Weevil *(Bangasternus orientalis)*	9 Sites
	Flower Weevil *(Larinus curtus)*	2 Sites
	Hairy Weevil *(Eustenopus villosus)*	4 Sites
	Gall Fly *(Urophora sirunaseva)*	2 Sites
Purple Star Thistle *(Centaurea calcitrapa)*	Weevil *(Larinus minutus)*	2 Sites
	Sead Head Fly *(Terrelia Sp.)*	
Red Gum Lerp Psyllid *(Glycaspis brimblecombei)*	Parasitic Wasp *(Psyllaephagus bliteus)*	1 Site
Klamath Weed *(Hypericum perforatum)*	Beetle *(Crysolina quadragemina)*	1 Site

PEST EXCLUSION / PEST DETECTION

	INSPECTED	NUMBER OF INSPECTIONS
Gypsy Moth *(Lymantria dispar)*	Outdoor household goods	58 Shipments
Exotic Pests	Incoming packages, plant shipments, trucks, seed, etc.	3,613 Inspections
	Raw agricultural (plant) products	1,180 Phytosanitary Origin Certificates issued
Apple Maggot, Glassy-Winged Sharpshooter, Gypsy Moth, Japanese Beetle, Khapra Beetle, Mediterranean Fruit Fly, Melon Fly, Olive Fruit Fly, Oriental Fruit Fly	2,007 pest detection traps	21,862 Inspections
Seed for Export	2,157 acres seed crops	

ORGANIC FARMING STATISTICS

FARMS	PRODUCTS	ACRES
25	Various Fruits & Vegetables (Apricots, Beans, Carrots, Cucumbers, Eggplant, Figs, Herbs, Lettuce, Mandarins, Melons, Mushrooms, Oranges, Peaches, Peppers, Persimmons, Plums, Prunes, Squash, Tomatoes, Walnuts, etc.)	Approximately 1,790

Biological Control of Yellow Starthistle: A Summary of Progress Through 2002

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Five exotic insect species have been established in California for biological control of yellow starthistle. Three species, *Bangasternus orientalis* (Capiomont) (Coleoptera: Curculionidae), *Urophora sirunaseva* (Hering) (Diptera: Tephritidae), and *Eustenopus villosus* (Boheman) (Coleoptera: Curculionidae), are widespread. The two other species, *Chaetorellia australis* Hering (Diptera: Tephritidae) and *Larinus curtus* Hochhut (Coleoptera: Curculionidae) are abundant in the Pacific Northwest but are limited to isolated populations in California. A sixth species, the seedhead fly, *Chaetorellia succinea* (Costa) (Diptera: Tephritidae), was accidentally introduced into western North America in 1991 and is now widespread throughout California and the Pacific Northwest. All of these insects attack the flower heads of yellow starthistle and destroy developing seeds.

Evaluation of the impact of biological control agents on yellow starthistle seed production in California suggest that no single agent will be the dramatic silver bullet in reducing yellow starthistle abundance. Rather, a combination of the current, and possibly, future natural enemies may be necessary to control this noxious weed. Seven years after the initial releases, we have evidence that attack by these biological control agents has reduced seed production by yellow starthistle at three long-term monitoring sites. The weevil, *E. villosus*, has become the most abundant insect at all three sites. In addition to seed destruction by larvae, adult *E. villosus* feed on and kill young developing buds. The loss of early buds produces a change in plant architecture with the damaged plant dominated by stem material. Instead of flowers born on the tips of stems, new flowers are produced on short stems (<1 cm) arising from the leaf axils along the main stems. The attack rates of *E. villosus* ranged from 50-70%. Population build-up and attack by *E. villosus* may have now leveled off and the values for attack rate observed over the last 3-4 years may indicate the range of values to be expected by this species in the future.

The infestation rates of *B. orientalis* and *U. sirunaseva* were initially high 1995-97 but have declined to less than 1% in 2001 at all three sites. The false peacock fly, *C. succinea*, was first recovered in the monitoring sites in 1996. Field observations suggest that *C. succinea* adults emerge before yellow starthistle plants have begun to produce seed heads. This lack of synchrony may be exacerbated by the destruction of young flower buds by adult *E. villosus*. The result is a long delay between fly emergence and the occurrence of flower heads in the appropriate stage for oviposition. In the absence of flower heads, gravid female flies likely will leave the area in search of host plants with heads ready for oviposition. The incidence of *L. curtus* has been low (<1%) at all three sites.

There has been little change in plant density and flower production at all three sites. However, seeds per head and total seed production (seeds/m^2) declined in two of the three monitoring sites. The attack rates of all insects appear to have leveled off and we may no longer see declines in seed production. If so, additional biological control agents will be required to eventually control this noxious weed. Several new agents are currently under study. A rust disease, *Puccinia jaceae* var. *solstitialis*, has just been approved for release in California. This rust attacks the young plants as they grow upwards to produce flowers. Impacts by this rust will complement the attack on the seed heads by the insects and combined may lead to further reduction in seed production. Other new agents include a small weevil that attacks young plants in the rosette stage and a gall mite that destroys the growing tips. Approval of these new agents is still 2-3 years away.

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