

US EPA ARCHIVE DOCUMENT



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

PC Code: 122804
DP Barcode: D262129

SUBJECT: Review of Proposed amendment to Abamectin label to add uses on plums/prunes, leafy vegetables, and fruiting vegetables

FROM: Stephanie Syslo, Environmental Scientist
and
Andrew Bryceland, Fishery Biologist
F. Nicholas Mastrota, Wildlife Biologist (peer reviewer)
Environmental Risk Branch II
Environmental Fate and Effects Division (7507C)

Stephanie Syslo 6/15/2000

Copy given for Andrew Bryceland 6-15-00

F. Nicholas Mastrota 6/15/00

TO: Tom Harris, PM Team
Registration Division (7505C)

THRU: Jean Holmes, Acting Branch Chief
Environmental Risk Branch II / EFED (7507C)

Jean Holmes 6/15/00

I. Summary

The registrant of abamectin (Novartis Crop Protection, Inc.) is requesting the addition of plums/prunes, leafy vegetables, and fruiting vegetables to the label for Agri-mek 0.15 EC Miticide Insecticide® (EPA Reg. No. 100-898 [the end-use product] and Reg.No.100-895 [technical]).

- ⊙ Please note: Abamectin has extremely high toxicity to aquatic and terrestrial invertebrates. For many years, EFED has only approved of registrations of abamectin that permitted ground application only or aerial application of granular bait. Aerial spray application is strongly discouraged because drift to aquatic habitats or nontarget terrestrial areas would result in a likelihood of acute and chronic risk. Therefore, EFED does not concur with the proposed label that includes aerial spray application, or in general, to any use of abamectin involving aerial spray application.

The proposed uses of abamectin pose potential acute and chronic risks to freshwater and marine/estuarine invertebrates, as well as potential risk to endangered freshwater fish and amphibians (See Tables 6 and 7). Currently, EFED does not assess risk to nontarget insects; however, the results of the honey bee acute toxicity test indicate that abamectin is very highly toxic to bees and suggest that the proposed new uses may pose a risk to endangered insect species. All of these risks could be greatly reduced by prohibiting aerial application. The proposed uses of abamectin are not expected to pose a risk to birds and mammals.

Why does it say this?

Because of the risk posed to endangered species, the registrant, Novartis, should work towards protecting endangered species through participation in the Endangered Species Task Force. In addition, EFED recommends the following statement for the abamectin labels:

Use of this product may pose a risk to threatened and endangered species of fish, amphibians, crustaceans (including freshwater shrimp), and insects. All use of this product in the state of California should comply with the recommendations of the California Endangered Species Project. Before using this product in California, consult with your county agricultural commissioner to determine use limitations that apply to your area.

✓ Furthermore, EFED recommends that the label statements on buffer zones/filter strips be changed for this new use, as well as for other registered uses of abamectin. For ground applications, EFED has previously recommended requirement of a 25-ft **vegetative filter strip** between application areas and aquatic habitats to prevent residues of abamectin from moving in runoff to surface water. The current label for grapes and peppers requires only a 25-ft uncultivated buffer zone, which is not the same a vegetative filter strip. A true vegetative filter strip is planted and maintained with specific types of grasses to create a barrier to surface water movement. An uncultivated strip of weeds may be totally inadequate for this function. The proposed label for leafy and fruiting vegetables and plums further weakens this already inadequate level of protection by reducing the width of the uncultivated area from 25 ft to only 10 ft. EFED recommends that the labels be changed to require a 25-ft vegetative filter strip that conforms to the conservation practices standards established by the Natural Resources Conservation Service, USDA. Otherwise, a wider buffer zone would be required to provide adequate protection.

Based upon both the laboratory and field data, ground water effects are expected to be minimal; estimated modeled concentrations in ground water are not expected to exceed 0.0015 $\mu\text{g/L}$. Please note that these EECs are well below the Limit of Quantitation for the analytical method (LOQ in water = 0.1 $\mu\text{g/L}$ = 100 ng/L).

Surface water contamination could occur from spray drift or runoff events that occur soon after application. Estimates of exposure to aquatic organisms from surface water are based on a Tier I screening model (GENEEC). For the purposes of acute risk calculations for aquatic organisms, the maximum estimated concentrations (EECs) for ground applications to vegetables and plums were 0.4 $\mu\text{g/L}$ and 0.3 $\mu\text{g/L}$, respectively, and for aerial application to vegetables was 0.5 $\mu\text{g/L}$.

(Aerial application is not permitted for plums.) EECs used in chronic risk calculations for ground applications were 0.2 $\mu\text{g/L}$ for invertebrates and 0.1 $\mu\text{g/L}$ for fish; for aerial applications, the respective EECs were 0.3 $\mu\text{g/L}$ and 0.2 $\mu\text{g/L}$.

Estimates of exposure from drinking water derived from surface water were based on the highest potential exposure PRZM-EXAMS scenario (strawberries grown on black plastic) incorporating the Index Reservoir and Percent Cropped Area factor and were provided in a memo dated 4/20/2000 (DP Barcode 265145); estimated drinking water concentrations to be used for exposure to abamectin in drinking water were 1.47 $\mu\text{g/L}$ for the acute toxicity endpoint and 0.71 $\mu\text{g/L}$ for the chronic non-cancer and cancer endpoints.

II. Risk Characterization

Abamectin is extremely toxic to freshwater and estuarine invertebrates. Movement of very small amounts into an aquatic ecosystem would be harmful because it would kill the zooplankton and other small aquatic invertebrates, such as waterfleas, amphipods, and aquatic insects. Furthermore, populations of these aquatic invertebrates may not be able to recover after an acute exposure because their reproduction may be inhibited by remaining trace residues of abamectin. Life-cycle testing with the mysid, a estuarine crustacean, showed that reproduction is significantly impaired at extremely low concentrations, as low as 35 ng/L. Extended reduction in these invertebrate populations would also adversely impact fish and other higher organisms which are dependent on the food source that these populations provide. The result would be degradation of the entire ecosystem. Therefore, it is very important to protect water bodies from exposure to abamectin from both runoff and spray drift. Fortunately, abamectin is not very mobile in soil. Vegetative filter strips should be effective at protecting water bodies by trapping soluble residues and residues attached to suspended particles.

The current label for grapes and peppers requires only a 25-ft uncultivated buffer zone, which is not the same as a vegetative filter strip. A true vegetative filter strip is planted with specific types of grasses, as well as possibly other types of perennial vegetation, and must be maintained to serve as a barrier to surface water movement. An uncultivated strip of weeds may be totally inadequate for this function. Standard practices for installing and maintaining vegetative filter strips are available from the Natural Resources Conservation Service of USDA and various university extension services. If it is not practical to require vegetative filter strips that comply to these standard practices, then a wider buffer zone would be required to provide a comparable level of protection to aquatic habitats.

- ⑥ Much larger buffer zones would be required to protect aquatic ecosystems from spray drift. Spray drift precautions were included on the proposed label for cucurbits, fruiting and leafy vegetables, and potatoes as a group; the specified buffer zone for adjacent water bodies was 150 feet for aerial application, and the label also includes standard drift minimization language. However, even with the generic spray drift language and the 150-foot buffer zone, movement of abamectin by spray drift resulting from aerial applications could be devastating to aquatic ecosystems. Spray drift data reported in Bird et al. (Figure 9; 1996) would indicate that at a

distance of 50 meters (approximately 150 feet), deposition of medium to fine sprays ranged from 2 to 8 % of the application. This amount of loading is predicted to be enough to kill aquatic invertebrates, even in a relatively deep (2 m) water body. Therefore, EFED recommends prohibiting aerial spraying of abamectin.

- ⑥ Another reason for prohibiting aerial applications would be to protect nontarget terrestrial insects, which are also very susceptible to abamectin. Spray drift into adjacent habitat containing flowering plants could pose a risk to beneficial pollinators like bees, butterflies, and moths. Spray drift could also pose a risk to several endangered butterfly species, such as the Karner blue butterfly. Since the larvae of these species would not be expected to occur within agricultural fields, they should not be harmed by ground spraying, but could be harmed by aerial spraying because spray drift could contaminate adjacent habitat where the larvae may feed.

The 1992 Census of Agriculture does not include information on all the crops mentioned on the label, so the impact on endangered species from use on these crops is uncertain. Use areas are likely small for each smaller use crop, so the increase in the number of crops on which abamectin would be used may not have a large national impact. However, use of the chemical could have significant impact on local freshwater and estuarine ecosystems.

- ⑥ There are uncertainties associated with the estimated concentrations of abamectin in surface water. The model used to estimate concentrations of abamectin reaching surface water from runoff is designed to be used with field soils; however, many of the vegetable crops are grown on black plastic which covers a large portion of the field. Abamectin is photolabile on soil and adsorbs to soil particles; however, the effect of black plastic on the persistence and subsequent runoff of abamectin is not known. The registrant will be providing more information on the effect of black plastic on the behavior of abamectin in the near future.

GENEEC was used to estimate exposure of aquatic organisms to the proposed uses of abamectin on leafy and fruiting vegetables and plums. This Tier I screening model may potentially result in slightly higher EECs than if the PRZM-EXAMS model had been used to estimate EECs; however, since many of these crops are also grown on black plastic as noted above, the Tier I screening estimate may or may not be an overestimate.

III. Background

The registrant is requesting the addition of three new use sites for the use of abamectin (PC # 122804); these are leafy vegetables, fruiting vegetables, and plums/prunes. The new use sites apply to the use of the end-use product Agri-mek 0.15 EC Miticide Insecticide® (Reg. No. 100-898), containing 1.9% Abamectin to control: *Liriomyza* leafminers, two-spotted spider mite, and carmine spider mite on leafy vegetables; *Liriomyza* leafminers, spider mites, russet mites, broad mites, *Thrips palmi*, Colorado potato beetle, and tomato pinworm on fruiting vegetables; and two-spotted spider mite, Pacific spider mite, and European redmite on plums and prunes. This

action also applies to the abamectin technical (Reg. No. 100-895), which is for manufacturing use only. Please note that abamectin is already labeled for a number of the vegetable crops individually; the proposed label changes consolidate these crops into the broader categories of "leafy" and "fruiting" vegetables, which also allows for an increase in the numbers of crops in each category on which abamectin would be used.

The crops included in the leafy vegetables are:

celery, lettuce [head and leaf], amaranth, arugala, cardoon, Chinese celery, celtuce, chervil, chrysanthemum [edible-leaved and garland], corn salad, cress [garden and upland], dandelion, dock, endive, fennel, orach, parsley, purslane [garden and winter], radicchio, rhubarb, spinach (leaf, New Zealand, and Vine), and Swiss chard.

The crops included in the fruiting vegetables are:

tomato, eggplant, peppers [bell, chili, cooking, sweet, and pimento], groundcherry, pepino, and tomatillo.

Application Rate on vegetables : 0.009 - 0.019 lb ai/A

No. of Applications: 3

Application Method: Ground and aerial (**Please note that aerial application is proposed. As previously noted, EFED does not concur with the addition of aerial application to the label.**)

Maximum total application per growing season: 0.05625 lb ai/A

Application Rate on plums/prunes : 0.012-0.0234 lbs. ai/A

No. of Applications: 2

Application Method: Ground only

Maximum total application per growing season: 0.046875 lb ai/A

For general use, the maximum seasonal application rate for abamectin on any crop is 0.075 lb ai/A for strawberries.

Previous Buffer Zone Requirements

The size of required buffer zones to protect aquatic habitats has varied considerably in past registration actions for abamectin. For crops where no air application is permitted, the size of the buffer zone varies. For almonds, walnuts, plums, and prunes, the label requires the use of "conventional sprayers" and a buffer zone of 25 yards. For apples, citrus, and pears, the label requires a buffer zone of "110 feet upwind"; it also includes instructions on how to minimize drift. For hops, the label requires "ground equipment" and a buffer zone of 25 feet. For grapes, the label requires conventional sprayers" but no buffer zone is specified. For strawberries, the label does not specify either the type of sprayer to be used or the size of the buffer zone. A recent EFED review for grapes and chili peppers [D244257] recommended a 25-foot vegetated buffer strip to trap runoff and sediment. This apparently led to the following statement that appears on

page 4 of the label:

Do not cultivate within 25 ft. of the aquatic area so as to allow growth of a vegetative filter strip.

The proposed label for plums, leafy, and fruiting vegetables has a similar statement, but the uncultivated zone was reduced to only 10 ft. **Neither of these label statements is adequate. One cannot create an effective vegetative filter strip by simply not cultivating and allowing weeds to grow. There are standard methods for installing vegetative filter strips that must be followed to ensure that they are effective.**

This is the first time in recent years that EFED has reviewed and commented on a registration of abamectin for a use that includes aerial spray application. All new uses that EFED has reviewed in recent years have been for ground applications or aerial application of a granular bait for fire ant control. Therefore, this review is the first time that EFED has had the opportunity to comment on the newly revised label which allows aerial spray application for certain uses. In 1990, the Ecological Exposure Branch (EEB) in EFED recommended a 100-yard (300-ft) buffer zone for mist-blower application on pears (D258239). Shortly after, EEB recommended that a 100-yard buffer zone be required for all Section 18 registrations, regardless of the application method (D264470). The proposed label requires a buffer zone of 150 ft for aerial applications to protect aquatic habitats, which is only half the 100-yard width recommended by EFED. EFED is recommending removal of all aerial spray applications of abamectin.

IV. Environmental Fate Summary

The environmental fate database for abamectin is incomplete. However, based on the acceptable and supplemental data, the active ingredient Abamectin, which itself is a mixture of avermectins containing $\geq 80\%$ avermectin B_{1a} (5-0-demethyl avermectin A_{1a}) and $\leq 20\%$ avermectin B_{1b} (5-0-demethyl-25-de(1-methylpropyl)-25-(1-methylethyl) avermectin A_{1a}), is not expected to persist in the environment under the experimental conditions of submitted studies.

EFED is requesting additional information on aerobic soil metabolism, aerobic aquatic metabolism, and terrestrial field dissipation in order to better assess the behavior of abamectin in the environment.

Results of reviewed studies indicate that abamectin should undergo rapid photodegradation (half-lives of less than one day) in the top 1-2 cm of soil and in clear, shallow surface water. However, in most surface waters, suspended sediments and lack of mixing would decrease the rate of photodegradation significantly. In natural waters, abamectin residues would be expected to be associated with the sediment, reducing aqueous concentrations. Abamectin is also slowly biodegraded in soil (90% upper confidence bound of mean half-life = 115 days). Abamectin is stable to hydrolytic degradation. Based on the low reported vapor pressure (1.5×10^{-9} Torr), volatilization is not likely to be a significant transport process.

Abamectin is nearly insoluble (7.8 $\mu\text{g/L}$ at pH 9) and somewhat mobile ($K_{ads} = 9.7$ to 160 mg kg^{-1}) in the laboratory; adsorption was correlated with soil organic matter content. However, there are no acceptable field dissipation studies available to determine if the behavior of abamectin in the laboratory is demonstrated in the field.

Based upon the laboratory data, ground water effects are expected to be minimal. Surface water contamination could occur from spray drift or runoff events that occur soon after application.

V. Water Resources Summary

A. Surface Water (Modeling and Monitoring)

1) Aquatic Ecosystems

The Tier I Screening model GENEEC was used to determine estimated concentrations for abamectin in surface water for the uses on leafy and fruiting vegetables and plums (Table 1). EECs were not calculated for degradates of abamectin.

| Crop | Application Rate | Application interval | Application method | Peak | 4-Day | 21-Day | 56-day |
|-------------------------------|----------------------------|----------------------|--------------------|-------|-------|--------|--------|
| Leafy and fruiting vegetables | 3 app. @ 0.0188 lb ai/A | 7 days | Ground | 0.36* | 0.34 | 0.23 | 0.14 |
| | | | Aerial | 0.46 | 0.43 | 0.30 | 0.18 |
| Plums | 2 app. @ 0.0234 lb ai/A | 21 days | Ground | 0.29 | 0.27 | 0.19 | 0.11 |

*EECs rounded to 2 significant figures.

Input values used in the surface water model are given in Table 2.

| MODEL INPUT VARIABLE | INPUT VALUE | COMMENTS |
|-----------------------------|--|-------------------------------------|
| Application Rate (lbs ai/A) | 0.0188 (Leafy and fruiting vegetables) 0.0234 (Plums) | Current label (EPA Reg.No. 100-898) |
| Maximum No. of Applications | 3 (Leafy and fruiting vegetables) 2 (Plums) | Current label |
| Application Interval (days) | 7 (Leafy and fruiting vegetables) 21 (Plums) | Current Label |

| | | |
|--|---|--|
| K _{oc} | 2,531 | Lowest non-sand K _{oc} of 2,531 in Three Bridges silt loam (1.22 % OC). MRID 40856301 |
| Aerobic Soil Metabolic Half-life (days) | 115 | 90% upper-bound confidence limit of mean half-life |
| Is the pesticide wetted-in? | No | Current label |
| Depth of Incorporation (in.) | 0 | Current label |
| Spray Drift | 5 (leafy and fruiting vegetables) 1 (leafy and fruiting vegetables, plums) | Aerial = 5%; Ground = 1% |
| Solubility (µg/L) | 7.8 | At pH 9; EFGWI3 One-Liner Database |
| Aerobic Aquatic Metabolic Half-life (days) | 230 | No acceptable aerobic aquatic metabolism data were available. Per current EFED guidance, use 2x aerobic soil metabolism half-life. |
| Hydrolysis (pH 7) half-life (days) | 0 | Stable. Maynard and Ku, 1982. Acc. # 249152. Review dated 4/18/83. |
| Photolysis Half-life (days) | 0.5 | Dark-control adjusted half-life. Ku and Jacob, 1983, Acc. # 252115, Review dated 3/28/84. |

2) Drinking Water

As previously stated, a Tier II screening assessment of estimated environmental concentrations (EECs) for abamectin in drinking water resulting from the uses on strawberries was performed. EFED did not perform a Tier II surface water drinking water assessment for the vegetable or plum scenarios because strawberries were considered a higher exposure scenario (4 applications per season @ 0.01875 lb ai/A [the highest national use rate for abamectin] vs. 3 applications for vegetables @ 0.01875 lb ai/A, and 2 applications for plums @ 0.0234 lb ai/A). Please refer to the review dated 4/20/2000 (D265145) for further details.

3) Monitoring

Surface water monitoring data was not available to the Environmental Fate and Effects Division (EFED) for abamectin at this time.

B. Ground Water (Modeling and Monitoring)

Ground water monitoring data for abamectin were not available to EFED at this time. Results from the SCI-GROW screening model predict that the maximum chronic concentration of parent abamectin in shallow ground water is not expected to exceed 2.0 ng/L for the current maximum use rate on strawberries, 1.5 ng/L for the proposed use on leafy and fruiting vegetables,

and 1.2 ng/L for the proposed use on plums. Please note that these EECs are well below the Limit of Quantitation for the analytical method (LOQ in water = 0. 1µg/L = 100 ng/L).

The SCI-GROW model (Version 1.2; executable file dated 11/12/97) was used to estimate concentrations of abamectin that could be found in drinking water derived from ground water, using the input values listed in Table 3. EECs were not calculated for degradates of abamectin.

| MODEL INPUT VARIABLE | INPUT VALUE | COMMENTS |
|---|--|--|
| Application Rate (lbs. ai/A) | 0.0234 (Plums) 0.0188 (Leafy and fruiting vegetables; strawberries) | Current label ((EPA Reg.No. 100-898) |
| Maximum No. of Applications | 2 (Plums) 3 (Leafy and fruiting vegetables) 4 (Strawberries) | Current label. |
| K _{oc} | 2,531 | Lowest non-sand K _{oc} of 2,531 in Three Bridges silt loam (1.22 % OC). Lowest K _{oc} was used since the K _{oc} 's differed by more than a factor of 3. MRID 40856301 |
| Aerobic Soil Metabolic Half-life (days) | 70 | Mean of 70 days from individual half-lives of 34, 41, 72, and 131 days. Ku and Jacob, 1983, No MRID available, Review dated 3/28/84. |

C. Recommendations for Drinking Water Concentrations

The EFED recommended drinking water concentrations were previously calculated, incorporating the Index Reservoir and Percent Cropped Area policy in place in EFED (memo dated 4/20/2000; D265145). The use site modeled was strawberries grown on black plastic mulch in Florida. Please note that the certainty of the concentrations estimated for strawberries is low, due to uncertainty on the amount of runoff from plant beds covered in plastic mulch and uncertainty on the amount of degradation of abamectin on black plastic compared to soil. EFED did not model the vegetable or plum scenarios because strawberries were considered a higher exposure scenario (4 applications per season allowed for strawberries vs. 3 applications for vegetables).

Crop specific consecutive PRZM-EXAM simulations were conducted to evaluate the cumulative probability distribution for peak and annual mean EECs, which are presented in Table 4.

| Table 4. Estimated drinking water concentrations to be used for exposure to Abamectin in drinking water derived from Surface Water | | | |
|--|-------------------------------------|--|--|
| Toxicity Endpoint | Model EEC Value ($\mu\text{g/L}$) | Use Modeled | PCA Modeled |
| Acute | 1.47* | Strawberries in Florida; 4 ground applications @ 0.01875 lb ai/A; application intervals of 7 days, 21 days, 7 days (per label instructions for strawberries) | The default PCA factor of 0.87 was used because at this time no PCA specific for strawberries has been developed |
| Chronic non-cancer | 0.71 | | |
| Cancer | 0.71 | | |

*One-in-ten-year value reported.

VI. Ecological Risk Assessment

1. Ecological Toxicity Data

Acc. 246358 (supplemental)
Terrestrial Animals: On an acute oral basis abamectin is moderately toxic to waterfowl (mallard $\text{LD}_{50} = 85 \text{ mg ai/kg}$), but is practically nontoxic to upland game birds (bobwhite $\text{LD}_{50} > 2000 \text{ mg ai/kg}$). On a subacute dietary basis, abamectin is highly toxic to waterfowl (mallard $\text{LC}_{50} = 383 \text{ ppm ai}$), but only slightly toxic to upland game birds (bobwhite $\text{LC}_{50} = 3,100 \text{ ppm ai}$). The NOAEL for avian reproduction effects is 12 ppm ai based on results for the mallard. Abamectin is highly toxic to mammals on an acute oral basis (mice LD_{50} 's: 11.4 - 41.3 mg ai/kg). It is also highly toxic to the honeybee ($\text{LD}_{50} = 0.41 \mu\text{g/bee}$).

Aquatic Animals: Abamectin is extremely toxic to aquatic organisms. The lowest LC_{50} for a freshwater fish is $3.2 \mu\text{g ai/L}$ for the rainbow trout, classifying abamectin as very highly toxic to freshwater fish. The NOAEL and LOAEL obtained in a trout early life-stage study are $0.52 \mu\text{g ai/L}$ and $0.96 \mu\text{g ai/L}$, respectively. Abamectin is very highly toxic to freshwater invertebrates (*Daphnia magna* LC_{50} 's: 0.22 - 0.34 $\mu\text{g ai/L}$). Chronic effects to aquatic invertebrates occur at extremely low levels (*Daphnia magna* NOAEL = 0.03 $\mu\text{g ai/L}$, LOAEL = 0.09 $\mu\text{g ai/L}$). Toxicity is even greater to estuarine crustaceans (mysid $\text{LC}_{50} = 0.022 \mu\text{g ai/L}$, NOAEL = 0.0035 $\mu\text{g ai/L}$, LOAEL = 0.0093 $\mu\text{g ai/L}$). Abamectin is very highly toxic to estuarine/marine fish (sheepshead minnow $\text{LC}_{50} = 15 \mu\text{g ai/L}$).

Terrestrial and Aquatic Plants: Abamectin is not very toxic to aquatic plants. The EC_{50} 's for duckweed (*Lemna gibba*) and green algae (*Kirchneria subcapitata*) are 3.9 and $>100 \text{ mg a.i./L}$, respectively. Data are not available for toxicity to terrestrial plants.

2. Risk Quotients

Use of abamectin on fruiting vegetables, leafy vegetables, and plums/prunes poses similar risks as other registered uses. Previous EFED reviews (e.g. D214852 [dated 5/16/96] and D217627 [dated 3/4/96]) provide risk quotients for birds and mammals that are applicable for fruiting

Mysid shrimp

Acc No. 40856304 $LC_{50} = 22 \text{ ng/L} = 0.022 \text{ ppb}$

vegetables, leafy vegetables, and plums/prunes. These previous reviews found that abamectin is predicted to pose minimal risk to birds and mammals. However, bees and other nontarget insects exposed to abamectin can be adversely impacted.

We have revised the risk quotients for fish and aquatic invertebrates based on the new aquatic estimated environmental concentrations (EEC's). The maximum single use rate is 0.019 lb ai/A applied three times by air or ground application for both fruiting vegetables and leafy vegetables. The maximum single use rate for plums/prunes is 0.024 lbs ai/A applied two times by ground. Aquatic risk quotients for the maximum use rate are provided in Tables 5 & 6. Acute risk quotients are based on the peak estimated environmental concentration (EEC). Chronic risk quotients are based on the 56-day average EEC for fish and the 21-day average EEC for freshwater invertebrates.

The following table lists the acute and chronic risk quotients (RQs) and estimated environmental concentrations (EEC) for abamectin's use on leafy vegetables and fruiting vegetables. The EEC's were based on an application rate 0.019 lbs ai/A applied three times by both ground and aerial application.

not sure where 3,2 came from.

| Organism | LC50 | NOAEL | Ground Application | | | Aerial Application | | |
|--|-----------|----------------|---------------------------------|-----------------------|-------------------------|---------------------------------|-----------------------|-------------------------|
| | | | EEC ¹ | Acute RQ ² | Chronic RQ ² | EEC ¹ | Acute RQ ² | Chronic RQ ² |
| Freshwater Fish - Rainbow Trout | 3.2 ppb | 0.52 ppb | Peak = 0.4ppb 56day = 0.1ppb | 0.13 | 0.19 | Peak = 0.5ppb 56day = 0.2ppb | 0.16 | 0.38 |
| Freshwater Invertebrate - <i>Daphnia magna</i> | 0.22 ppb | 0.03 ppb | Peak = 0.4ppb 21day = 0.2ppb | 1.8 | 6.6 | Peak = 0.5ppb 21day = 0.3ppb | 2.27 | 10 |
| Estuarine/ Marine Fish - Sheepshead minnow | 15 ppb | - ³ | Peak = 0.4ppb | 0.03 | - ³ | Peak = 0.5ppb | 0.03 | - ³ |
| Estuarine/ Marine Invertebrate - Mysid shrimp | 0.022 ppb | 0.0035 ppb | Peak = 0.4ppb 21day = 0.2ppb | 18.2 | 57.1 | Peak = 0.5ppb 21day = 0.3ppb | 22.7 | 85.7 |

1) EECs rounded to 1 significant figure, based on three applications at 0.019 lbs ai/A

2) RQ = EEC/Toxicity Endpoint

3) - = No data available

For both ground and aerial applications, RQs for estuarine/marine and freshwater invertebrates exceeds the LOCs for high acute (0.5) and chronic risk (1.0). Furthermore, the RQs for both ground and aerial application exceed the restricted use (0.1) and the endangered species (0.05) acute risk LOCs for freshwater fish. The ground and aerial application RQs do not exceed the aquatic LOCs for acute risk to estuarine/marine fish. Although no chronic effects data are available, it is not expected that these proposed uses of abamectin will pose a chronic risk to estuarine/marine fish, based on the absence of a chronic risk to the freshwater fish species tested, which shows a somewhat higher acute sensitivity (lower LC_{50}) to abamectin.

Acc No. 246358 Acute tox to *Daphnia* $LC_{50} = 0.34 \text{ ppb}$

NOAEC < 0.31 ug/L

259364 Chronic " " NOAEC 0.03 ppb

Acc No. 40856306

The following table lists the acute and chronic risk quotients (RQs) and estimated environmental concentrations (EECs) for abamectin's use on **plums/prunes**. The EEC's were based on an application rate of 0.023 lbs ai/A applied two times by ground application.

| Organism | LC50 | NOAEL | EEC ¹ | Acute RQ ² | Chronic RQ ² |
|---|-----------|-----------------|---------------------------------|-----------------------|-------------------------|
| Freshwater Fish- Rainbow Trout | 3.2 ppb | 0.52 ppb | Peak = 0.3ppb 56day = 0.1ppb | 0.09 | 0.19 |
| Freshwater Invertebrate - <i>Daphnia magna</i> | 0.22 ppb | 0.03 ppb | Peak = 0.3ppb 21day = 0.2ppb | 1.36 | 6.67 |
| Estuarine/Marine Fish - Sheepshead minnow | 15 ppb | -- ³ | Peak = 0.3ppb | 0.02 | -- ³ |
| Estuarine/Marine Invertebrate - Mysid shrimp | 0.022 ppb | 0.0035 ppb | Peak = 0.3ppb 21day = 0.2ppb | 13.6 | 57 |

1) EECs rounded to 1 significant figure; based on two applications at 0.023 lbs ai/A by ground.

2) RQ = EEC/Toxicity Endpoint

3) -- = No data available

For both ground and aerial applications, RQs for estuarine/marine and freshwater invertebrates exceed the LOCs for high acute (0.5) and chronic risk (1.0). Furthermore, the RQs for ground application of abamectin on plums/prunes exceed the restricted use (0.1) and the endangered species (0.05) LOCs for freshwater fish. The RQs do not exceed any of the aquatic LOCs for estuarine/marine fish. Although no chronic effects data are available, it is not expected that this proposed use of abamectin will pose a chronic risk to estuarine/marine fish, based on the absence of a chronic risk to the freshwater fish species tested, which shows a somewhat higher acute sensitivity (lower LC₅₀) to abamectin.

3. Endangered Species

Use of abamectin on leafy vegetables, fruiting vegetables, and plums/prunes poses a risk to many threatened and endangered species of fish, amphibians, crustaceans, and insects (Appendix A). Risk is greatest to nontarget insects, including several species of moths and butterflies, and to aquatic crustaceans, including several species of fairy shrimp occurring in California. California has an effective endangered species program in place that should provide adequate protection of species in that state. Outside of California, special care should be taken to protect the Nashville crayfish and the Karne Blue butterfly. Abamectin is less toxic to fish and poses only a minor risk from direct toxic effects, but is likely to cause indirect effects through reducing the aquatic invertebrate populations on which they feed. Abamectin has been found to have relatively low toxicity to mollusks (oyster larvae LC₅₀ = 430 ppb) and is therefore not expected to pose a risk to threatened or endangered species of freshwater mussels.

The registrant, Novartis, should work towards protecting these species through participation in the Endangered Species Task Force. The Endangered Species Protection Program is expected to become final in the future. This program may require modification in the use of abamectin to protect threatened and endangered species. Such modifications would most likely consist of generic label statements referring pesticide users to use limitations defined by County Bulletins. In the meantime, the risk mitigation measures discussed in the risk characterization section (prohibiting aerial application and requiring a buffer zone) will help to mitigate risk to threatened and endangered species. In addition, EFED recommends the following statement for the abamectin label:

Use of this product may pose a risk to threatened and endangered species of fish, amphibians, crustaceans (including freshwater shrimp), and insects. All use of this product in the state of California should comply with the recommendations of the California Endangered Species Project. Before using this product in California, consult with your county agricultural commissioner to determine use limitations that apply to your area. Use of abamectin on leafy vegetables, fruiting vegetables, and plums/prunes pose a risk to threatened and endangered species of fish, amphibians, crustaceans, and insects (see Appendix I). According to EFED's risk criteria, no endangered birds or mammals should be impacted from the use of abamectin.

References:

Bird, S.L., D.M. Esterly, and S.G. Perry. 1996. Off-target deposition of pesticides from agricultural aerial spray applications. *J. Environ. Qual.* 25:1095-1104.

Tier I GENEEC Values for Abamectin in Surface Water**Vegetables - Ground application**

Abamectin INPUT VALUES

| RATE (#/AC) ONE(MULT) | APPLICATIONS NO.-INTERVAL | SOIL KOC | SOLUBILITY (PPB) | % SPRAY | INCRP DRIFT | DEPTH(IN) |
|--------------------------|------------------------------|-------------|---------------------|---------|----------------|-----------|
| .019(.054) | 3 7 | 2531.0 | 7.8 | 1.0 | | .0 |

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

| METABOLIC (FIELD) | DAYS UNTIL RAIN/RUNOFF | HYDROLYSIS (POND) | PHOTOLYSIS (POND-EFF) | METABOLIC (POND) | COMBINED (POND) |
|----------------------|---------------------------|----------------------|--------------------------|---------------------|--------------------|
| 115.00 | 0 | N/A | .50- 61.35 | ***** | 48.43 |

GENERIC EECs (IN PPT)

| PEAK GEEC | AVERAGE 4 DAY GEEC | AVERAGE 21 DAY GEEC | AVERAGE 56 DAY GEEC |
|--------------|-----------------------|------------------------|------------------------|
| 362.48 | 335.29 | 229.08 | 139.22 |

Vegetables - Aerial application

Abamectin INPUT VALUES

| RATE (#/AC) ONE(MULT) | APPLICATIONS NO.-INTERVAL | SOIL KOC | SOLUBILITY (PPB) | % SPRAY | INCRP DRIFT | DEPTH(IN) |
|--------------------------|------------------------------|-------------|---------------------|---------|----------------|-----------|
| .019(.054) | 3 7 | 2531.0 | 7.8 | 5.0 | | .0 |

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

| METABOLIC (FIELD) | DAYS UNTIL RAIN/RUNOFF | HYDROLYSIS (POND) | PHOTOLYSIS (POND-EFF) | METABOLIC (POND) | COMBINED (POND) |
|----------------------|---------------------------|----------------------|--------------------------|---------------------|--------------------|
| 115.00 | 0 | N/A | .50- 61.35 | ***** | 48.43 |

GENERIC EECs (IN PPT)

| PEAK GEEC | AVERAGE 4 DAY GEEC | AVERAGE 21 DAY GEEC | AVERAGE 56 DAY GEEC |
|--------------|-----------------------|------------------------|------------------------|
| 456.66 | 425.83 | 288.67 | 173.11 |

Plums - Ground application

Abamectin INPUT VALUES

| RATE (#/AC) ONE(MULT) | APPLICATIONS NO.-INTERVAL | SOIL KOC | SOLUBILITY (PPB) | % SPRAY INCORP DRIFT | INCORP DEPTH(IN) |
|--------------------------|------------------------------|-------------|---------------------|-------------------------|---------------------|
| .023(.044) | 2 | 21 | 2531.0 | 7.8 | 1.0 .0 |

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

| METABOLIC (FIELD) | DAYS UNTIL RAIN/RUNOFF | HYDROLYSIS (POND) | PHOTOLYSIS (POND-EFF) | METABOLIC (POND) | COMBINED (POND) |
|----------------------|---------------------------|----------------------|--------------------------|---------------------|--------------------|
| 115.00 | 0 | N/A | .50- 61.35 | ***** | 48.43 |

GENERIC EECs (IN PPT)

| PEAK GEEC | AVERAGE 4 DAY GEEC | AVERAGE 21 DAY GEEC | AVERAGE 56 DAY GEEC |
|--------------|-----------------------|------------------------|------------------------|
| 294.43 | 272.33 | 186.08 | 113.09 |

**Tier I SCI-GROW Values for Abamectin in Ground Water
Plums - Ground application**

Abamectin INPUT VALUES

APPL (#/AC) APPL. URATE SOIL SOIL AEROBIC
RATE NO. (#/AC/YR) KOC METABOLISM (DAYS)

.023 2 .047 2531.0 70.0

GROUND-WATER SCREENING CONCENTRATIONS IN PPB

.001225

A= 65.000 B= 2536.000 C= 1.813 D= 3.404 RILP= 1.080
F= -1.582 G= .026 URATE= .047 GWSC= .001225

Leafy and fruiting vegetables - Ground and aerial application

Abamectin INPUT VALUES

APPL (#/AC) APPL. URATE SOIL SOIL AEROBIC
RATE NO. (#/AC/YR) KOC METABOLISM (DAYS)

.019 3 .056 2531.0 70.0

GROUND-WATER SCREENING CONCENTRATIONS IN PPB

.001476

A= 65.000 B= 2536.000 C= 1.813 D= 3.404 RILP= 1.080
F= -1.582 G= .026 URATE= .056 GWSC= .001476

Strawberries - Ground application

Abamectin INPUT VALUES

APPL (#/AC) APPL. URATE SOIL SOIL AEROBIC
RATE NO. (#/AC/YR) KOC METABOLISM (DAYS)

.019 4 .075 2531.0 70.0

GROUND-WATER SCREENING CONCENTRATIONS IN PPB

.001969

A= 65.000 B= 2536.000 C= 1.813 D= 3.404 RILP= 1.080
F= -1.582 G= .026 URATE= .075 GWSC= .001969

APPENDIX I
Endangered Species

Plums/Prunes

Ag Census updated through: October 1, 1992
 Species database updated through October 1 1992

Wednesday 02/09/00 12:04

Species in counties where **Plums & prunes** (fresh wt) are grown.

| | | | |
|--|------------|-------|----------|
| SALAMANDER, DESERT SLENDER | AMPHIBIAN | E | KNOWN |
| SALAMANDER, SANTA CRUZ LONG-TOED | AMPHIBIAN | E | KNOWN |
| TOAD, ARROYO SOUTHWESTERN | AMPHIBIAN | E | KNOWN |
| LINDERIELLA, CALIFORNIA | CRUSTACEAN | E | KNOWN |
| SHRIMP, CALIFORNIA FRESHWATER | CRUSTACEAN | E | KNOWN |
| SHRIMP, CONSERVANCY FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, LONGHORN FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, RIVERSIDE FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, VERNAL POOL FAIRY | CRUSTACEAN | T | KNOWN |
| SHRIMP, VERNAL POOL TADPOLE | CRUSTACEAN | E | KNOWN |
| CATFISH, YAQUI | FISH | T, CH | KNOWN |
| CHUB, BONYTAIL | FISH | E, CH | POSSIBLE |
| CHUB, MOHAVE TUI | FISH | E | KNOWN |
| CHUB, OREGON | FISH | E | KNOWN |
| CHUB, YAQUI | FISH | E, CH | KNOWN |
| GOBY, TIDEWATER | FISH | E | POSSIBLE |
| PUPFISH, DESERT | FISH | E, CH | KNOWN |
| SALMON, CHINOOK (SACRAMENTO RIVER WINTER RUN) FISH | | E | KNOWN |
| SALMON, CHINOOK (SNAKE RIVER FALL RUN) FISH | | T | POSSIBLE |
| SALMON, CHINOOK (SNAKE RIVER SPRING/SUMMER) FISH | | T | POSSIBLE |
| SALMON, COHO (CENTRAL CALIFORNIA COAST POP) FISH | | E | POSSIBLE |
| SALMON, COHO (SOUTHERN OR/NORTHERN CA COAST) FISH | | T | POSSIBLE |
| SHINER, BEAUTIFUL | FISH | T, CH | KNOWN |
| SHRIMP, SAN DIEGO FAIRY | FISH | E | POSSIBLE |
| SMELT, DELTA | FISH | T | KNOWN |
| SQUAWFISH, COLORADO | FISH | CH | POSSIBLE |
| STEELHEAD, CALIFORNIA CENTRAL VALLEY POP | FISH | E | POSSIBLE |
| STEELHEAD, CENTRAL CALIFORNIA POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, KLAMATH MOUNTAINS PROVINCE | FISH | T | KNOWN |
| STEELHEAD, LOWER COLUMBIA RIVER POPULATION FISH | | T | POSSIBLE |
| STEELHEAD, NORTHERN CALIFORNIA POPULATION FISH | | T | POSSIBLE |
| STEELHEAD, OREGON COAST POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, SNAKE RIVER BASIN POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, SOUTH-CENTRAL CALIFORNIA POP | FISH | T | POSSIBLE |
| STEELHEAD, SOUTHERN CALIFORNIA POPULATION FISH | | E | POSSIBLE |
| STEELHEAD, UPPER COLUMBIA RIVER POPULATION FISH | | E | POSSIBLE |
| STICKLEBACK, UNARMORED THREESPINE | FISH | E, CH | KNOWN |
| STURGEON, PALLID | FISH | E | KNOWN |
| STURGEON, SHORTNOSE | FISH | E | KNOWN |
| SUCKER, RAZORBACK | FISH | E, CH | KNOWN |
| TOPMINNOW, GILA (YAQUI) | FISH | E | KNOWN |
| TROUT, BULL (COLUMBIA RIVER POPULATION) | FISH | T | POSSIBLE |
| TROUT, CUTTHROAT (UMPQUA RIVER POPULATION) FISH | | E | POSSIBLE |
| TROUT, LAHONTAN CUTTHROAT | FISH | T | KNOWN |
| TROUT, LITTLE KERN GOLDEN | FISH | T, CH | POSSIBLE |
| TROUT, PAIUTE CUTTHROAT | FISH | T | POSSIBLE |

Plums/Prunes cont'd.

| | | | |
|------------------------------------|--------|-------|----------|
| BEETLE, DELTA GREEN GROUND | INSECT | T, CH | KNOWN |
| BEETLE, MOUNT HERMON JUNE | INSECT | E | POSSIBLE |
| BEETLE, VALLEY ELDERBERRY LONGHORN | INSECT | T, CH | KNOWN |
| BUTTERFLY, BAY CHECKERSPOT | INSECT | T, CH | KNOWN |
| BUTTERFLY, BEHREN'S SILVERSPOT | INSECT | E | KNOWN |
| BUTTERFLY, EL SEGUNDO BLUE | INSECT | E | KNOWN |
| BUTTERFLY, KARNER BLUE | INSECT | E | KNOWN |
| BUTTERFLY, LANGE'S METALMARK | INSECT | E | KNOWN |
| BUTTERFLY, LOTIS BLUE | INSECT | E | KNOWN |
| BUTTERFLY, MITCHELL'S SATYR | INSECT | E | KNOWN |
| BUTTERFLY, MYRTLE'S SILVERSPOT | INSECT | E | KNOWN |
| BUTTERFLY, OREGON SILVERSPOT | INSECT | T, CH | KNOWN |
| BUTTERFLY, PALOS VERDES BLUE | INSECT | E, CH | KNOWN |
| BUTTERFLY, QUINO CHECKERSPOT | INSECT | E | POSSIBLE |
| FLY, DELHI SANDS FLOWER-LOVING | INSECT | E | KNOWN |
| GRASSHOPPER, ZAYANTE BAND-WINGED | INSECT | E | POSSIBLE |
| MOTH, KERN PRIMROSE SPHINX | INSECT | T | KNOWN |
| SKIPPER, LAGUNA MOUNTAIN | INSECT | E | POSSIBLE |
| SNAIL, MORRO SHOULDERBAND | SNAIL | E | KNOWN |

**Leafy Vegetables
(Lettuce)**

Ag Census updated through: October 1, 1992
Species database updated through October 1 1992

Wednesday 02/09/00 11:57

Species in counties where **Lettuce and Romaine**, Harvested are grown.

| | | | |
|---|------------|-------|----------|
| FROG, CALIFORNIA RED-LEGGED | AMPHIBIAN | T | KNOWN |
| SALAMANDER, DESERT SLENDER | AMPHIBIAN | E | KNOWN |
| SALAMANDER, SANTA CRUZ LONG-TOED | AMPHIBIAN | E | KNOWN |
| TOAD, ARROYO SOUTHWESTERN | AMPHIBIAN | E | KNOWN |
| LINDERIELLA, CALIFORNIA | CRUSTACEAN | E | KNOWN |
| SHRIMP, CALIFORNIA FRESHWATER | CRUSTACEAN | E | KNOWN |
| SHRIMP, CONSERVANCY FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, LONGHORN FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, RIVERSIDE FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, SQUIRREL CHIMNEY CAVE | CRUSTACEAN | T | KNOWN |
| SHRIMP, VERNAL POOL FAIRY | CRUSTACEAN | T | KNOWN |
| SHRIMP, VERNAL POOL TADPOLE | CRUSTACEAN | E | KNOWN |
| CATFISH, YAQUI | FISH | T, CH | KNOWN |
| CHUB, BONYTAIL | FISH | E, CH | KNOWN |
| CHUB, MOHAVE TUI | FISH | E | KNOWN |
| CHUB, OREGON | FISH | E | KNOWN |
| CHUB, YAQUI | FISH | E, CH | KNOWN |
| GOBY, TIDEWATER | FISH | E | POSSIBLE |
| MINNOW, LOACH | FISH | T, CH | KNOWN |
| PUFFISH, DESERT | FISH | E, CH | KNOWN |
| SALMON, CHINOOK (SACRAMENTO RIVER WINTER RUN) | FISH | E | POSSIBLE |
| SALMON, CHINOOK (SNAKE RIVER FALL RUN) | FISH | T | POSSIBLE |

**Leafy Vegetables
(Lettuce cont'd)**

| | | |
|---|-------|----------|
| SALMON, CHINOOK (SNAKE RIVER SPRING/SUMMER) FISH | T | POSSIBLE |
| SALMON, COHO (CENTRAL CALIFORNIA COAST POP) FISH | E | POSSIBLE |
| SALMON, COHO (SOUTHERN OR/NORTHERN CA COAST) FISH | T | POSSIBLE |
| SHINER, BEAUTIFUL FISH | T, CH | KNOWN |
| SHRIMP, SAN DIEGO FAIRY FISH | E | POSSIBLE |
| SMELT, DELTA FISH | T | KNOWN |
| SPIKEDACE FISH | T, CH | KNOWN |
| SQUAWFISH, COLORADO FISH | CH | POSSIBLE |
| STEELHEAD, CALIFORNIA CENTRAL VALLEY POP FISH | E | POSSIBLE |
| STEELHEAD, CENTRAL CALIFORNIA POPULATION FISH | T | POSSIBLE |
| STEELHEAD, KLAMATH MOUNTAINS PROVINCE FISH | T | POSSIBLE |
| STEELHEAD, LOWER COLUMBIA RIVER POPULATION FISH | T | POSSIBLE |
| STEELHEAD, NORTHERN CALIFORNIA POPULATION FISH | T | POSSIBLE |
| STEELHEAD, OREGON COAST POPULATION FISH | T | POSSIBLE |
| STEELHEAD, SNAKE RIVER BASIN POPULATION FISH | T | POSSIBLE |
| STEELHEAD, SOUTH-CENTRAL CALIFORNIA POP FISH | T | POSSIBLE |
| STEELHEAD, SOUTHERN CALIFORNIA POPULATION FISH | E | POSSIBLE |
| STEELHEAD, UPPER COLUMBIA RIVER POPULATION FISH | E | POSSIBLE |
| STICKLEBACK, UNARMORED THREESPINE FISH | E, CH | KNOWN |
| STURGEON, SHORTNOSE FISH | E | KNOWN |
| SUCKER, RAZORBACK FISH | E, CH | KNOWN |
| TOPMINNOW, GILA (YAQUI) FISH | E | KNOWN |
| TROUT, BULL (COLUMBIA RIVER POPULATION) FISH | T | POSSIBLE |
| TROUT, CUTTHROAT (UMPQUA RIVER POPULATION) FISH | E | POSSIBLE |
| TROUT, GILA FISH | E | KNOWN |
| TROUT, LITTLE KERN GOLDEN FISH | T, CH | POSSIBLE |
| TROUT, PAIUTE CUTTHROAT FISH | T | POSSIBLE |
| BEETLE, MOUNT HERMON JUNE INSECT | E | POSSIBLE |
| BEETLE, VALLEY ELDERBERRY LONGHORN INSECT | T, CH | KNOWN |
| BUTTERFLY, BAY CHECKERSPOT INSECT | T, CH | KNOWN |
| BUTTERFLY, BEHREN'S SILVERSPOT INSECT | E | KNOWN |
| BUTTERFLY, CALLIPPE SILVERSPOT INSECT | E | KNOWN |
| BUTTERFLY, EL SEGUNDO BLUE INSECT | E | KNOWN |
| BUTTERFLY, KARNER BLUE INSECT | E | KNOWN |
| BUTTERFLY, LOTIS BLUE INSECT | E | KNOWN |
| BUTTERFLY, MISSION BLUE INSECT | E | KNOWN |
| BUTTERFLY, MYRTLE'S SILVERSPOT INSECT | E | KNOWN |
| BUTTERFLY, OREGON SILVERSPOT INSECT | T, CH | KNOWN |
| BUTTERFLY, PALOS VERDES BLUE INSECT | E, CH | KNOWN |
| BUTTERFLY, QUINO CHECKERSPOT INSECT | E | POSSIBLE |
| BUTTERFLY, SAN BRUNO ELFIN INSECT | E | KNOWN |
| BUTTERFLY, SCHAUS SWALLOWTAIL INSECT | E | KNOWN |
| BUTTERFLY, SMITH'S BLUE INSECT | E | KNOWN |
| BUTTERFLY, UNCOMPAGRE FRITILLARY INSECT | E | KNOWN |
| FLY, DELHI SANDS FLOWER-LOVING INSECT | E | KNOWN |
| GRASSHOPPER, ZAYANTE BAND-WINGED INSECT | E | POSSIBLE |
| MOTH, KERN PRIMROSE SPHINX INSECT | T | KNOWN |
| SKIPPER, LAGUNA MOUNTAIN INSECT | E | POSSIBLE |
| SNAIL, MORRO SHOULDERBAND SNAIL | E | KNOWN |
| TALUSSNAIL, SAN XAVIER SNAIL | E | KNOWN |

**Leafy Vegetables
(Endive)**

Ag Census updated through: October 1, 1992
Species database updated through October 1 1992

Tuesday 05/16/00 14:15

Species in counties where **Endive**, Harvested (acres) are grown.

| | | | |
|---|------------|---|----------|
| FROG, CALIFORNIA RED-LEGGED | AMPHIBIAN | T | KNOWN |
| SALAMANDER, SANTA CRUZ LONG-TOED | AMPHIBIAN | E | KNOWN |
| LINDERIELLA, CALIFORNIA | CRUSTACEAN | E | KNOWN |
| SHRIMP, VERNAL POOL FAIRY | CRUSTACEAN | T | KNOWN |
| GOBY, TIDEWATER | FISH | E | POSSIBLE |
| STEELHEAD, SOUTH-CENTRAL CALIFORNIA POP | FISH | T | POSSIBLE |
| STURGEON, SHORTNOSE | FISH | E | KNOWN |
| BUTTERFLY, SMITH'S BLUE | INSECT | E | KNOWN |

**Leafy Vegetables
(Celery)**

Ag Census updated through: October 1, 1992
Species database updated through October 1 1992

Tuesday 05/16/00 13:56

Species in counties where **Celery**, Harvested (acres) are grown.

| | | | |
|---|------------|-------|----------|
| FROG, CALIFORNIA RED-LEGGED | AMPHIBIAN | T | KNOWN |
| SALAMANDER, SANTA CRUZ LONG-TOED | AMPHIBIAN | E | KNOWN |
| TOAD, ARROYO SOUTHWESTERN | AMPHIBIAN | E | KNOWN |
| LINDERIELLA, CALIFORNIA | CRUSTACEAN | E | KNOWN |
| SHRIMP, CONSERVANCY FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, LONGHORN FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, VERNAL POOL FAIRY | CRUSTACEAN | T | KNOWN |
| CHUB, BONYTAIL | FISH | E, CH | POSSIBLE |
| GOBY, TIDEWATER | FISH | E | POSSIBLE |
| PUPFISH, DESERT | FISH | E, CH | KNOWN |
| SALMON, COHO (CENTRAL CALIFORNIA COAST POP) | FISH | E | POSSIBLE |
| SQUAWFISH, COLORADO | FISH | CH | POSSIBLE |
| STEELHEAD, CENTRAL CALIFORNIA POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, SOUTH-CENTRAL CALIFORNIA POP | FISH | T | POSSIBLE |
| STEELHEAD, SOUTHERN CALIFORNIA POPULATION | FISH | E | POSSIBLE |
| STICKLEBACK, UNARMORED THREESPIKE | FISH | E, CH | KNOWN |
| SUCKER, RAZORBACK | FISH | E, CH | KNOWN |
| BEETLE, MOUNT HERMON JUNE | INSECT | E | POSSIBLE |
| BUTTERFLY, KARNER BLUE | INSECT | E | KNOWN |
| BUTTERFLY, MITCHELL'S SATYR | INSECT | E | KNOWN |
| BUTTERFLY, SMITH'S BLUE | INSECT | E | KNOWN |
| FLY, DELHI SANDS FLOWER-LOVING | INSECT | E | KNOWN |
| GRASSHOPPER, ZAYANTE BAND-WINGED | INSECT | E | POSSIBLE |
| SNAIL, MORRO SHOULDERBAND | SNAIL | E | KNOWN |

**Leafy Vegetables
(Spinach)**

Ag Census updated through: October 1, 1992
Species database updated through October 1 1992

Tuesday 05/16/00 14:20

Species in counties where Spinach, Harvested (acres) are grown.

| | | | |
|---|------------|-------|----------|
| FROG, CALIFORNIA RED-LEGGED | AMPHIBIAN | T | KNOWN |
| SALAMANDER, DESERT SLENDER | AMPHIBIAN | E | KNOWN |
| SALAMANDER, SANTA CRUZ LONG-TOED | AMPHIBIAN | E | KNOWN |
| TOAD, ARROYO SOUTHWESTERN | AMPHIBIAN | E | KNOWN |
| LINDERIELLA, CALIFORNIA | CRUSTACEAN | E | KNOWN |
| SHRIMP, CONSERVANCY FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, LONGHORN FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, RIVERSIDE FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, VERNAL POOL FAIRY | CRUSTACEAN | T | KNOWN |
| SHRIMP, VERNAL POOL TADPOLE | CRUSTACEAN | E | KNOWN |
| CHUB, BONYTAIL | FISH | E, CH | POSSIBLE |
| CHUB, OREGON | FISH | E | KNOWN |
| DARTER, LEOPARD | FISH | T, CH | KNOWN |
| GOBY, TIDEWATER | FISH | E | POSSIBLE |
| PUFFISH, DESERT | FISH | E, CH | KNOWN |
| SALMON, CHINOOK (SNAKE RIVER FALL RUN) | FISH | T | POSSIBLE |
| SALMON, CHINOOK (SNAKE RIVER SPRING/SUMMER) | FISH | T | KNOWN |
| SQUAWFISH, COLORADO | FISH | CH | POSSIBLE |
| STEELHEAD, CALIFORNIA CENTRAL VALLEY POP | FISH | E | POSSIBLE |
| STEELHEAD, LOWER COLUMBIA RIVER POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, SNAKE RIVER BASIN POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, SOUTH-CENTRAL CALIFORNIA POP | FISH | T | POSSIBLE |
| STEELHEAD, SOUTHERN CALIFORNIA POPULATION | FISH | E | POSSIBLE |
| STEELHEAD, UPPER COLUMBIA RIVER POPULATION | FISH | E | POSSIBLE |
| STICKLEBACK, UNARMORED THREESPINE | FISH | E, CH | KNOWN |
| STURGEON, PALLID | FISH | E | KNOWN |
| STURGEON, SHORTNOSE | FISH | E | POSSIBLE |
| SUCKER, RAZORBACK | FISH | E, CH | KNOWN |
| TOPMINNOW, GILA (YAQUI) | FISH | E | POSSIBLE |
| TROUT, BULL (COLUMBIA RIVER POPULATION) | FISH | T | POSSIBLE |
| TROUT, LITTLE KERN GOLDEN | FISH | T, CH | KNOWN |
| BEETLE, AMERICAN BURYING | INSECT | E | POSSIBLE |
| BEETLE, VALLEY ELDERBERRY LONGHORN | INSECT | T, CH | KNOWN |
| BUTTERFLY, QUINO CHECKERSPOT | INSECT | E | POSSIBLE |
| BUTTERFLY, SMITH'S BLUE | INSECT | E | KNOWN |
| FLY, DELHI SANDS FLOWER-LOVING | INSECT | E | KNOWN |
| SNAIL, MORRO SHOULDERBAND | SNAIL | E | KNOWN |

**Leafy Vegetables
(Rhubarb)**

Ag Census updated through: October 1, 1992
Species database updated through October 1 1992

Tuesday 05/16/00 14:19

Species in counties where **Rhubarb**, Harvested (acres) are grown.

| | | | |
|---|------|---|----------|
| CHUB, OREGON | FISH | E | KNOWN |
| SALMON, CHINOOK (SNAKE RIVER FALL RUN) | FISH | T | POSSIBLE |
| SALMON, CHINOOK (SNAKE RIVER SPRING/SUMMER) | FISH | T | POSSIBLE |
| STEELHEAD, LOWER COLUMBIA RIVER POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, SNAKE RIVER BASIN POPULATION | FISH | T | POSSIBLE |
| TROUT, BULL (COLUMBIA RIVER POPULATION) | FISH | T | POSSIBLE |

**Leafy Vegetables
(Parsley)**

Ag Census updated through: October 1, 1992
Species database updated through October 1 1992

Tuesday 05/16/00 14:18

Species in counties where **Parsley**, Harvested (acres) are grown.

| | | | |
|---|------------|-------|----------|
| FROG, CALIFORNIA RED-LEGGED | AMPHIBIAN | T | KNOWN |
| SALAMANDER, DESERT SLENDER | AMPHIBIAN | E | KNOWN |
| SALAMANDER, SANTA CRUZ LONG-TOED | AMPHIBIAN | E | KNOWN |
| TOAD, ARROYO SOUTHWESTERN | AMPHIBIAN | E | KNOWN |
| LINDERIELLA, CALIFORNIA | CRUSTACEAN | E | KNOWN |
| SHRIMP, CONSERVANCY FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, RIVERSIDE FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, VERNAL POOL FAIRY | CRUSTACEAN | T | KNOWN |
| CHUB, BONYTAIL | FISH | E, CH | POSSIBLE |
| GOBY, TIDEWATER | FISH | E | POSSIBLE |
| PUPFISH, DESERT | FISH | E, CH | KNOWN |
| SQUAWFISH, COLORADO | FISH | CH | POSSIBLE |
| STEELHEAD, SOUTH-CENTRAL CALIFORNIA POP | FISH | T | POSSIBLE |
| STEELHEAD, SOUTHERN CALIFORNIA POPULATION | FISH | E | POSSIBLE |
| STICKLEBACK, UNARMORED THREESPINE | FISH | E, CH | KNOWN |
| STURGEON, SHORTNOSE | FISH | E | KNOWN |
| SUCKER, RAZORBACK | FISH | E, CH | KNOWN |
| TOPMINNOW, GILA (YAQUI) | FISH | E | POSSIBLE |
| BUTTERFLY, QUINO CHECKERSPOT | INSECT | E | POSSIBLE |
| BUTTERFLY, SMITH'S BLUE | INSECT | E | KNOWN |
| FLY, DELHI SANDS FLOWER-LOVING | INSECT | E | KNOWN |

**Fruiting Vegetables
(Tomatoes)**

Ag Census updated through: October 1, 1992
Species database updated through October 1 1992

Wednesday 02/09/00 12:06

Species in counties where **Tomatoes**, Harvested (acres) are grown.

| | | | |
|---|------------|--------|----------|
| FROG, CALIFORNIA RED-LEGGED | AMPHIBIAN | T | KNOWN |
| SALAMANDER, DESERT SLENDER | AMPHIBIAN | E | KNOWN |
| SALAMANDER, RED HILLS | AMPHIBIAN | T | KNOWN |
| SALAMANDER, SANTA CRUZ LONG-TOED | AMPHIBIAN | E | KNOWN |
| SALAMANDER, SONORA TIGER | AMPHIBIAN | E | POSSIBLE |
| TOAD, ARROYO SOUTHWESTERN | AMPHIBIAN | E | KNOWN |
| TOAD, HOUSTON | AMPHIBIAN | E, CH | KNOWN |
| AMPHIPOD, ILLINOIS CAVE | CRUSTACEAN | E | POSSIBLE |
| CRAYFISH, NASHVILLE | CRUSTACEAN | E | KNOWN |
| LINDERIELLA, CALIFORNIA | CRUSTACEAN | E | KNOWN |
| SHRIMP, CALIFORNIA FRESHWATER | CRUSTACEAN | E | KNOWN |
| SHRIMP, CONSERVANCY FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, KENTUCKY CAVE | CRUSTACEAN | E, CH | KNOWN |
| SHRIMP, LONGHORN FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, RIVERSIDE FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, SQUIRREL CHIMNEY CAVE | CRUSTACEAN | T | KNOWN |
| SHRIMP, VERNAL POOL FAIRY | CRUSTACEAN | T | KNOWN |
| SHRIMP, VERNAL POOL TADPOLE | CRUSTACEAN | E | KNOWN |
| CHUB, BONYTAIL | FISH | E, CH | KNOWN |
| CHUB, HUMPBACK | FISH | E, CH | KNOWN |
| CHUB, MOHAVE TUI | FISH | E | KNOWN |
| CHUB, OREGON | FISH | E | KNOWN |
| CHUB, SLENDER | FISH | T, CH | POSSIBLE |
| CHUB, SPOTFIN | FISH | T, CH | POSSIBLE |
| CHUB, VIRGIN RIVER | FISH | E | KNOWN |
| DACE, BLACKSIDE | FISH | T | KNOWN |
| DARTER, BOULDER | FISH | E | KNOWN |
| DARTER, FOUNTAIN | FISH | E, CH | POSSIBLE |
| DARTER, MARYLAND | FISH | E, CH | KNOWN |
| DARTER, RELICT | FISH | E | POSSIBLE |
| DARTER, SNAIL | FISH | T | KNOWN |
| DARTER, WATERCRESS | FISH | E | KNOWN |
| GOBY, TIDEWATER | FISH | E | POSSIBLE |
| LOGPERCH, ROANOKE | FISH | E | KNOWN |
| MADTOM, YELLOWFIN | FISH | TCHPXN | POSSIBLE |
| MINNOW, LOACH | FISH | T, CH | KNOWN |
| MINNOW, RIO GRANDE SILVERY | FISH | E | POSSIBLE |
| PUPFISH, DESERT | FISH | E, CH | KNOWN |
| SALMON, CHINOOK (SACRAMENTO RIVER WINTER RUN) | FISH | E | POSSIBLE |
| SALMON, CHINOOK (SNAKE RIVER FALL RUN) | FISH | T | POSSIBLE |
| SALMON, CHINOOK (SNAKE RIVER SPRING/SUMMER) | FISH | T | POSSIBLE |
| SALMON, COHO (CENTRAL CALIFORNIA COAST POP) | FISH | E | POSSIBLE |
| SALMON, COHO (SOUTHERN OR/NORTHERN CA COAST) | FISH | T | POSSIBLE |
| SHINER, CAPE FEAR | FISH | E, CH | KNOWN |
| SHRIMP, SAN DIEGO FAIRY | FISH | E | POSSIBLE |
| SMELT, DELTA | FISH | T | KNOWN |

Fruiting Vegetables
(Tomatoes cont'd)

| | | | |
|--|--------|-------|----------|
| SPIKEDACE | FISH | T, CH | KNOWN |
| SQUAWFISH, COLORADO | FISH | CH | POSSIBLE |
| STEELHEAD, CALIFORNIA CENTRAL VALLEY POP | FISH | E | POSSIBLE |
| STEELHEAD, CENTRAL CALIFORNIA POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, KLAMATH MOUNTAINS PROVINCE | FISH | T | POSSIBLE |
| STEELHEAD, LOWER COLUMBIA RIVER POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, NORTHERN CALIFORNIA POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, OREGON COAST POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, SNAKE RIVER BASIN POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, SOUTH-CENTRAL CALIFORNIA POP | FISH | T | POSSIBLE |
| STEELHEAD, SOUTHERN CALIFORNIA POPULATION | FISH | E | POSSIBLE |
| STEELHEAD, UPPER COLUMBIA RIVER POPULATION | FISH | E | POSSIBLE |
| STICKLEBACK, UNARMORED THREESPINE | FISH | E, CH | KNOWN |
| STURGEON, GULF | FISH | CH | KNOWN |
| STURGEON, PALLID | FISH | E | POSSIBLE |
| STURGEON, SHORTNOSE | FISH | E | KNOWN |
| SUCKER, JUNE | FISH | E, CH | KNOWN |
| SUCKER, RAZORBACK | FISH | E, CH | KNOWN |
| TOPMINNOW, GILA (YAQUI) | FISH | E | KNOWN |
| TROUT, APACHE | FISH | T | KNOWN |
| TROUT, BULL (COLUMBIA RIVER POPULATION) | FISH | T | POSSIBLE |
| TROUT, CUTTHROAT (UMPQUA RIVER POPULATION) | FISH | E | POSSIBLE |
| TROUT, LAHONTAN CUTTHROAT | FISH | T | KNOWN |
| TROUT, LITTLE KERN GOLDEN | FISH | T, CH | POSSIBLE |
| TROUT, PAIUTE CUTTHROAT | FISH | T | POSSIBLE |
| BETTER, AMERICAN BURYING | INSECT | E | KNOWN |
| BETTER, DELTA GREEN GROUND | INSECT | T, CH | KNOWN |
| BETTER, HUNGERFORD'S CRAWLING WATER | INSECT | E | POSSIBLE |
| BETTER, MOUNT HERMON JUNE | INSECT | E | POSSIBLE |
| BETTER, NORTHEASTERN BEACH TIGER | INSECT | T | KNOWN |
| BETTER, PURITAN TIGER | INSECT | T | KNOWN |
| BETTER, VALLEY ELDERBERRY LONGHORN | INSECT | T, CH | KNOWN |
| BUTTERFLY, BAY CHECKERSPOT | INSECT | T, CH | KNOWN |
| BUTTERFLY, BEHREN'S SILVERSPOT | INSECT | E | KNOWN |
| BUTTERFLY, EL SEGUNDO BLUE | INSECT | E | KNOWN |
| BUTTERFLY, KARNER BLUE | INSECT | E | KNOWN |
| BUTTERFLY, LANGE'S METALMARK | INSECT | E | KNOWN |
| BUTTERFLY, LOTIS BLUE | INSECT | E | KNOWN |
| BUTTERFLY, MITCHELL'S SATYR | INSECT | E | KNOWN |
| BUTTERFLY, MYRTLE'S SILVERSPOT | INSECT | E | KNOWN |
| BUTTERFLY, OREGON SILVERSPOT | INSECT | T, CH | KNOWN |
| BUTTERFLY, PALOS VERDES BLUE | INSECT | E, CH | KNOWN |
| BUTTERFLY, QUINO CHECKERSPOT | INSECT | E | POSSIBLE |
| BUTTERFLY, SCHAUS SWALLOWTAIL | INSECT | E | KNOWN |
| BUTTERFLY, SMITH'S BLUE | INSECT | E | KNOWN |
| DRAGONFLY, HINES EMERALD | INSECT | E | KNOWN |
| FLY, DELHI SANDS FLOWER-LOVING | INSECT | E | KNOWN |
| GRASSHOPPER, ZAYANTE BAND-WINGED | INSECT | E | POSSIBLE |
| MOTH, KERN PRIMROSE SPHINX | INSECT | T | KNOWN |
| SKIPPER, LAGUNA MOUNTAIN | INSECT | E | POSSIBLE |
| AMBERSNAIL, KANAB | SNAIL | E | KNOWN |
| SNAIL, MORRO SHOULDERBAND | SNAIL | E | KNOWN |
| SNAIL, TULOTOMA | SNAIL | E | KNOWN |

**Fruiting Vegetables
(Sweet Peppers)**

Ag Census updated through: October 1, 1992
Species database updated through October 1 1992

Wednesday 02/09/00 12:05

Species in counties where **Sweet peppers**, Harvested (acre) are grown.

| | | | |
|---|------------|-------|----------|
| FROG, CALIFORNIA RED-LEGGED | AMPHIBIAN | T | KNOWN |
| SALAMANDER, DESERT SLENDER | AMPHIBIAN | E | KNOWN |
| SALAMANDER, SANTA CRUZ LONG-TOED | AMPHIBIAN | E | KNOWN |
| SALAMANDER, SONORA TIGER | AMPHIBIAN | E | POSSIBLE |
| TOAD, ARROYO SOUTHWESTERN | AMPHIBIAN | E | KNOWN |
| LINDERIELLA, CALIFORNIA | CRUSTACEAN | E | KNOWN |
| SHRIMP, CALIFORNIA FRESHWATER | CRUSTACEAN | E | KNOWN |
| SHRIMP, CONSERVANCY FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, KENTUCKY CAVE | CRUSTACEAN | E, CH | KNOWN |
| SHRIMP, LONGHORN FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, RIVERSIDE FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, SQUIRREL CHIMNEY CAVE | CRUSTACEAN | T | KNOWN |
| SHRIMP, VERNAL POOL FAIRY | CRUSTACEAN | T | KNOWN |
| SHRIMP, VERNAL POOL TADPOLE | CRUSTACEAN | E | KNOWN |
| CATFISH, YAQUI | FISH | T, CH | KNOWN |
| CHUB, BONYTAIL | FISH | E, CH | POSSIBLE |
| CHUB, HUMPBACK | FISH | E, CH | KNOWN |
| CHUB, OREGON | FISH | E | KNOWN |
| CHUB, SPOTFIN | FISH | T, CH | POSSIBLE |
| CHUB, YAQUI | FISH | E, CH | KNOWN |
| DACE, BLACKSIDE | FISH | T | KNOWN |
| DARTER, BOULDER | FISH | E | KNOWN |
| DARTER, SLACKWATER | FISH | T, CH | KNOWN |
| DARTER, SNAIL | FISH | T | POSSIBLE |
| DARTER, WATERCRESS | FISH | E | POSSIBLE |
| GAMBUSIA, PECOS | FISH | E | KNOWN |
| GOBY, TIDEWATER | FISH | E | POSSIBLE |
| MADTOM, SCIOTO | FISH | E | POSSIBLE |
| MINNOW, RIO GRANDE SILVERY | FISH | E | POSSIBLE |
| PUPFISH, DESERT | FISH | E, CH | KNOWN |
| SALMON, CHINOOK (SACRAMENTO RIVER WINTER RUN) | FISH | E | KNOWN |
| SALMON, CHINOOK (SNAKE RIVER FALL RUN) | FISH | T | POSSIBLE |
| SALMON, CHINOOK (SNAKE RIVER SPRING/SUMMER) | FISH | T | POSSIBLE |
| SALMON, COHO (CENTRAL CALIFORNIA COAST POP) | FISH | E | POSSIBLE |
| SHINER, BEAUTIFUL | FISH | T, CH | KNOWN |
| SHINER, PECOS BLUNTNOSE | FISH | T, CH | KNOWN |
| SMELT, DELTA | FISH | T | KNOWN |
| SQUAWFISH, COLORADO | FISH | CH | POSSIBLE |
| STEELHEAD, CALIFORNIA CENTRAL VALLEY POP | FISH | E | POSSIBLE |
| STEELHEAD, CENTRAL CALIFORNIA POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, KLAMATH MOUNTAINS PROVINCE | FISH | T | KNOWN |
| STEELHEAD, LOWER COLUMBIA RIVER POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, NORTHERN CALIFORNIA POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, OREGON COAST POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, SNAKE RIVER BASIN POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, SOUTH-CENTRAL CALIFORNIA POP | FISH | T | POSSIBLE |
| STEELHEAD, SOUTHERN CALIFORNIA POPULATION | FISH | E | POSSIBLE |

**Fruiting Vegetables
(Sweet Peppers cont'd.)**

| | | | |
|--|--------|-------|----------|
| STEELHEAD, UPPER COLUMBIA RIVER POPULATION | FISH | E | POSSIBLE |
| STICKLEBACK, UNARMORED THREESPINE | FISH | E, CH | KNOWN |
| STURGEON, GULF | FISH | CH | KNOWN |
| STURGEON, PALLID | FISH | E | POSSIBLE |
| STURGEON, SHORTNOSE | FISH | E | KNOWN |
| SUCKER, RAZORBACK | FISH | E, CH | KNOWN |
| TOPMINNOW, GILA (YAQUI) | FISH | E | KNOWN |
| TROUT, BULL (COLUMBIA RIVER POPULATION) | FISH | T | POSSIBLE |
| TROUT, CUTTHROAT (UMPQUA RIVER POPULATION) | FISH | E | POSSIBLE |
| TROUT, LAHONTAN CUTTHROAT | FISH | T | KNOWN |
| TROUT, LITTLE KERN GOLDEN | FISH | T, CH | POSSIBLE |
| TROUT, PAIUTE CUTTHROAT | FISH | T | POSSIBLE |
| BEEBLE, AMERICAN BURYING | INSECT | E | POSSIBLE |
| BEEBLE, MOUNT HERMON JUNE | INSECT | E | POSSIBLE |
| BEEBLE, NORTHEASTERN BEACH TIGER | INSECT | T | KNOWN |
| BEEBLE, PURITAN TIGER | INSECT | T | KNOWN |
| BEEBLE, VALLEY ELDERBERRY LONGHORN | INSECT | T, CH | KNOWN |
| BUTTERFLY, BAY CHECKERSPOT | INSECT | T, CH | KNOWN |
| BUTTERFLY, BEHREN'S SILVERSPOT | INSECT | E | KNOWN |
| BUTTERFLY, KARNER BLUE | INSECT | E | KNOWN |
| BUTTERFLY, LANGE'S METALMARK | INSECT | E | KNOWN |
| BUTTERFLY, MITCHELL'S SATYR | INSECT | E | KNOWN |
| BUTTERFLY, MYRTLE'S SILVERSPOT | INSECT | E | KNOWN |
| BUTTERFLY, QUINO CHECKERSPOT | INSECT | E | POSSIBLE |
| BUTTERFLY, SCHAUS SWALLOWTAIL | INSECT | E | KNOWN |
| BUTTERFLY, SMITH'S BLUE | INSECT | E | KNOWN |
| DRAGONFLY, HINES EMERALD | INSECT | E | KNOWN |
| FLY, DELHI SANDS FLOWER-LOVING | INSECT | E | KNOWN |
| GRASSHOPPER, ZAYANTE BAND-WINGED | INSECT | E | POSSIBLE |
| MOTH, KERN PRIMROSE SPHINX | INSECT | T | KNOWN |
| SNAIL, MORRO SHOULDERBAND | SNAIL | E | KNOWN |

**Fruiting Vegetables
(Hot Peppers)**

Ag Census updated through: October 1, 1992
Species database updated through October 1 1992

Wednesday 02/09/00 12:01

Species in counties where **Hot peppers**, Harvested (acres) are grown.

| | | | |
|----------------------------------|------------|---|-------|
| FROG, CALIFORNIA RED-LEGGED | AMPHIBIAN | T | KNOWN |
| SALAMANDER, DESERT SLENDER | AMPHIBIAN | E | KNOWN |
| SALAMANDER, SANTA CRUZ LONG-TOED | AMPHIBIAN | E | KNOWN |
| TOAD, ARROYO SOUTHWESTERN | AMPHIBIAN | E | KNOWN |
| ISOPOD, SOCORRO | CRUSTACEAN | E | KNOWN |
| LINDERIELLA, CALIFORNIA | CRUSTACEAN | E | KNOWN |
| SHRIMP, CALIFORNIA FRESHWATER | CRUSTACEAN | E | KNOWN |
| SHRIMP, CONSERVANCY FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, LONGHORN FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, RIVERSIDE FAIRY | CRUSTACEAN | E | KNOWN |

**Fruiting Vegetables
(Hot Peppers cont'd)**

| | | | |
|--|------------|-------|----------|
| SHRIMP, VERNAL POOL FAIRY | CRUSTACEAN | T | KNOWN |
| SHRIMP, VERNAL POOL TADPOLE | CRUSTACEAN | E | KNOWN |
| CATFISH, YAQUI | FISH | T, CH | KNOWN |
| CHUB, BONYTAIL | FISH | E, CH | POSSIBLE |
| CHUB, HUMPBACK | FISH | E, CH | KNOWN |
| CHUB, MOHAVE TUI | FISH | E | KNOWN |
| CHUB, YAQUI | FISH | E, CH | KNOWN |
| GAMBUSIA, PECOS | FISH | E | KNOWN |
| GOBY, TIDEWATER | FISH | E | POSSIBLE |
| MINNOW, LOACH | FISH | T, CH | KNOWN |
| MINNOW, RIO GRANDE SILVERY | FISH | E | KNOWN |
| PUPFISH, DESERT | FISH | E, CH | KNOWN |
| SALMON, CHINOOK (SACRAMENTO RIVER WINTER RUN) FISH | | E | KNOWN |
| SALMON, COHO (CENTRAL CALIFORNIA COAST POP) FISH | | E | POSSIBLE |
| SHINER, BEAUTIFUL | FISH | T, CH | KNOWN |
| SHINER, PECOS BLUNTNOST | FISH | T, CH | KNOWN |
| SMELT, DELTA | FISH | T | KNOWN |
| SPIKEDACE | FISH | T, CH | KNOWN |
| SQUAWFISH, COLORADO | FISH | CH | POSSIBLE |
| STEELHEAD, CALIFORNIA CENTRAL VALLEY POP | FISH | E | POSSIBLE |
| STEELHEAD, CENTRAL CALIFORNIA POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, NORTHERN CALIFORNIA POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, SOUTH-CENTRAL CALIFORNIA POP | FISH | T | POSSIBLE |
| STEELHEAD, SOUTHERN CALIFORNIA POPULATION | FISH | E | POSSIBLE |
| STEELHEAD, UPPER COLUMBIA RIVER POPULATION | FISH | E | POSSIBLE |
| STICKLEBACK, UNARMORED THREESPINE | FISH | E, CH | KNOWN |
| STURGEON, GULF | FISH | CH | KNOWN |
| STURGEON, PALLID | FISH | E | POSSIBLE |
| STURGEON, SHORTNOSE | FISH | E | POSSIBLE |
| SUCKER, RAZORBACK | FISH | E, CH | KNOWN |
| TOPMINNOW, GILA (YAQUI) | FISH | E | KNOWN |
| TROUT, APACHE | FISH | T | KNOWN |
| TROUT, BULL (COLUMBIA RIVER POPULATION) | FISH | T | POSSIBLE |
| TROUT, GILA | FISH | E | KNOWN |
| TROUT, LITTLE KERN GOLDEN | FISH | T, CH | POSSIBLE |
| TROUT, PAIUTE CUTTHROAT | FISH | T | POSSIBLE |
| BEETLE, VALLEY ELDERBERRY LONGHORN | INSECT | T, CH | KNOWN |
| BUTTERFLY, BAY CHECKERSPOT | INSECT | T, CH | KNOWN |
| BUTTERFLY, BEHREN'S SILVERSPOT | INSECT | E | KNOWN |
| BUTTERFLY, KARNER BLUE | INSECT | E | KNOWN |
| BUTTERFLY, MITCHELL'S SATYR | INSECT | E | KNOWN |
| BUTTERFLY, MYRTLE'S SILVERSPOT | INSECT | E | KNOWN |
| BUTTERFLY, QUINO CHECKERSPOT | INSECT | E | POSSIBLE |
| BUTTERFLY, SCHAUS SWALLOWTAIL | INSECT | E | KNOWN |
| BUTTERFLY, SMITH'S BLUE | INSECT | E | KNOWN |
| FLY, DELHI SANDS FLOWER-LOVING | INSECT | E | KNOWN |
| MOTH, KERN PRIMROSE SPHINX | INSECT | T | KNOWN |
| SNAIL, MORRO SHOULDERBAND | SNAIL | E | KNOWN |
| SPRINGSNAIL, ALAMOSA | SNAIL | E | KNOWN |
| SPRINGSNAIL, SOCORRO | SNAIL | E | KNOWN |

**Fruiting Vegetables
(Pimientos)**

Ag Census updated through: October 1, 1992
Species database updated through October 1 1992

Wednesday 02/09/00 12:03

Species in counties where **Pimientos**, Harvested (acres) are grown.

| | | | |
|--------------------|------|-------|-------|
| DARTER, BOULDER | FISH | E | KNOWN |
| DARTER, SLACKWATER | FISH | T, CH | KNOWN |
| DARTER, SNAIL | FISH | T | KNOWN |

**Fruiting Vegetables
(Eggplant)**

Ag Census updated through: October 1, 1992
Species database updated through October 1 1992

Wednesday 02/09/00 12:01

Species in counties where **Eggplant**, Harvested (acres) are grown.

| | | | |
|---|------------|-------|----------|
| SALAMANDER, DESERT SLENDER | AMPHIBIAN | E | KNOWN |
| TOAD, ARROYO SOUTHWESTERN | AMPHIBIAN | E | KNOWN |
| LINDERIELLA, CALIFORNIA | CRUSTACEAN | E | KNOWN |
| SHRIMP, CONSERVANCY FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, RIVERSIDE FAIRY | CRUSTACEAN | E | KNOWN |
| SHRIMP, SQUIRREL CHIMNEY CAVE | CRUSTACEAN | T | KNOWN |
| SHRIMP, VERNAL POOL FAIRY | CRUSTACEAN | T | KNOWN |
| SHRIMP, VERNAL POOL TADPOLE | CRUSTACEAN | E | KNOWN |
| CHUB, BONYTAIL | FISH | E, CH | POSSIBLE |
| MINNOW, RIO GRANDE SILVERY | FISH | E | KNOWN |
| PUPFISH, DESERT | FISH | E, CH | KNOWN |
| SALMON, CHINOOK (SNAKE RIVER FALL RUN) | FISH | T | POSSIBLE |
| SALMON, CHINOOK (SNAKE RIVER SPRING/SUMMER) | FISH | T | KNOWN |
| SMELT, DELTA | FISH | T | KNOWN |
| SQUAWFISH, COLORADO | FISH | CH | POSSIBLE |
| STEELHEAD, CALIFORNIA CENTRAL VALLEY POP | FISH | E | POSSIBLE |
| STEELHEAD, SNAKE RIVER BASIN POPULATION | FISH | T | POSSIBLE |
| STEELHEAD, UPPER COLUMBIA RIVER POPULATION | FISH | E | POSSIBLE |
| STURGEON, GULF | FISH | CH | KNOWN |
| STURGEON, SHORTNOSE | FISH | E | KNOWN |
| SUCKER, RAZORBACK | FISH | E, CH | KNOWN |
| TROUT, BULL (COLUMBIA RIVER POPULATION) | FISH | T | POSSIBLE |
| TROUT, LITTLE KERN GOLDEN | FISH | T, CH | POSSIBLE |
| TROUT, PAIUTE CUTTHROAT | FISH | T | POSSIBLE |
| BEETLE, NORTHEASTERN BEACH TIGER | INSECT | T | KNOWN |
| BEETLE, PURITAN TIGER | INSECT | T | KNOWN |
| BEETLE, VALLEY ELDERBERRY LONGHORN | INSECT | T, CH | KNOWN |
| BUTTERFLY, MITCHELL'S SATYR | INSECT | E | KNOWN |
| BUTTERFLY, QUINO CHECKERSPOT | INSECT | E | POSSIBLE |
| BUTTERFLY, SCHAUS SWALLOWTAIL | INSECT | E | KNOWN |
| FLY, DELHI SANDS FLOWER-LOVING | INSECT | E | KNOWN |