

A woman with long dark hair, wearing a dark long-sleeved shirt with colorful stripes on the sleeves, is kneeling in a greenhouse. She is carefully packing fresh green leafy vegetables into a large cardboard box. The greenhouse structure is visible in the background, and other plants are growing in the foreground. A semi-transparent dark grey box is overlaid on the top half of the image, containing white text.

# Water and Nitrogen Management of Asian Vegetables/ CDFA Healthy Soils Programs

A woman with long dark hair, wearing a dark long-sleeved shirt with colorful stripes on the sleeves, is kneeling in a greenhouse. She is carefully packing fresh green leafy vegetables into a large cardboard box. The greenhouse structure is visible in the background, and other plants are growing in the foreground. A semi-transparent dark grey box is overlaid on the bottom half of the image, containing white text.

**Aparna Gazula**  
Small Farms Advisor  
UCCE Santa Clara County

# Asian Specialty Vegetable Production

County	No of Asian Farmers	Acres Harvested	Value of Asian Vegetable Production
Monterey	128	963	\$17,378,000
Santa Clara*	277	503	\$6,981,000
Fresno	1,499	950	\$15,975,000
San Bernardino	157	1716	\$16,471,184
San Luis Obispo	118	267	\$2,161,000
Riverside	368	2627	\$19,866,000
Ventura	255	755	\$15,006,000
<b>Total</b>	<b>2802</b>	<b>7781</b>	<b>\$93,838,184</b>

\* Limited-resource, small-scale, Chinese and other Asian immigrant farmers

# Asian Farms Information

	Monterey	Santa Clara
Total no. of farms	128	277
Average size of farms (acres)	456	22
No of farms <10 acres	17 (21%)	140 (68%)
No of farms <\$50,000 in sales	17 (20%)	137 (67%)

# Farming Practices

## Greenhouse Production



## Open Field Production



# Farming Practices

---



# Farming Practices

---



# Farming Practices: Grow more than 20+ types of Asian vegetables

---



**Bok Choy**



**Edible  
Chrysanthemum**



**Garlic Chives**



**A Choy**



**Amaranth**



**Chinese Celery**

# Farming Practices: Grow more than 20+ types of Asian vegetables

---



**Daikon Radish**



**Gai Choy**



**Gai Lan**



**Ong Choy**



**Malabar Spinach**



**Yam Leaves**



# Asian Leafy Vegetables Grown in Monterey & Santa Clara Counties

Crop	Monterey County	Santa Clara County
<b>45-days duration crops (1 harvest)</b>		
Bok Choy	x	x
Baby Bok Choy		x
A Choy		x
Gai Choy		x
Yu Choy		x
Gai Lan		x
<b>2-3 months duration crops (1-2 harvest)</b>		
Amaranth		x
Daikon Radish		x
Garlic		x
Malabar Spinach		x
Chinese Celery		x
Yam Leaves		x
<b>4-6 months duration crops (multiple harvests)</b>		
Edible Chrysanthemum		x
On Choy		x
Snow Pea Tips		x
<b>1 year duration (2 or more harvests)</b>		
Garlic Chives		x

# Asian Leafy Vegetables Total Nitrogen Use

Crop	Total Nitrogen Used (lbs/Acre)
<b>45-days duration crops (1 harvest)</b>	
Bok Choy	15 - 140
Baby Bok Choy	50
A Choy	10 - 240
Gai Choy	10 - 140
Yu Choy	10 - 30
Gai Lan	10 - 140
<b>2-3 months duration crops (1-2 harvest)</b>	
Amaranth	40 - 140
Daikon Radish	140
Garlic	55 - 140
Malabar Spinach	25 - 80
Chinese Celery	50 - 410
Yam Leaves	10 - 410
<b>4-6 months duration crops (multiple harvests)</b>	
Edible Chrysanthemum	10 - 180
On Choy	50 - 380
Snow Pea Tips	20 - 120
<b>1 year duration (2 or more harvests)</b>	
Garlic Chives	50 - 410

# Asian Leafy Vegetables Production Practices

Crop	Monterey County	Santa Clara County
Bok Choy	x	x
Baby Bok Choy		x
A Choy		x
Gai Choy		x
Yu Choy		x
Gai Lan		x

- Around 45-days duration crops from seed to harvesting
- Growers follow same production practices - fertilization, irrigation, pest management practices for these crops
- In greenhouse production systems, grown intensively with around 6 crop cycles per year
- Nitrogen fertilizer application varied a lot 15 ~140 lb/acre

# Nitrogen Use Reporting

TIER 2/TIER 3 FARMS WITH HIGH NITRATE LOADING RISK

## TOTAL NITROGEN APPLIED REPORT - RANCH/RISK UNIT & FIELD/BLOCK

Page 1 of 3 - September 26, 2016 Version

**EMAIL FORM AS AN ATTACHMENT:** Attach completed and saved form to an email and send to [AgNOI@waterboards.ca.gov](mailto:AgNOI@waterboards.ca.gov)

Reporting Period:  to

Any changes to the reporting period must be approved or form will not be accepted.

### CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM IRRIGATED LANDS - REGIONAL BOARD ORDER R3-2012-0011

Annually by October 1st, Tier 2 and Tier 3 dischargers with High Nitrate Loading Risk must report total nitrogen applied and present in the soil.

[Click below to clear the corresponding section of the form.](#)

*Hover over the cells/boxes with your mouse for more information on what is required. Refer to instructions for further detail.*

[Section I](#) | [Section II](#) | [Section III](#) | [Section IV](#) | [All](#)

#### SECTION I: GENERAL RANCH INFORMATION

AW#: <input type="text"/>	Ranch Global ID: <input type="text"/>	Ranch/Risk Unit or Field/Block Name: <input type="text"/>	Physical Ranch Acres Reporting: <input type="text"/>
County: <input type="text" value="Santa Clara"/>	APN(s): <input type="text"/>	<input type="text"/>	Fallow Acres: <input type="text"/> <small>(if fallow entire report period)</small>
If ranch is a greenhouse, nursery, or hydroponic, select from the dropdown: <input type="text"/>			Sum of Total Crop Acres: <input type="text" value="0.0"/> <small>(Auto-calculates from Section IV)</small>

#### SECTION II: NITROGEN APPLIED WITH IRRIGATION WATER

Section II-A: PVWMA/CSIP water use	Section II-B: PVWMA/CSIP water	Section II-C: Well/city water (or other non-PVWMA/CSIP source)	Section II-D: Nitrogen applied
Was PVWMA/CSIP water used during the reporting period? <input type="text" value="NO. Only well, city, or other water"/>		<b>Average Nitrate Concentration in Well/City Water (mg/L)</b> <input type="text"/> <input type="checkbox"/> as Nitrate (NO3) <input type="checkbox"/> as Nitrogen (NO3-N or N)	<b>Estimated Total Volume of Well/City Water Applied to Entire Reporting Acres During Reporting Period (gallons)</b> <input type="text"/>
<i>If no PVWMA/CSIP water was used, complete Section II-C. Leave II-B blank.</i>		<i>To calculate the weighted average concentration if more than one sample from one or more sources of irrigation water was used, use the Excel tool 'weighted_avg_conc'</i>	<b>Nitrogen Applied with Irrigation Water (lbs/ranch-ac)</b> <input type="text"/>
<i>Section II-D will auto-calculate based on Sections II-B, II-C, and ranch acreage.</i>		<i>This field can be erased before submittal. Do not include volume of PVWMA/CSIP water applied. To convert from acre-feet or acre-inches to gallons, use the Excel tool 'convert_to_gallons'</i>	<b>Physical Acres Receiving Compost &amp; Amendments</b> <input type="text"/>
			<b>Nitrogen Applied in Compost &amp; Amendments (total lbs)</b> <input type="text"/>
			<b>Section II-E: Volume check</b> <input type="text"/>
			<i>This field auto-calculates. After completing Sections I-IV, check the estimated average acre-feet of water applied to each crop-acre grown</i>
			<i>Applications of nitrogen from compost and amendments (not fertilizers) made to improve soil properties, and/or as a source of nitrogen to ALL crops grown during the reporting period may be reported here. Alternatively, the nitrogen may be distributed accordingly between the crops and reported in Section IV. Do not report this information in both sections.</i>

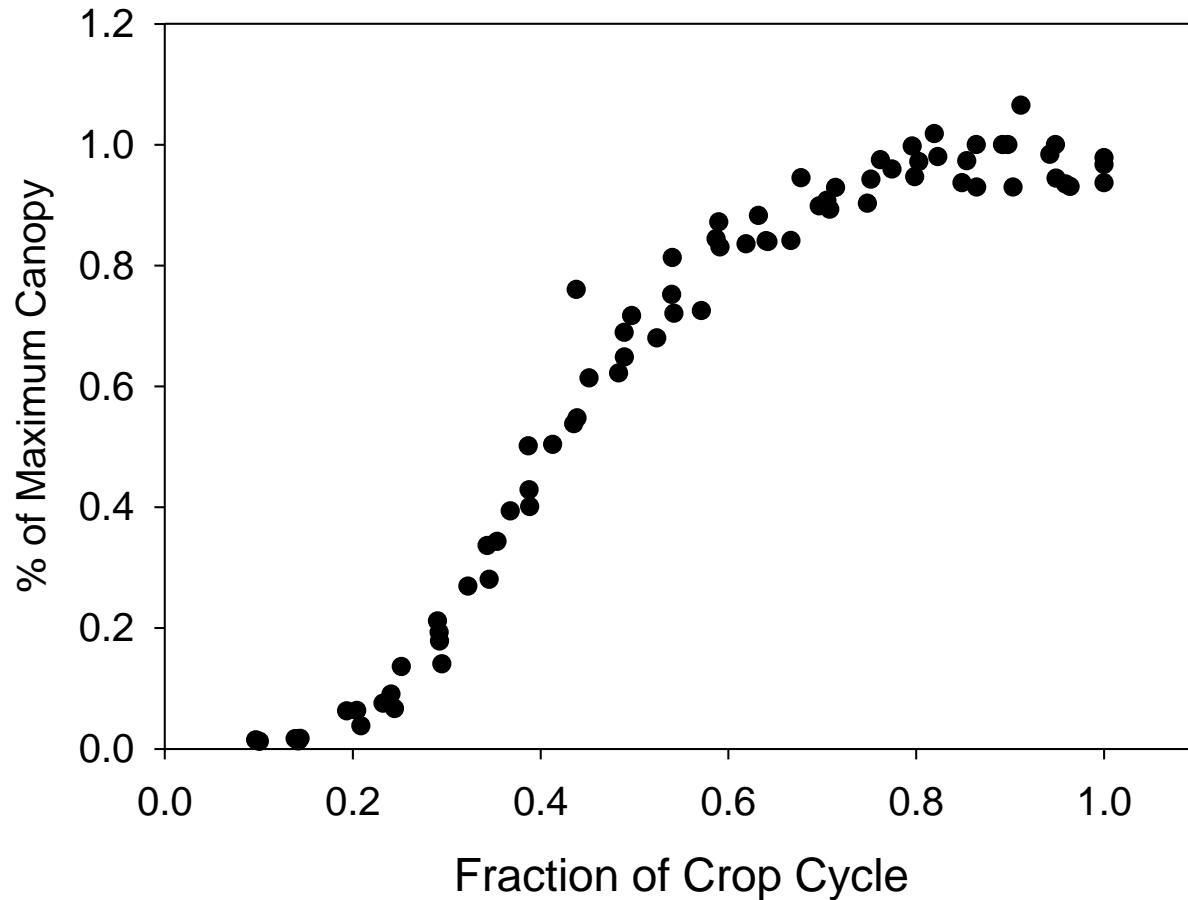
#### SECTION IV: NITROGEN APPLIED WITH FERTILIZERS & OTHER MATERIALS AND NITROGEN PRESENT IN SOIL

	Specific Crop(s) Grown and Harvested During Reporting Period <small>(Select from List on Page 3)</small>	Total Crop Acres	Nitrogen Present in Soil (lbs/ac)	Nitrogen Applied in Fertilizers and Other Materials (lbs/crop-ac)	O/C	Additional Information		Specific Crop(s) Grown and Harvested During Reporting Period <small>(Select from List on Page 3)</small>	Total Crop Acres	Nitrogen Present in Soil (lbs/ac)	Nitrogen Applied in Fertilizers and Other Materials (lbs/crop-ac)	O/C	Additional Information
1.	Amaranth						11.	Chinese Greens (On Choy)					
2.	Bok Choy						12.	Chinese Greens (Shanghai Bok C)					
3.	Bok Choy, Baby						13.	Chinese Greens (Snow Pea Tips)					
4.	Celery						14.	Chinese Greens (Tong Ho)					
5.	Chinese Greens (A Choy)						15.	Chinese Greens (Yam Leaves)					
6.	Chinese Greens (Bok Choy)						16.	Chinese Greens (Yu Choy)					
7.	Chinese Greens (Bok Choy, Baby)						17.	Chives					
8.	Chinese Greens (Bun Choy)						18.	Daikon					
9.	Chinese Greens (Gai Choy)						19.	Yam Leaf					
10.	Chinese Greens (Gai Lan)						20.	Malabar					

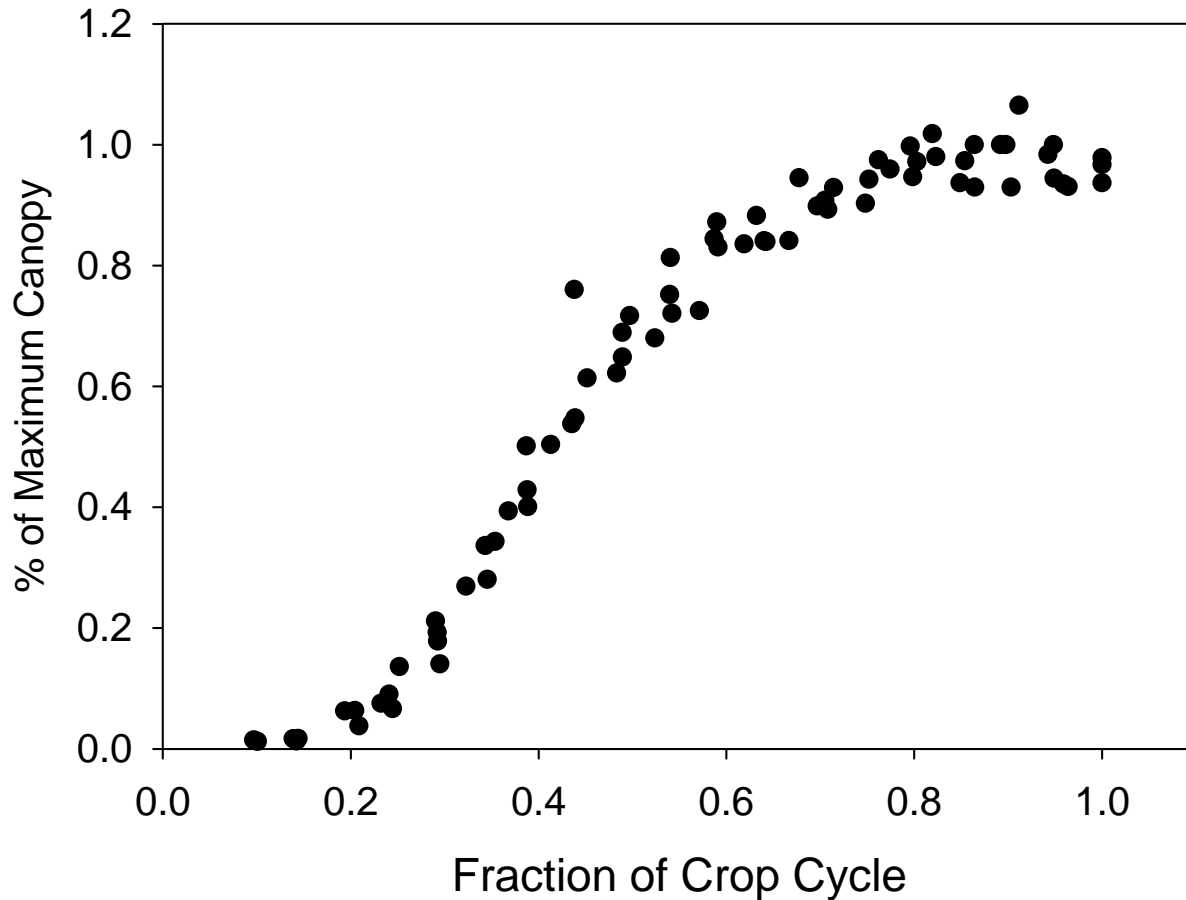
# Irrigation and Nitrogen Evaluation in Bok Choy, Ong Choy, and Garlic Chives



# Irrigation and Nitrogen Evaluation in Bok Choy, Ong Choy, and Garlic Chives



# Irrigation and Nitrogen Evaluation in Bok Choy, Tong Ho, and Garlic Chives



# Irrigation and Nitrogen Evaluation in Bok Choy, Ong Choy, and Garlic Chives

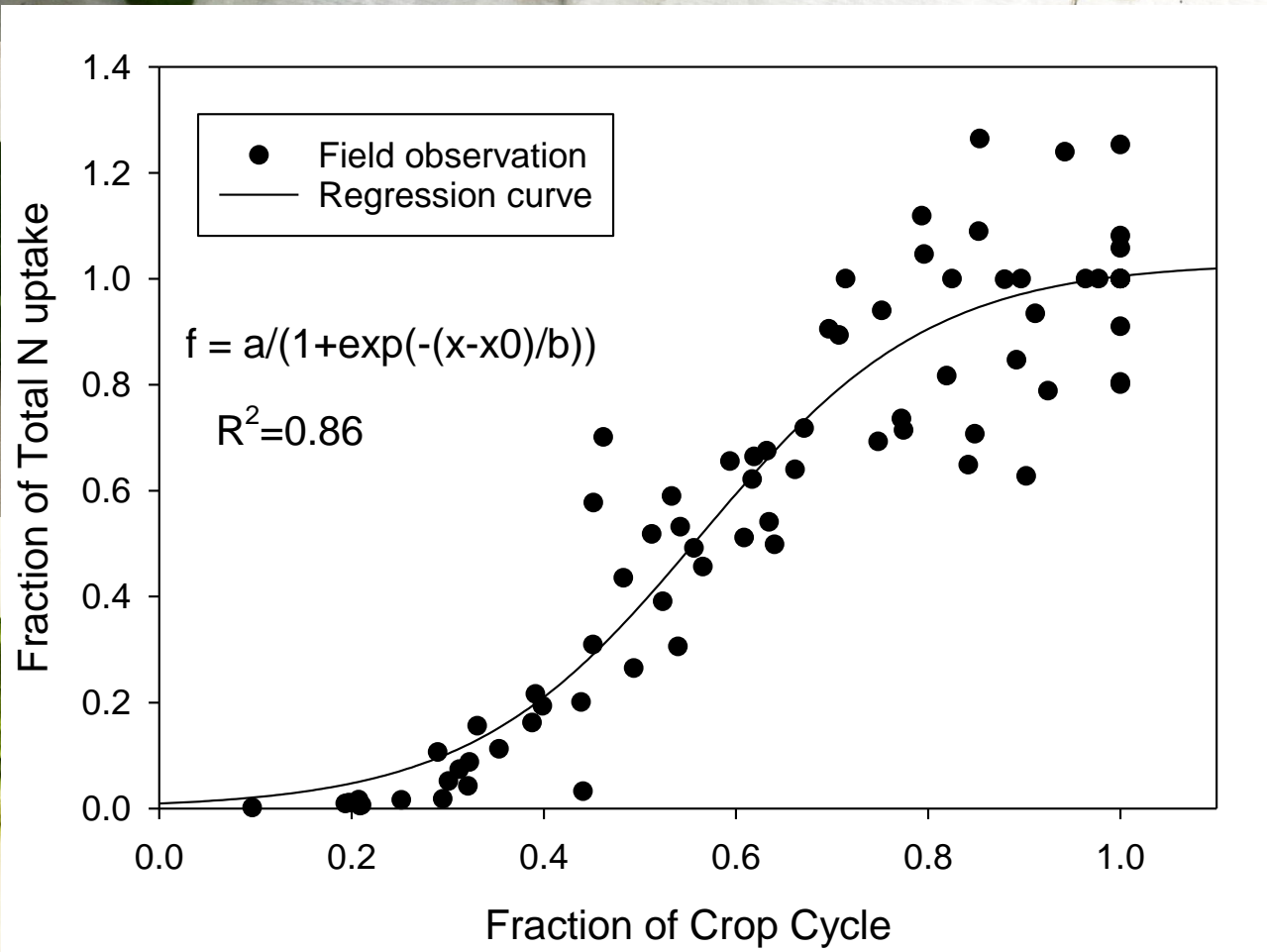




# Irrigation and Nitrogen Evaluation in Bok Choy, Ong Choy, and Garlic Chives






# Irrigation and Nitrogen Evaluation in Bok Choy, Ong Choy, and Garlic Chives



# CropManage: Online irrigation and nitrogen management decision support tool

☆ **Bok Choy BK-Rep 1**  
Bok Choy BK-Rep 1



Lettuce-green leaf, 6-row, 80-inch bed  
**19 Oct 2018 - 26 Dec 2018**

**Events** Add:   

Upcoming | Past




**26 Feb 2019** Today

No Events Today

View all events by:  

☆ **Bok Choy BK-Rep 2**  
Bok Choy BK-Rep 2



Lettuce-green leaf, 6-row, 80-inch bed  
**31 Oct 2018 - 17 Jan 2019**

**Events** Add:   

Upcoming | Past




**26 Feb 2019** Today

No Events Today

View all events by:  

☆ **Bok Choy BK-Rep 3**  
Bok Choy BK-Rep 3



Lettuce-green leaf, 6-row, 80-inch bed  
**31 Oct 2018 - 17 Jan 2019**

**Events** Add:   

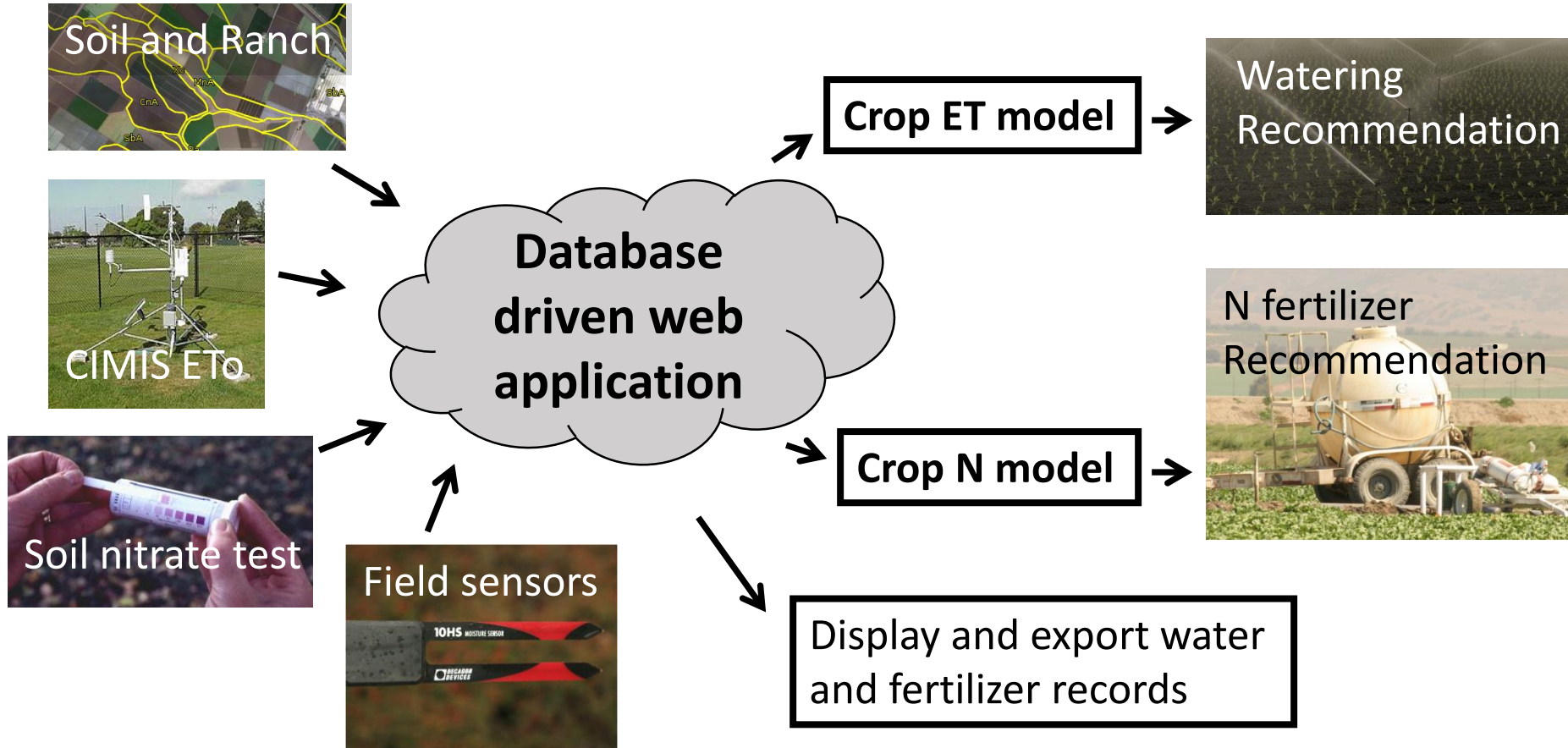
Upcoming | Past

**26 Feb 2019** Today

No Events Today

View all events by:  

# Integrate information from multiple sources



**Decision support using crop models**

# Irrigation and Nitrogen Evaluation in Open Field Bok Choy & Napa Cabbage



# CDFA Healthy Soils Program

---

- **Healthy Soils Program (HSP)**
  - Stems from California Healthy Soils Initiative, a collaboration of state agencies and departments that promotes the development of healthy soils on California's farmlands and ranchlands.
  - Competitive grant program: HSP Incentives Program and HSP Demonstration Projects
- ⑩ **Objectives:** To build soil organic carbon and reduce atmospheric greenhouse gases (GHGs).
- ⑩ **HSP Incentives Program** provides financial incentives to California growers and ranchers to implement agricultural management practices that sequester carbon, reduce atmospheric GHGs and improve soil health.

# Funding and Duration

---

- **Funding sources:**
  - **Budget Act of 2018 - \$10 Million** through Proposition 68 (California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access for All Act of 2018).
  - **Budget Act of 2018 (SB 856) - \$5 Million** through the California Climate Investments (CCI).
- **Program Funding:**
  - **HSP Incentives Program:** Maximum Grant Amount: \$75,000 per application
- **Grant (Project) Duration:** July 1, 2019 – March 31, 2022

# Program Eligibility

---

- California farmers, ranchers and Federal and California Recognized Native American Indian Tribes.
- Projects must be located on California agricultural operations, reduce agricultural GHGs and sequester soil carbon.
- Applicant must have control of the land for the duration of the grant. (Letter of agreement from landowner for leased land is required)
- One application per unique tax identification number.
- Grant amount cannot exceed \$75,000.
- Implement at least one HSP Agricultural Management Practice on land where it was not implemented previously.



# HSP Agricultural Management Practices (1)

---

## 1. Cropland Management Practices

1. CoverCrop ([USDANRCS CPS340](#))
2. Conservation Crop Rotation ([USDA NRCS CPS 328](#))
3. Mulching ([USDANRCS CPS484](#))
4. Nutrient Management ([USDA NRCS CPS 590](#)) (15% reduction in fertilizer application *only*)
5. Residue and Tillage Management – No-Till ([USDA NRCS CPS 329](#))
6. Residue and Tillage Management – Reduced Till ([USDA NRCS CPS 345](#))
7. Strip Cropping ([USDA NRCS CPS 585](#))
8. Compost Application Practices (application rates consistent with those specified in [CDFA Compost Application White Paper](#))
  - Compost Application to Annual Crops
    - Compost Purchased from a Certified Composting Facility
    - On-farm Produced Compost (*compliant with all requirements in the RGA*)
  - Compost Application to Perennials, Orchards and Vineyards
    - Compost Purchased from a Certified Composting Facility
    - On-farm Produced Compost (*compliant with all requirements in the RGA*)

# HSP Agricultural Management Practices (2)

---

## 2. Herbaceous Cover Establishment

1. Conservation Cover ([USDA NRCS CPS 327](#))
2. Contour Buffer Strips ([USDA NRCS CPS 332](#))
3. Field Border ([USDA NRCS CPS 386](#))
4. Filter Strip ([USDA NRCS CPS 393](#))
5. Forage and Biomass Planting ([USDA NRCS 512](#))
6. Grassed Waterway ([USDA NRCS CPS 412](#))
7. Herbaceous Wind Barrier ([USDA NRCS CPS 603](#))
8. Riparian Herbaceous Cover ([USDA NRCS CPS 390](#))
9. Vegetative Barriers (601) ([USDA NRCS CPS 601](#))

# HSP Agricultural Management Practices (3)

---

## 3. Woody Cover Establishment

1. Alley Cropping ([USDA NRCS CPS 311](#))
2. Hedgerow Planting ([USDA NRCS CPS 422](#))
3. Multi-story Cropping ([USDA NRCS CPS 379](#))
4. Riparian Forest Buffer ([USDA NRCS CPS 391](#))
5. Tree/Shrub Establishment ([USDA NRCS CPS 612](#))
6. Windbreak/Shelterbelt Establishment ([USDA NRCS CPS 380](#))

# HSP Agricultural Management Practices (4)

---

## 4. Grazing Lands Practices

1. Compost Application to Grassland (application rates consistent with those specified in [CDFA Compost Application White Paper](#))
  - Compost Purchased from a Certified Composting Facility
  - On-farm Produced Compost (*compliant with all requirements in the RGA*)
2. Prescribed Grazing ([USDA NRCS CPS 528](#))
3. Range Planting ([USDA NRCS CPS 550](#))
4. Silvopasture ([USDA NRCS CPS 381](#))

# Why is this important?

---

- During 2017-18: \$7.5 million allocated to the program - \$5.23 million awarded in grants.
  - 2 calls for applications
- ⑩ During 2018-19: \$15 million available in funding
  - First round of applications due March 8th, 2019
  - Second round?

Organization	Address	Contact Information	Area Served
*UC Community Agriculture Specialist		Valerie Perez vmperez@ucanr.edu (831) 763-8028	Santa Cruz County
*UC Community Agriculture Specialist		Allison Rowe amrowe@ucdavis.edu (805) 645-1474	Ventura County
Ventura County RCD	3380 Somis Road Somis, CA 93066	Lexi Ballinger lexi.vcrcd@gmail.com 805-764-5135	Ventura County
Upper Salinas-Las Tablas Resource Conservation District	65 S. Main St., Suite 107, Templeton, CA 93465	Andrew Johnson andrew@us-ltrcd.org (805) 434-0396 x.3175 Audrey Weichert audrey@us-ltrcd.org (805) 434-0396 x.3185	The US-LTRCD District in San Luis Obispo County
Santa Clara County Farm Bureau	605 Tennant Ave., Suite H, Morgan Hill, CA 95037	Jim Leap jeleap@yahoo.com (831) 535-9399	Santa Clara County
Santa Cruz County Farm Bureau	141 Monte Vista Ave, Watsonville, CA 95076	Jim Leap jeleap@yahoo.com (831) 535-9399	Santa Cruz County
RCD of Monterey County	744A LaGuardia St. Salinas, CA 93905	Laura Murphy laura.murphy@rcdmonterey.org 831-975-7749	Monterey County

# Acknowledgements

---

- **Elisa Mineo and Kenny Cheng**
- **Michael Cahn, David Chambers, Zhixuan Qin, and Richard Smith**
- **CDFR-Fertilizer Research Education Program**
- **Cooperating Growers**



**Thank You  
Any Questions?**



# Asian Leafy Vegetables Grown in Monterey & Santa Clara Counties

Crop	Monterey County	Santa Clara County
<b>45-days duration crops (1 harvest)</b>		
Bok Choy	x	x
Baby Bok Choy		
A Choy		x
Gai Choy		x
Yu Choy		x
Gai Lan		x
<b>2-3 months duration crops (1-2 harvest)</b>		
Amaranth		x
Daikon Radish		x
Garlic		x
Malabar Spinach		x
Chinese Celery		x
Yam Leaves		x
<b>4-6 months duration crops (multiple harvests)</b>		
Edible Chrysanthemum		x
On Choy		x