

Pest Management Practices Used in the Field

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ECOFARM PRE-CONFERENCE WORKSHOP

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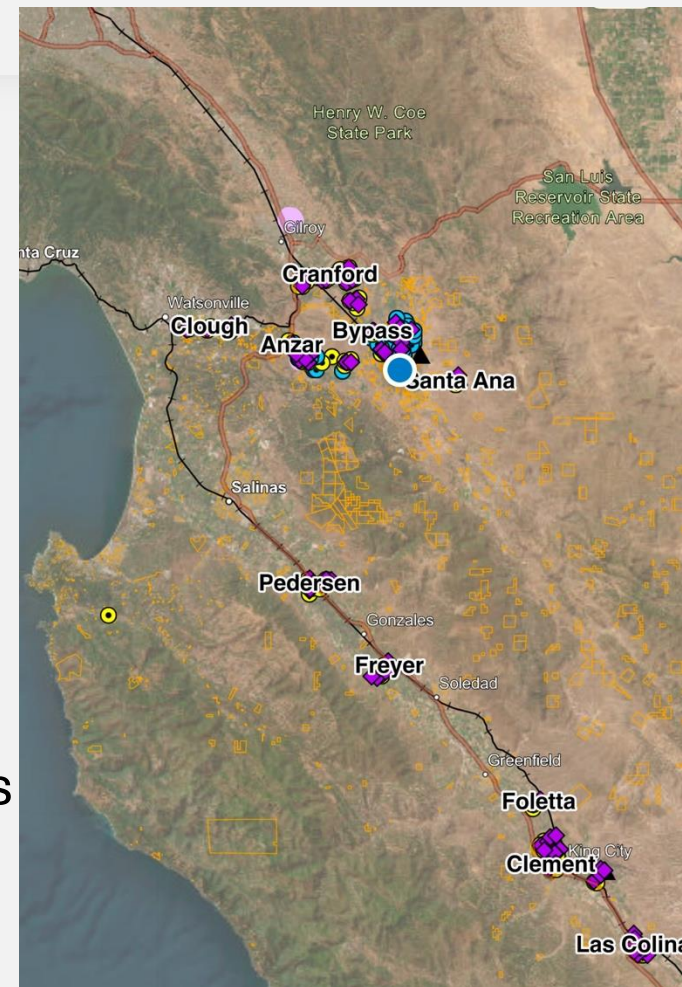


What does pest management encompass?

From a Central Coast Vegetable Grower Perspective:

Whole Farm Approach
Focusing on Insects,
Diseases, and Weeds

Healthy Soil = Healthy Plants



Research Supporting Cover Crops



RESEARCH ARTICLE

Winter cover crops increase readily decomposable soil carbon, but compost drives total soil carbon during eight years of intensive, organic vegetable production in California

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Cover Crops - Benefits

- Cover the soil
- Improve water infiltration & water holding capacity
- Reduce sedimentation, erosion & dust
- Diversify crop rotation
- Break disease life cycles
- Capture residual nitrogen from previous crop
- Increase aggregate stability
- Add degradable (labile) organic matter
- Diversifying soil community/biological activation
- Nutrient cycling
- Sequester & reduce greenhouse gases

Types of Cover Crops



Grasses

- Triticale, Oats & Rye
- Use in high residual N areas

Legumes

- Pea, Vetch & Bell Bean
- Use in low residual N areas
- Not usually as stand alone

Grass/Legume Mix

- Triticale/Vetch
- Pea/Oats
- Vetch/Rye



Types of Cover Crops

Mustards

- Single or Multiple Species
- Glucosinolates (GSL) amounts vary for disease and weed suppression
- Needs ~20 lb N/ac residual or applied to thrive





Types of Cover Crops

Multi-Species Mixes

- Soil Max from LA Hearn's
 - Bell Bean, Vetch, Pea & Triticale
- Various from Green Cover Seed
- Many other suppliers out there too

Planting Methods

On the Flat Using a Grain Drill



On 80" Beds Using a High-Density Planter





Central Coast Water Board Ag Order 4.0

Qualifications for N Scavenging Credit

To qualify for fall/winter cover crop credit, they must be:

- ✓ Non-legume
- ✓ Be grown for 90 days or longer (October – April)
- ✓ Produces at least 4,500 lbs/acre of oven-dry shoot biomass to get 30 lb N/ac/yr
- ✓ Have C:N Ratio $\geq 20:1$ to get Calculated Credit

| Final Data Snapshot | Final Data Snapshot | | | | | |
|---|---------------------|------------|------------------|----------------------------|-----|------------|
| | Sample ID | Avg. Stage | Avg. Height (in) | Predicted Biomass (lbs/ac) | %N | N (lbs/ac) |
| Merced Rye =  Pacheco Triticale =  | Lonoak 25 | 10.5 | 39.7 | 9,362 | 1.3 | 121.7 |
| | Las Colinas 45 | 10.2 | 38.7 | 6,134 | 1.4 | 85.9 |
| | Las Colinas 66 | 10 | 33.7 | 5,194 | 1.6 | 83.1 |
| | Las Colinas 76 | 10 | 33.7 | 5,194 | 1.6 | 83.1 |
| | Freitas 3 | 9 | 30.3 | 5,704 | 2.2 | 125.5 |
| | Freitas 4 | 9 | 29 | 5,203 | 2.2 | 114.5 |
| | Freyer 31 | 9.8 | 40.6 | 6,416 | 1.6 | 102.7 |
| | Freyer 32 | 10.3 | 40.3 | 6,416 | 1.4 | 89.8 |
| | Freyer 33 | 10.2 | 44.3 | 7,169 | 1.4 | 100.4 |
| | Freyer 34 | 10.1 | 38.4 | 6,040 | 1.4 | 84.6 |
| | Freyer 35 | 9.2 | 32.1 | 6,225 | 2.2 | 136.95 |
| | Freyer 36 | 9.4 | 31.1 | 5,875 | 2.2 | 129.3 |
| | Freyer 37 | 9.3 | 31.8 | 6,225 | 2.2 | 137 |
| | Freyer 38 | 9 | 30 | 5,534 | 2.2 | 121.7 |
| | Freyer 39 | 9 | 34.1 | 6,954 | 2.2 | 153 |

Use this paper for reference on how to sample, determine Feeks Stages, etc.:

Title: Simple Methods for Evaluating Cover Crop Nitrogen, C:N Ratios, and Biomass

Investigators: Eric Brennan and Richard Smith, USDA ARS, Salinas & UCCE Monterey

Sponsored by CA LGRP Emergency Funding August 2021 to March 31, 2022

Determining C:N Ratios

For mustards, use 1-meter square samples, sub-sample, and dry in lab oven to get biomass and C:N.

If mix of cover crop types, separate by plant families and repeat above (i.e. separate grasses from legumes).



Noteworthy Experiences on Cover Crops

- Merced Rye in high residual N fields – gets Rust and it lodges/falls over
- CC roots improve water infiltration in heavy rain years
- Takes a long time for seed to mature & become viable
- Fields with low N, legumes will compete well with grasses and converse.
- Mustards are a good cc for high rotation fields

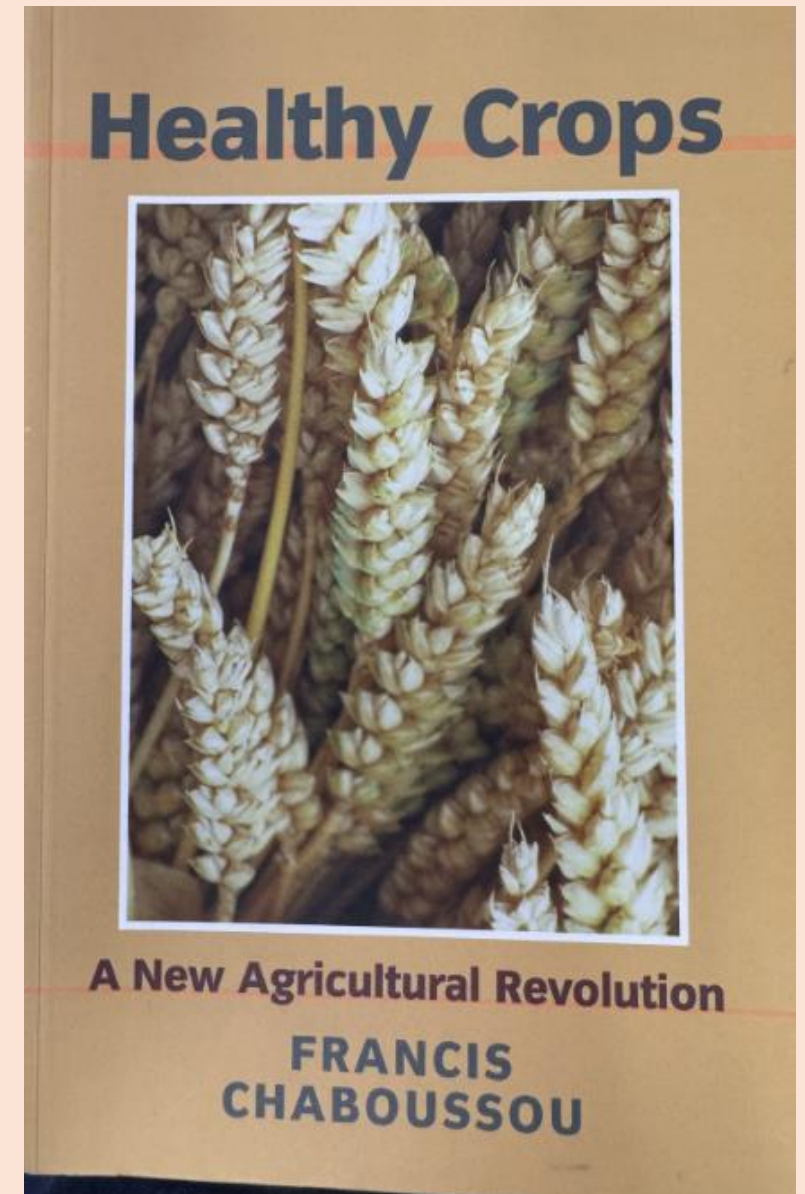


Managing Plant Nutrition

Important for plants to have enough but not too much

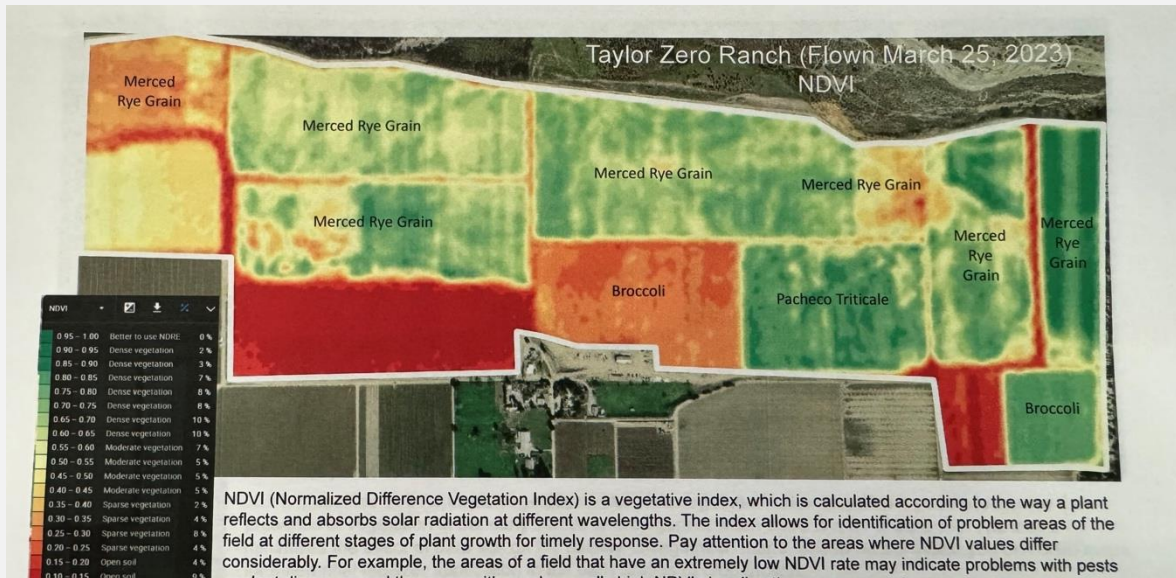
Trophobiosis Theory (Chaboussou) – Balanced Plant Nutrition to Deter Pests

Fertilization increases soluble N & free amino acid levels in plant tissue causing decrease in pest resistance



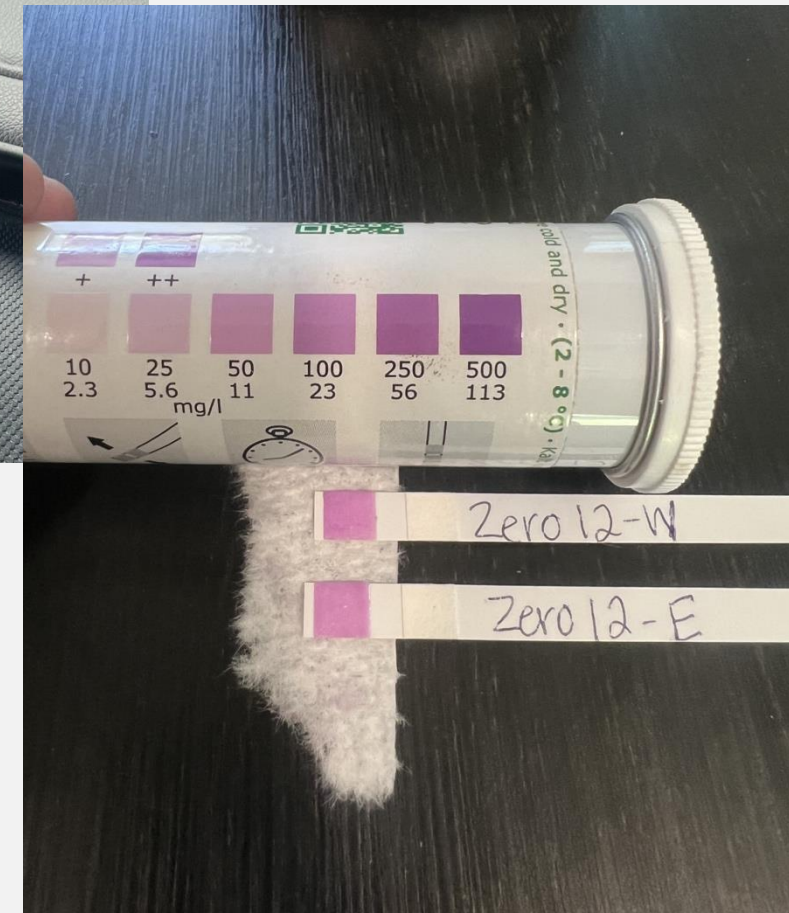
Ways to Manage Plant Nutrition

- Soil Sampling
- Plant Tissue Sampling
- Sap Analysis
- Plant Health Imaging via Drones & Automated Weeders



Nitrate Quick Test

- ✓ Easy way to test N in the soil prior to planting and during growing cycle
- ✓ Richard Smith & Michael Cahn – “Details on Nitrate Quick Test” Reference Guide
- ✓ Purchase tubes, Calcium Chloride, and test strips and ready!



Mineralization Rates

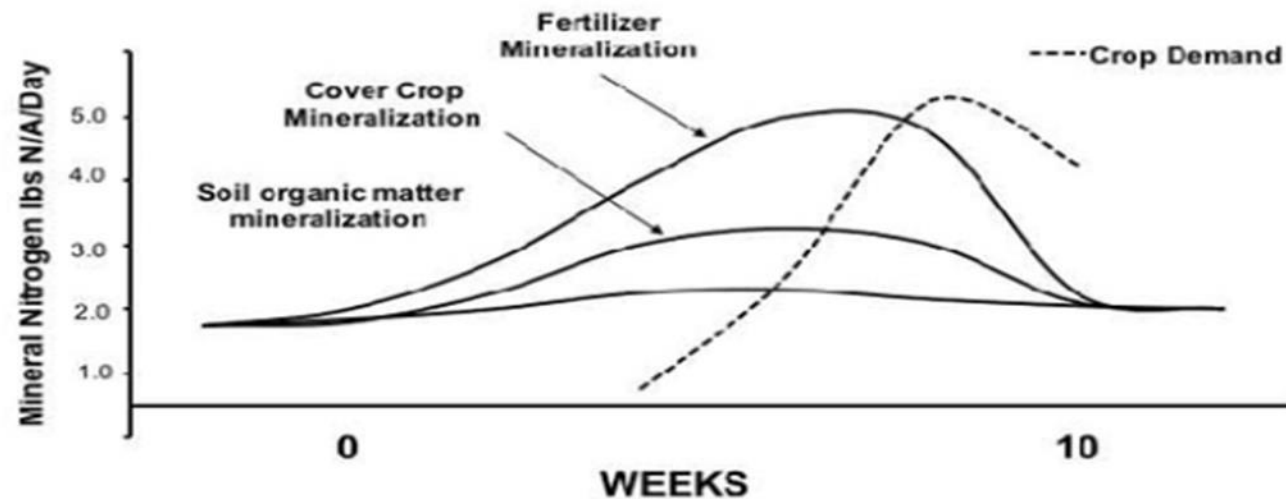
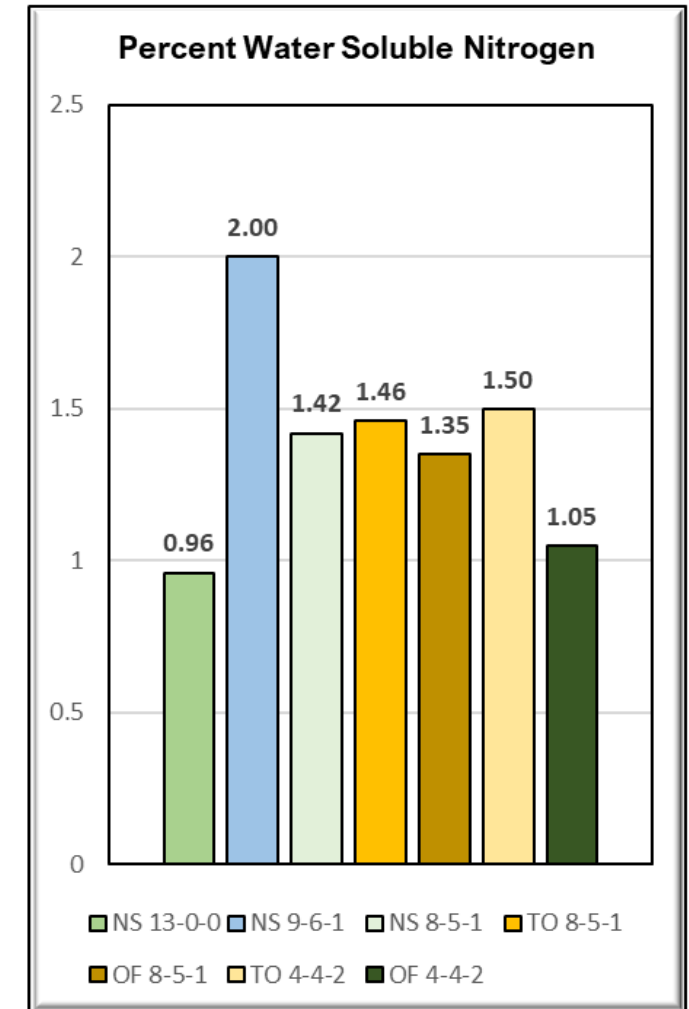
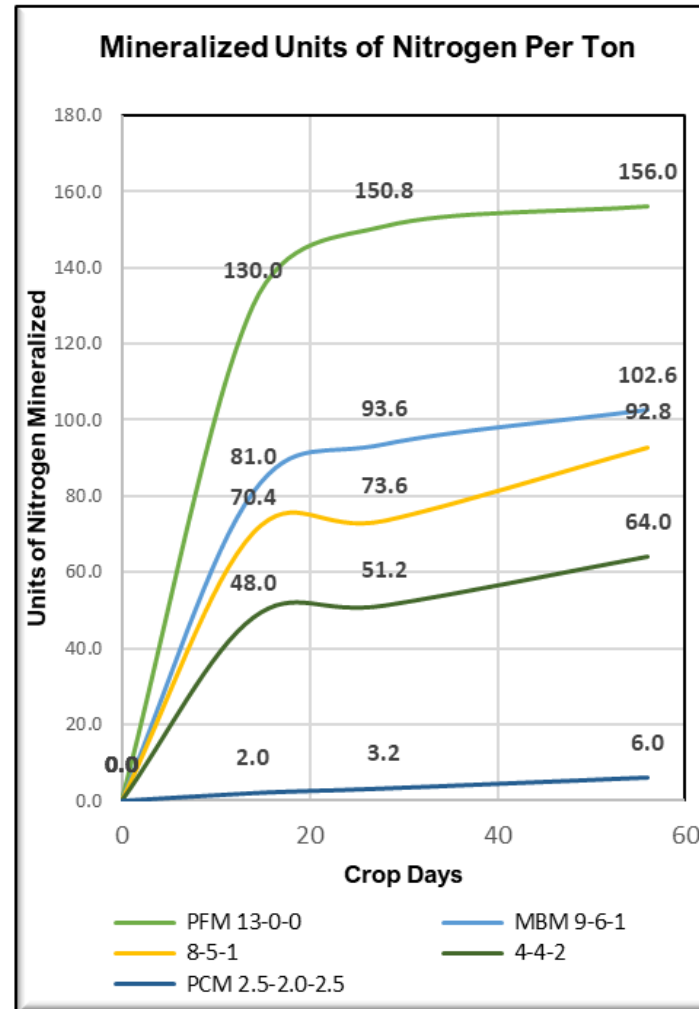
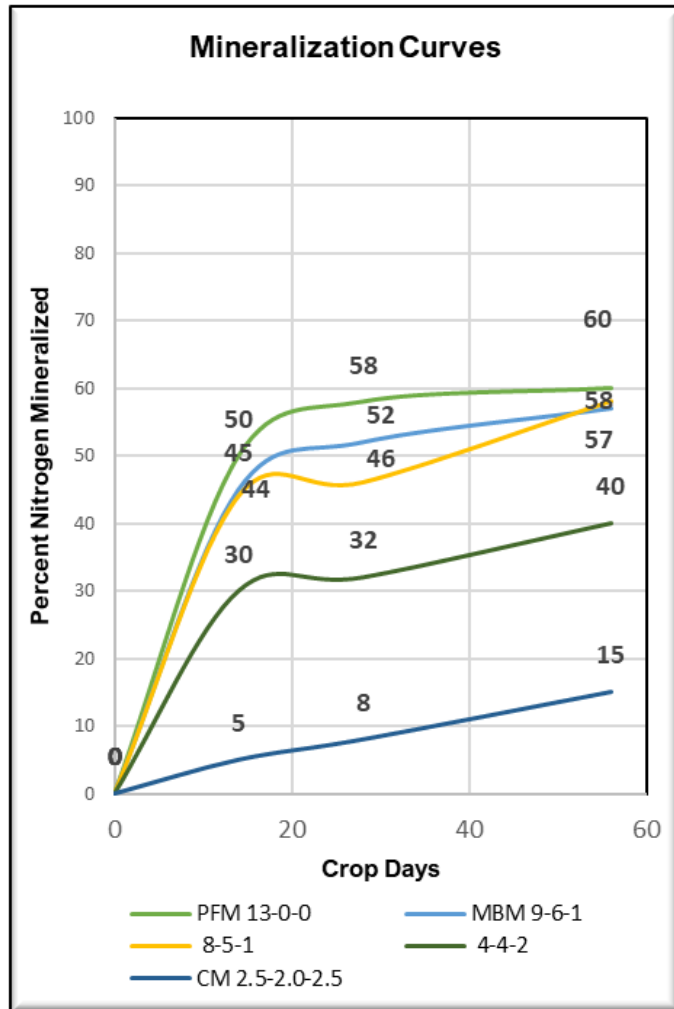


Figure 3. Theoretical depiction of N supplied to a crop from mineralization of soil organic matter, mineralization of crop residues and organic fertilizers

Smith, R., Hartz, T., Geissler D., Love, P., (2017). Release of mineral nitrogen from organic soils and fertilizer investigated. Salinas Valley Agriculture. April 21, 2017. Release of mineral nitrogen from organic soils and fertilizers investigated - Salinas Valley Agriculture - ANR Blogs (ucanr.edu)

Organic Sources of N & Release Rates



****Mineralization rates obtained from:** Smith, R., Cahn, M., Hartz, T., Geissler D., Love, P., (2022). Fine-tuning fertilizer applications in organic cool-season leafy green crops can increase soil quality and yields. California Agriculture. Volume 76. Number 2.

Building and Protecting Beneficial Insect Populations



Permanent Insectary Plantings



Permanent Insectary Plantings



Resources from the Xerces Society

422A Hedgerow Planting, Pollinators: *Central Valley, Central Coast, Southern California*



Specifications

These instructions provide in-depth guidance on how to install hedgerows for pollinators. To plan a specific project, use these Specifications to fill out the Implementation Requirements form. These requirements and considerations are in addition to those in the *Hedgerow Planting (422) Specification* written for all purposes.

Definition and Purpose

Establishment of dense vegetation in a linear design to enhance pollen, nectar, and nesting habitat for pollinators.

Client Conservation Objectives

Depending on landowner objectives and project design, hedgerows for pollinators may also provide food, cover and corridors for other wildlife, provide habitat for predaceous and beneficial invertebrates as a component of an integrated pest management plan, provide food, cover or shade for aquatic organisms in adjacent streams or increase carbon storage.

327A Conservation Cover, Pollinators: *Central Valley, Central Coast, Southern California*



Specifications

These instructions provide in-depth guidance on how to install wildflower meadows for pollinators. To plan a specific project, use these Specifications to fill out the Implementation Requirements form. These requirements and considerations are in addition to those in the *Conservation Cover (327) Specifications* that are written for all purposes.

Definition and Purpose

Establishing and maintaining permanent vegetative cover to enhance habitat for pollinators.

Client Conservation Objectives

Depending on landowner objectives and project design, conservation cover for pollinators also will enhance wildlife habitat, may reduce soil erosion and sedimentation, improve soil, water or air quality, or help manage plant pests by removing weeds that harbor pest insects or by increasing habitat for predaceous and beneficial invertebrates as a component of an integrated pest management plan.



Keys to Success

- Plant in non-traffic areas
- Fence if plant debris an issue
- Get ranch manager buy in
- Consult an expert for plant selection
- Discuss plans with Food Safety
- Have weed control plan



In-Field Insectaries

- Almost every insect needs pollen and/or nectar during their life cycle
- Add alyssum, cilantro, dill or other flowering plants via TP or DS
- Brings Beneficials into field sooner
- Keeps naturally occurring & released Beneficials in field longer



In-Field Insectary Plantings Tips

- Treat the flowering plants like a crop
- Spread them out throughout the field to have islands of nectar and pollen
- 2% per acre is our current rate for transplant alyssum
- 1 teaspoon of pelleted alyssum seed to the amount of pelleted seed that you'd plant for an acre (same size of pelleted seed for both)
- Eric Brennan's YouTube Channel



Thank you for
your time!

