ENVIRONMENTAL FARMING ACT SCIENCE ADVISORY PANEL (EFA SAP)
CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

MEETING AGENDA
July 19, 2018

EFA SAP MEMBERSHIP
https://www.cdfa.ca.gov/oefi/efasap/

Jocelyn Bridson, MSc, Rio Farms, Member and Chair

Don Cameron, Terranova Ranch, Member	Jeff Dlott, PhD, SureHarvest, Member
Vicky Dawley, Tehama RCD, Member	David Bunn, PhD, Resources Agency, DOC, Member
Emily Wimberger, CalEPA, ARB, Member	Judith Redmond, Full Belly Farm, Member
Scott Couch, CalEPA, State Water Board, Member	Julie Alvis, Resources Agency, Member
Tom Hedt, USDA NRCS, Subject Matter Expert	Doug Parker, PhD, Subject Matter Expert

Public Meeting
10:00 to 5:00 PM
California Department of Food and Agriculture
Main Auditorium
1220 N Street, Sacramento CA 95814
916-654-0433

REMOTE ACCESS
Webinar information
Registration URL: https://attendee.gotowebinar.com/register/4425472021395253507
Webinar ID: 736-436-963
Please note the webinar is on listen-only mode.
For verbal questions and comments, please attend the meeting in person

Presentation materials will be posted at the following link prior to the meeting:
https://www.cdfa.ca.gov/EnvironmentalStewardship/Meetings_Presentations.html

Meeting Agenda

1. Introductions	Chair Bridson
2. Minutes	Chair Bridson
3. State Water Efficiency and Enhancement Program (SWEEP) • Update • New funding for 2018-19 • Timeline of activities • Proposed programmatic changes for next solicitation	Carolyn Cook, MSc. CDFA
4. Healthy Soils Program (HSP) • Update • New funding for 2018-19 • Timeline of activities • Proposed programmatic changes for next solicitation	Geetika Joshi, PhD. CDFA
5. Strategic Planning document	Chair Bridson
6. Public Comments	Chair Bridson
7. Next Meeting and location	Chair Bridson

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE (CDFA)
ENVIRONMENTAL FARMING ACT SCIENCE ADVISORY PANEL

U.S. Fish and Wildlife Office
10950 Tyler Road Red Bluff, CA

May 24, 2018
1:00 p.m. – 5:00 p.m.

MEETING MINUTES

Panel Members in Attendance

Jocelyn Bridson, MSc, Rio Farms, (Chair and Member)
Don Cameron, Terranova Ranch (Member)
Jeff Dlott, PhD. SureHarvest (Member)
Julie Alvis, Natural Resources Agency (Member)
Scott Couch, State Water Resources Control Board (Member)
Judith Redmond, Full Belly Farm (Member)
Vicky Dawley, Tehama RCD (Member)
Kathryn Lyddan, Department of Conservation (Member)
Doug Parker, PhD. UC ANR (Subject Matter Expert)
Tom Hedt, USDA NRCS (Subject Matter Expert)

State Agency Staff and Presenters

Jaydeep Bhatia, CDFA
Scott Weeks, CDFA
Geetika Joshi, PhD, CDFA
Amrith Gunasekara, PhD, CDFA

AGENDA ITEM 1 – Introductions

The meeting was called to order at 1:08 PM by the Chair, Jocelyn Bridson. Introductions were made. Present at the meeting were all the members noted above under “Panel Members in Attendance.”

AGENDA ITEM 2 –Administrative Housekeeping

Chair Bridson introduced the minutes from the March 15, 2018 meeting. A motion was presented by Member Redmond to accept the minutes as presented by CDFA staff and the motion was seconded by Member Cameron. The motion was moved by all members present and accepted without further changes.
The motion to fill co-chair vacancy was introduced by Member Cameron and proposed Jeff Dlott for the position. Member Dawley seconded the motion and Jeff Dlott accepted

the position. All panel members favored the motion. Jeff Dlott was elected as co-chair unanimously.

AGENDA ITEM 3 – Healthy Soils Program Update

Dr. Joshi of CDFA provided updates on two rounds of solicitation of Healthy Soils Program (HSP). She noted that 51 projects were awarded $1.4 million in first round from incentive category of the program. This category was initially undersubscribed. These projects are located in 22 counties and are projected to reduce 9,000 MT CO_2e per year. Second solicitation was offered to encumber remaining funds and a total of 33 projects were awarded in 16 counties. The demonstration project category awarded 22 and 6 projects during two solicitations respectively. These projects are projected to reduce 1,642 and 447 tons of CO2e per year respectively. Dr. Joshi provided program analysis results on average farm size and concluded that 79 percent of the awarded projects have farm size less than 250 acres. She further noted that compost application was the most popular practice proposed by the applicant. She also provided update on new management practices under consideration for HSP and overview of the submitted proposals. She noted that the proposals submitted fall into four practice categories, 1) Nitrogen Management, which includes reduced fertilizer application, slow release fertilizer and nitrification inhibitors. 2) Non-nitrogen practices such as strip cropping, biomass planting, conservation cover, range planting, grassed waterway, alley cropping, prescribed grazing, conservation cover crop rotation, windbreaker and shelterbelt renovation and tree shrub establishment. 3) Practices that are already included in the program or have significant overlap and 4) Practices which are not considered for funding either these are covered under other programs or don't have sufficient peer reviewed research to quantify GHG benefit. Chair Bridson asked if there is a list of crops which can be planted for biomass crops practice. Presenter noted that this information is being looked into. Another question asked was that why the second-round solicitation was first come first serve basis. Presenter responded that it was an attempt to increase the flow in order to meet the legislative encumbrance deadline for utilization of available funds; but applicant still had to meet certain minimum criteria to be eligible for award. Another question asked was that if there will be a proposal to review slow release fertilizers. Dr. Gunasekara responded that Secretary will review the proposal with the team and make recommendation.

AGENDA ITEM 4 – SWEEP Update

Scott Weeks of CDFA provided update on the SWEEP. He noted that program future funding allocations are coded in Proposition 68 and it would need voter approval in June 5, 2018 primary elections. He further updated the panel on 2017 fund reallocation and noted that some 2017 regular SWEEP projects and CDFA/DWR join project got cancelled resulting in 1.8 million unencumbered funds. CDFA awarded 27 additional projects utilizing 1.8 million dollars. These projects will impact a total of 4927 acres and are projected to save 5041-acre feet of water and 1228 MT CO2e per year. Mr. Weeks also updated panel on media outreach efforts carried out by CDFA.

AGENDA ITEM 5 – Strategic Planning Summary document

Chair Bridson introduced the summary document and provided overview of the document. She noted that the document is posted on CDFA website for public comments. The public comment period ends on June 21, 2018. She further noted that Strategic Planning document will provide timeline and work plan for the panel.

AGENDA ITEM 6 – CDFA Climate Smart Agriculture efforts

Jaydeep Bhatia of CDFA provided informational presentation on the CDFA's Climate Smart Agriculture (CSA) efforts. He noted that CSA is an integrated approach to achieve GHG reductions while ensuring food security in the face of climate change. He further noted that CDFA is providing a number of incentive programs and provided overview of OEFI's incentive programs, and CSA is building international collaborations and resources. He mentioned that CDFA is fostering international collaborations through CDFA delegation visits. Mr. Bhatia noted that CDFA hosted 10 climate-smart webinars, which were attended by 75 panelists and more than 1500 people worldwide. Member Lyddan asked if CSA also include agriculture land conservation in addition to the technologies. Member Cameron noted this topic came up during Israel visit as well. Dr. Gunkasekara noted that greenhouses are popular in Europe but that may change the land use from agriculture to commercial even though it is used for food production. Member Dlott suggested that CSA work should be tied to certain United Nations goals for example changing dietary patterns and food demands. Dr. Gunasekara responded that main mandate of CSA is focused on adoption technologies and practices, and climate change adaption. Member Cameron acknowledged California's leadership in global agriculture and the necessity to be aware of global agriculture situation.

AGENDA ITEM 6 – Public Comments

Several questions and comments from the public were accommodated by Chair Bridson and CDFA staff. They included feedback on HSP application process being complex and the lack of substantial assistance. Another public comment on HSP was to clarify if the panel would approve the list of practices in July and when stakeholders can submit their comments. Dr. Gunasekara responded that the panel may decide in July if the public comment period is required. It was decided that CDFA will post meeting materials for July 19th meeting online on July 9th to allow time for Panel Members, stakeholders and public to review ahead of the meeting. Member Redmond asked if public comments can be submitted and Dr. Gunasekara responded that comments can be submitted until June 19th. However, CDFA staff would not officially respond to comments at the next meeting due to insufficient time to review them by July 9th.

AGENDA ITEM 7 – Next Meeting and Location

Dr. Gunasekara stated that the next meeting will be on July 19, 2018, at CDFA headquarters in Sacramento, CA to cover HSP and SWEEP new funding updates, and the Strategic Plan. The meeting was adjourned at 3.52 PM by Chair Bridson.

Respectfully submitted by:

_____ _____

Amrith Gunasekara, Ph.D.

cdfa

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

State Water Efficiency and Enhancement Program

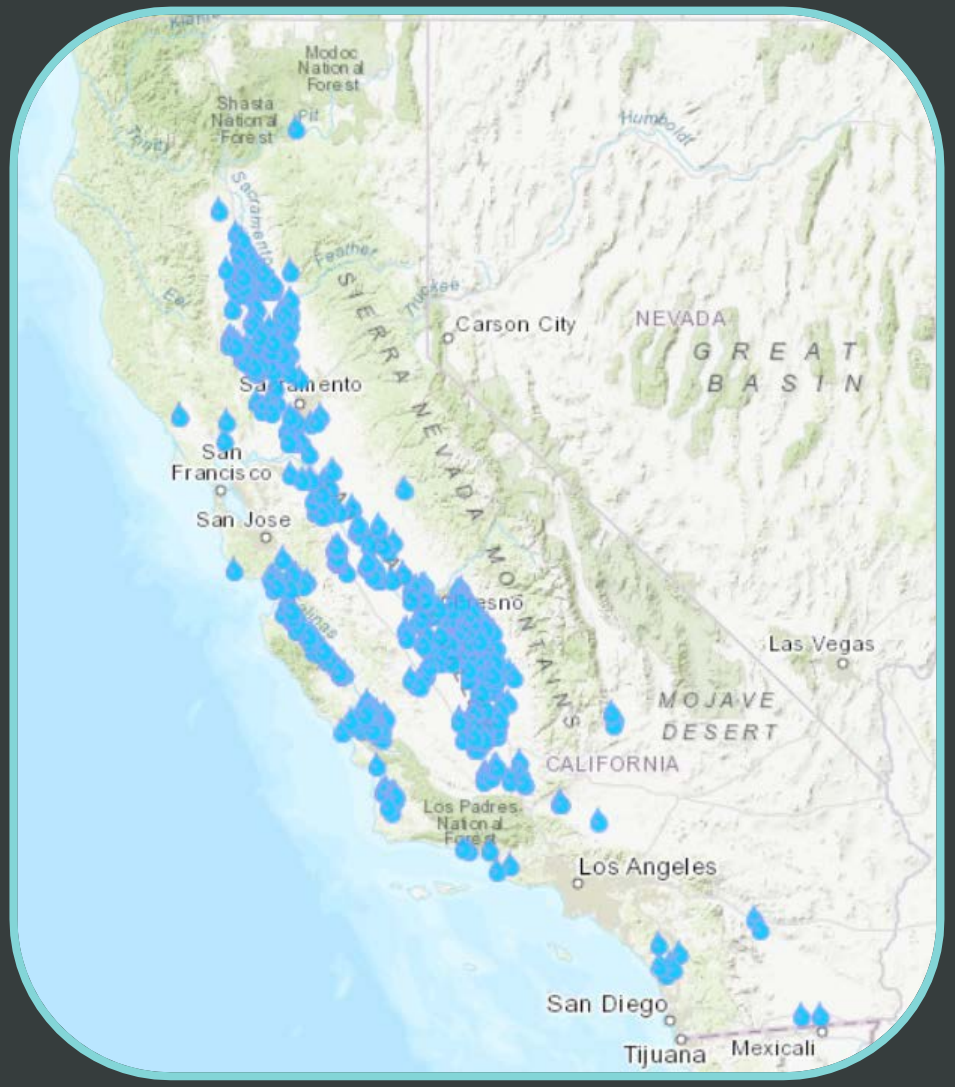
PLANNING FOR THE NEXT ROUND OF FUNDING

Project Types

- Soil, Weather, Plant Sensors
- Micro-irrigation
- Improved energy efficiency - Pump replacement or retrofit
- Fuel conversion – Including renewable energy installations
- Variable frequency drives
- Low pressure systems
- Reduced Pumping
- Other projects that combine water savings and GHG reductions

Summary of Previous SWEEP Projects

- $62.7 million awarded
- $40.8 million in matching funds
- 614 projects
- 113,994 acres impacted
- GHG Reductions: 75,368 MT CO_2e/yr
- Water Savings: 101,050 ac-ft/yr



Source: https://webmaps.arb.ca.gov/ccimap/

Proposition 68

On June 5, 2018 California voters approved Proposition 68

$4 Billion in bond funding was authorized for environmental protection projects, water infrastructure, and flood protection

CDFA's SWEEP program receives $20 million

Two solicitations for the $20 million

- Each solicitation will be for $10 million
- The first half of the funding will be announced in fall 2018

Proposed Framework for Next Solicitation

No major changes to SWEEP framework for the upcoming round

Two rounds at $10 million per round

- $100,000 cap for each award
- Project types remain the same
  - Water Savings and GHG reductions required
- Quantification methodologies
  - ARB GHG Calculator
  - SWEEP Irrigation Water Savings Calculator

Bond Funding Allowances

- New funding source – Proposition 68
  - Funding can be used for administrative costs (Up to 5%)
    - Staff salaries and technical review contracts
  - Planning, monitoring and technical assistance (Up to 10%)
    - Technical assistance funding through Climate Smart Agriculture technical assistance program
    - Post project outcome tracking through records collection and possibly third party monitoring

New Requirements of Funding Source

- Public comment period on draft solicitation
  - 30 Days comment period
  - 3 workshops to be held in Northern, Central and Southern California
- Projects will post signage indicating Proposition 68 funding
- 20% of the funds must be allocated to projects serving severely disadvantaged communities and provide a benefit in that community.
  - "Severely disadvantaged community" means a community with a median household income less than 60 percent of the statewide average.
  - Technical assistance efforts will be targeted to these regions
  - Benefits to these communities will be included as an additional consideration in the application review process.

Focus on Water Conservation & Recycling

The SWEEP program will provide additional consideration in the review process for projects that demonstrate:

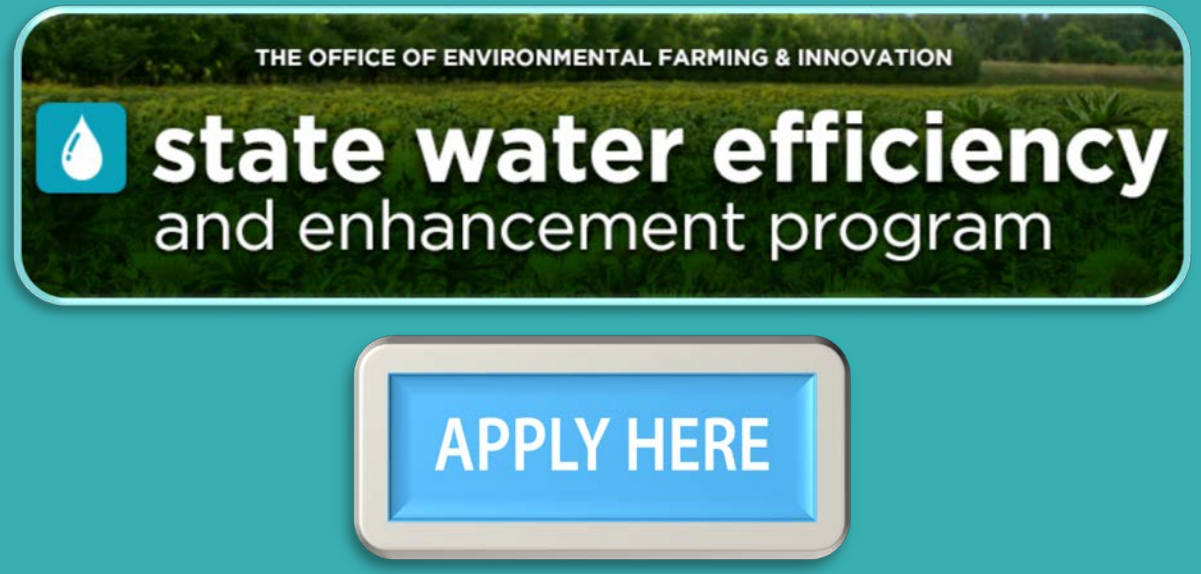
- Efficient use and conservation of water supplies
  - *This is already a requirement of SWEEP*
- Use of recycled water
- The capture of stormwater to reduce stormwater runoff, reduce water pollution, or recharge groundwater supplies, or a combination thereof

Summary of Scoring Considerations

- Previously unawarded applicant
- Provision of matching funds
- Commitment to irrigation training
- Reduction of groundwater pumping in a critically over-drafted groundwater basin
- Implementation of soil management practices
- Benefits to a severely disadvantaged community - *NEW
- Storm water capture and reuse, use of recycled water - *NEW

New Application Platform

- Working on a new application platform
- Applicants will access the application from the SWEEP webpage
- Log in to access application and submit



Estimated Timeline for Bond-Funded SWEEP Solicitation

Activity	Estimated Timeframe
Public Comment on Draft Request for Applications	August – September 2018
Present finalized guidelines to EFA SAP	October 2018
Accept Applications	November 2018 – January 2019
Administrative Review and Technical Review	January to April 2019
Announce Awards	April/May 2019
Prepare and Announce 2nd Solicitation	Late Summer 2019

Questions and Public Comment Process

Public comments on the draft SWEEP solicitation can be sent to cdfa.oefi@cdfa.ca.gov

The draft Applications Guidelines will be posted by the end of July

There will be a 30 day comment period

Thank you!

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

SWEEP TEAM

CAROLYN COOK

Senior Environmental Scientist, Supervisor

SCOTT WEEKS

Environmental Scientist

RAVNEET BEHLA

Senior Environmental Scientist, Specialist

CDFA HEALTHY SOILS PROGRAM

Geetika Joshi, Ph.D.
Senior Environmental Scientist, Office of Environmental Farming & Innovation

Environmental Farming Act – Science Advisory Panel Meeting
July 19, 2018
Sacramento, CA

Outline

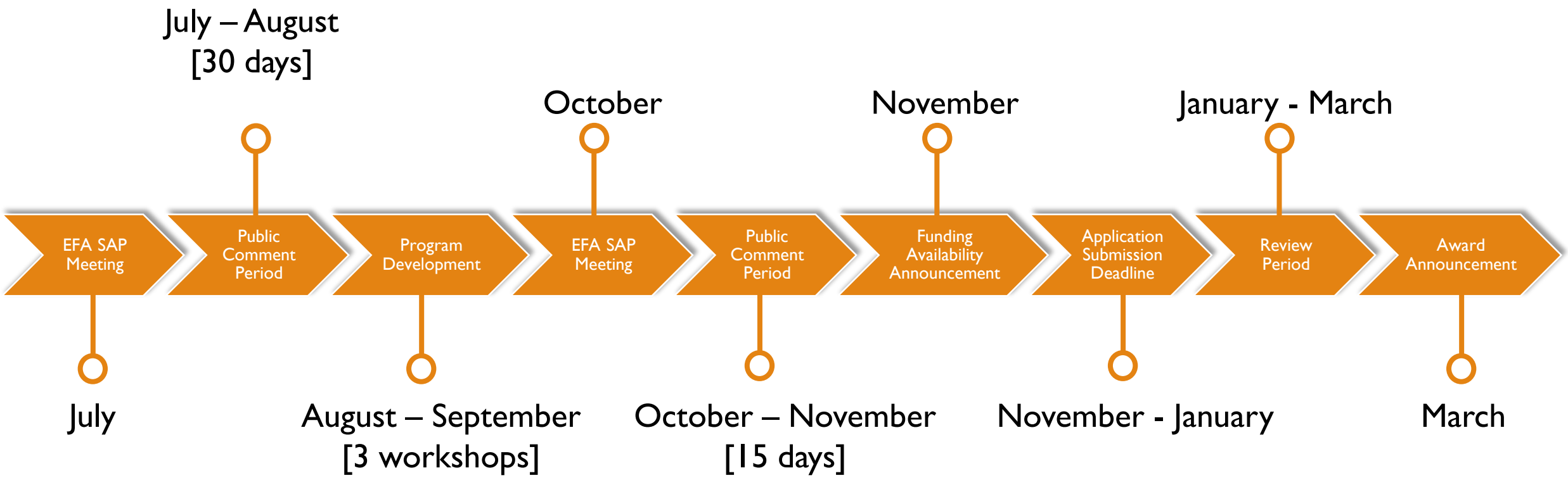
- Funding Source and Timeline of Activities
- Changes to HSP from Last Round
- New Management Practices Under Consideration for Inclusion in the CDFA HSP
- Plan for Technical Assistance

- Funding Source and Timeline of Activities
- Changes from Last Round

Funding Sources and Next Steps

- 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 Greenhouse Gas Reduction Fund (GGRF)
- Two rounds of funding:
  - Round I: Prop 68 allocation – anticipated announcement of funding availability in November 2018.
  - Round II: GGRF allocation – 2019.

Program Timeline 2018-19 (Round 1)



QM Development in Collaboration with CARB and USDA-NRCS

Changes to HSP From Last Round

- New practices.
- Requirements related to SB 5 (De Leon) California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access for All Act of 2018 (Proposition 68):
  - Public comment period on draft solicitation (30 days comment period and 3 workshops)
  - Bond Signage for Project Postings
  - 20% of the funds must be allocated to projects serving severely disadvantaged communities and provide a benefit in that community.
    - "Severely disadvantaged community" means a community with a median household income less than 60 percent of the statewide average.
    - Technical assistance efforts to be targeted to these regions.
    - Benefits to these communities to be included as an additional consideration in the application review process.
- New user interface for application process – under development.

New Management Practices Under Consideration for Inclusion in the CDFA HSP

1. Recommended for Inclusion in 2018 HSP Incentives Program and 2018 HSP Demonstration Projects	2. Recommended for Inclusion in 2018 HSP Demonstration Projects with Research (Type A)	3. Practices Not Recommended for Inclusion
Nutrient Management (15% reduction in fertilizer application) (CPS 590)	Nutrient Management (Replacing Synthetic N Fertilizer with Soil Amendments) (CPS 590)	
Strip-cropping (CPS 585)	Nutrient Management (Nitrification Inhibitors) (CPS 590)	
Forage and Biomass Planting (CPS 512)	Nutrient Management (Slow-release Fertilizers) (CPS 590)	
Conservation Cover (CPS 327)	Whole Almond Orchard Recycling	
Range Planting (CPS 550)	One-time Compost Application with Higher Rates for Grazed Grasslands	
Grassed Waterway (CPS 412)	Anaerobic Digestate Application	
Alley Cropping (CPS 311)	Vermicompost Application	
Multistory Cropping (CPS 379)	Mycorrhizal Application	
Prescribed Grazing (CPS 528)	Microbial Inoculation with Compost Tea	
Conservation Crop Rotation (CPS 328)		
Tree/Shrub Establishment (CPS 612)		
Application of On-farm Produced Compost		

- Proposals were submitted between November 6, 2017 – December 18, 2017
- 32 unique practices evaluated

Practices Recommended for Inclusion under the 2018 HSP Incentives Program and 2018 HSP Demonstration Projects

I. Recommended for Inclusion in 2018 HSP Incentives Program and 2018 HSP Demonstration Projects

590: Nutrient Management: Reduce Fertilizer Application Rate by 15%

Managing the amount (rate), source, placement (method of application), and timing of nitrogen fertilizer application to achieve 15% reduction.

Status: Under development in CA-HSP Comet-Planner.

Verification Method: Comparison of N-fertilizer purchase receipts from past one year with project years.

In case of a crop change from previous year, 15% reduction from FREP-recommended N-application rate for planned crop.

I. Recommended for Inclusion in 2018 HSP Incentives Program and 2018 HSP Demonstration Projects

585 Strip Cropping: Add perennial cover grown in strips with irrigated/non-irrigated annual crops.

Growing planned rotations of row crops, forages, small grains, or fallow in a systematic arrangement of equal width strips across a field.

Status: Under development in CA-HSP Comet-Planner.

Verification Method: Field site visit.

I. Recommended for Inclusion in 2018 HSP Incentives Program and 2018 HSP Demonstration Projects

512 Forage and Biomass Planting: Conversion of Annual Cropland to Irrigated/Non-Irrigated Grass-Legume Forage/Biomass Crops

Establishing adapted and/or compatible species, varieties, or cultivars of herbaceous species suitable for pasture, hay, or biomass production.

Status: Under development in CA-HSP Comet-Planner.

Requirements:

1. Plant species to be planted would be consistent with NRCS California eVegGuide https://www.calflora.org/nrcs/index.html
2. Cannot overlap with 550 Range Planting.

Verification Method: Field site visit; confirm species planted and seeding rate; plan for weed control; receipts to confirm germination rate of seeds.

I. Recommended for Inclusion in 2018 HSP Incentives Program and 2018 HSP Demonstration Projects

327 Conservation Cover: Convert Irrigated/Non-irrigated cropland to permanent unfertilized grass/grass legume cover.

Converting conventionally managed, irrigated or non-irrigated, annual cropland to permanent unfertilized grass cover.

Status: Under development in CA-HSP Comet-Planner.

Verification Method: Field site visit; confirm species planted and seeding rate; receipts to confirm germination rate.

I. Recommended for Inclusion in 2018 HSP Incentives Program and 2018 HSP Demonstration Projects

550 Range Planting

Establishment of adapted perennial or self-sustaining vegetation such as grasses, forbs, legumes, shrubs and trees.

Status: Under development in CA-HSP Comet-Planner.

Requirement: Cannot overlap with 512 Forage and Biomass Planting.

Verification Method: Field site visit; confirm species planted and minimum number of plantings/seeding rate; receipt to confirm germination rate.

412 Grassed Waterway: Convert Strips of Irrigated/Non-Irrigated Cropland to Permanent Unfertilized Grass/Grass-Legume Cover

A shaped or graded channel that is established with suitable vegetation to carry surface water at a non-erosive velocity to a stable outlet.

Status: Under development in CA-HSP Comet-Planner.

Verification Method: Field site visit and confirmation of species planted.

311 Alley Cropping

Trees or shrubs are planted in sets of single or multiple rows with agronomic, horticultural crops or forages produced in the alleys between the sets of woody plants that produce additional products.

Status: Under development in CA-HSP Comet-Planner.

Requirement: Cannot overlap with 379 Multistory Cropping.

Verification Method: Field site visit; confirm species planted and minimum number of plantings are consistent with plan submitted at time of application.

379 Multistory Cropping

Existing or planted stands of trees or shrubs that are managed as an overstory with an understory of woody and/or non-woody plants that are grown for a variety of products.

Status: Under development in CA-HSP Comet-Planner.

Requirement: Cannot overlap with 311 Alley Cropping.

Verification Method: Field site visit; confirm species planted and minimum number of plantings are consistent with plan submitted at time of application.

528 Prescribed Grazing: Grazing Management to Improve Irrigated/Non-Irrigated Pasture Condition

Managing the harvest of vegetation with grazing and/or browsing animals.

Status: Under development in CA-HSP Comet-Planner.

Requirement: A Grazing Management Plan signed by a certified professional range manager.

Verification Method: Field site visits and on-site review of Monitoring Plan.

528 Prescribed Grazing: Grazing Management Plan

Prescribed grazing plan will include—

- Goals and objectives clearly stated.
- Resource inventory that identifies—
  - Existing resource conditions and concerns.
  - Ecological site or forage suitability group.
  - Opportunities to enhance resource conditions.
  - Location and condition of structural improvements such as fences, water developments, etc., including seasonal availability and quality of watering sites.
- Forage inventory of the expected forage quality, quantity, and species in each management unit(s).
- Forage-animal balance developed for the grazing plan that ensures forage produced or available meets forage demand of livestock and/or wildlife.
- Grazing plan developed for livestock that identifies periods of grazing and/or browsing, deferment, rest, and/or other treatment activities for each management unit that accommodates the flexibility needed for adaptive management decisions as supported by the contingency plan and monitoring plan in order to meet goals and objectives.
- Contingency plan developed that details potential problems (i.e., drought, flooding, and insects) and serves as a guide for adaptive management decisions in grazing prescription adjustments in order to mitigate resource and economic effects.
- Monitoring plan developed with appropriate protocols and records that assess whether the grazing strategy is resulting in a movement toward meeting goals and objectives. Short-term and long-term monitoring may be needed to determine outcomes and support timely adaptive management decisions. Identify the key areas, key plants, or other monitoring indicators that the manager should evaluate in making grazing management decisions.

328 Conservation Crop Rotation: Decrease Fallow Frequency or Add Perennial Crops to Rotations

A planned sequence of crops grown on the same ground over a period of time (i.e. the rotation cycle).

Status: Under development in CA-HSP Comet-Planner.

Requirements:

1. A complete implementation plan or Conservation Plan for 3 years of project duration.
2. Cannot overlap with 340 Cover Crop in the same field.

Verification Method: Field site visit; confirm cash crop and cover crop species planted are consistent with plan submitted at time of application.

612 Tree/Shrub Establishment

Establishing woody plants by planting seedlings or cuttings, direct seeding, or natural regeneration.

Status: Under development in CA-HSP Comet-Planner.

Verification Method: Field site visit; confirm species planted and minimum number of plantings are consistent with plan submitted at time of application.

I. Recommended for Inclusion in 2018 HSP Incentives Program and 2018 HSP Demonstration Projects

Application of On-farm Produced Compost

Status: Existing GHG calculation methodology (Compost-Planner).

Requirements:

1. Plant and animal materials must be composted through the processes outlined below and a farm log must be maintained to document the process:
   i. In-vessel or Static Aerated Pile System: Maintained a temperature of between 131°F and 170°F for 3 days;
   ii. Windrow Composting: Maintained a temperature of between 131°F and 170°F for 15 days. The materials must be turned a minimum of five times.
2. CDFA will only reimburse compost applied at CDFA-approved compost application rates determined based on C:N ratio.
3. C:N ratio and moisture content of the compost to be applied must be verified through laboratory testing before application.
4. Applicant must document and provide the details of the feedstock used for preparing compost.
5. Compost used under this practice does not include vermicompost.

Verification Method: Field site visit; review of farm logs to confirm compost feedstock and composting method (aerated pile versus windrow, maintenance of temperature and turning of windrows); C:N ratio, moisture content and quantity (e.g. cubic yards) of compost applied through review of lab test results.

Practices Recommended for Inclusion under the 2018 HSP Demonstration with Research (Type A)

590 Nutrient Management: Replacing synthetic N fertilizer with soil amendments.

Improved nutrient management by partial substitution of beef feedlot manure, chicken broiler manure, chicken layer manure, other manure, dairy manure, sheep manure, swine manure, compost (various C:N) for synthetic nitrogen fertilizer.

Status: Need to establish application rates and determine environmental impacts for amendments other than compost. Compost application practice already exists.

Verification Method: Quarterly progress reports including research findings and field-site visits.

590 Nutrient Management: Slow release fertilizers

Improved nitrogen management by use of slow release nitrogen fertilizers. Slow release fertilizers release nutrients into the soil gradually, which results in lower N losses from cropland soils.

Status: Insufficient published peer-reviewed research literature to demonstrate soil C-sequestration in varying CA climate zones and soil types.

Verification Method: Quarterly progress reports including research findings and field-site visits.

590 Nutrient Management: Nitrification Inhibitors.

Improved nitrogen management planning by use of nitrification inhibitors. Nitrification inhibitors slow the nitrification of ammonia, ammonium-containing, and urea-based fertilizers, which results in lower N losses from cropland soils.

Status: Insufficient published peer-reviewed research literature to demonstrate soil C-sequestration in varying CA climate zones and soil types.

Verification Method: Quarterly progress reports including research findings and field-site visits.

Whole Almond Orchard Recycling

Grinding of whole almond trees and incorporating into soil during orchard removal.

Status: Insufficient published peer-reviewed research literature to demonstrate soil C-sequestration in varying CA climate zones and soil types. Additional research demonstrating effectiveness in other orchard crops desirable.

Verification Method: Quarterly progress reports including research findings and field-site visits.

One-time Compost Application with Higher Rates for Grazed Grasslands

Application of compost to grazed grasslands at rates higher than currently incentivized by CDFA HSP, once every ten years.

Status: Insufficient published peer-reviewed research literature to demonstrate soil C-sequestration in varying CA climate zones and soil types and to address ecosystem and environmental concerns.

Verification Method: Quarterly progress reports including research findings and field-site visits.

Anaerobic Digestate Application

Application of solids generated from anaerobic digestion of organic material to cropland.

Status: Insufficient published peer-reviewed research literature to demonstrate soil C-sequestration in CA.

Verification Method: Quarterly progress reports including research findings and field-site visits.

Vermicompost Application

Application of compost produced from organic materials using various species of worms.

Status: Insufficient published peer-reviewed research literature to demonstrate soil C-sequestration in CA.

Verification Method: Quarterly progress reports including research findings and field-site visits.

Mycorrhizal Application

Inoculating soil with fungi that form a symbiotic relationship with the roots of crop plants.

Status: Insufficient published peer-reviewed research literature to demonstrate soil C-sequestration in CA.

Verification Method: Quarterly progress reports including research findings and field-site visits.

Microbial Inoculation with Compost Tea

Cropland application of diluted compost steeped or brewed in water with aeration/stirring (i.e. compost tea).

Status: Insufficient published peer-reviewed research literature to demonstrate soil C-sequestration in CA.

Verification Method: Quarterly progress reports including research findings and field-site visits.

Practices Not Recommended for Inclusion in the HSP

650 Windbreak/Shelterbelt Renovation

Replacing, releasing and/or removing selected trees and shrubs or rows within an existing windbreak or shelterbelt, adding rows to the windbreak or shelterbelt or removing selected tree and shrub branches.

Determining damage to existing windbreak/shelterbelt to require renovation is beyond the scope of the HSP and requires a professional arborist or forester to determine. For purpose of practice implementation and verification, it is tough to distinguish from 380 Windbreak/Shelterbelt Establishment, an eligible practice.

317 On-Farm Composting Facility

A structure or device to contain and facilitate an aerobic microbial ecosystem for the decomposition of manure and/or other organic material into a final product sufficiently stable for storage, on farm use and application to land as a soil amendment.

Construction of a composting facility is beyond the scope of the HSP.

Soil Erosion Control by Swale Building and Mulching

Soil erosion control is covered as a co-benefit under several practices. Swale building has not been shown to reduce GHG emissions. Mulching already incentivized under the HSP.

Practices Overlap with Existing Incentivized Practices

Green Manure

Included under Cover Crops (CPS 340)

Cover crop and Bio-Diverse Planting

Included under Cover Crops (CPS 340)

Semi-permanent Coverage

Included under Reduced-till (CPS 345)

Alternative Inter-row Tillage

Included under Reduced-till (CPS 345)

Sub-surface Drip Irrigation

Covered under SWEEP

Livestock Management and Ruminant Grazing

Accommodated under Prescribed Grazing (528).

Integrated Cropland Ruminant Grazing

Accommodated under Prescribed Grazing (528).

Composting and Mulching

Can be implemented together currently.

Plan for Technical Assistance

Technical Assistance

- Proposition 68 funding requirements allow for up to 10% of the funds to be allocated to technical assistance.
- CDFA will conduct a joint technical assistance application for HSP, SWEEP and AMMP in July, 2018.
- Eligibility: University Cooperative Extensions, RCDs, nonprofit organizations.
- Grants process – Request for Applications:
  - Fillable application form and budget.
  - Selection on the basis of first-come-first-serve.
  - Award amount:
    - Up to $10,000 per round of funding per program.
    - Total: up to $60,000, assuming 2 rounds per program.
  - Grant duration – two years.

Technical Assistance

- HSP and SWEEP requirements:
  - One-on-one assistance.
    - Payment based on per individual assisted ($200) or per application submitted ($400).
  - Reporting Requirements:
    - Names, location and contact information of individuals assisted under each program.
    - Names, location and contact information of individuals that submit applications under each program.
    - Reasons for non-submission (as applicable).

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Comments on Healthy Soils Program
Received between
May 24, 2018 and June 19, 2018

From:	Jim Brown
To:	CDFA OEFI@CDFA
Subject:	Bio-char
Date:	Tuesday, May 29, 2018 1:22:17 PM
Attachments:	image001.jpg corey"s without.docx coreys with.docx

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CDFA Environmental Farming Act Science Advisory Panel

Bio-Char sequesters both water and nutrients, it is a bulking agent, and is preferred habitat for beneficial microbes. This creates an environment that increases the Cation Exchange; enabling the plant to absorb more nutrients.

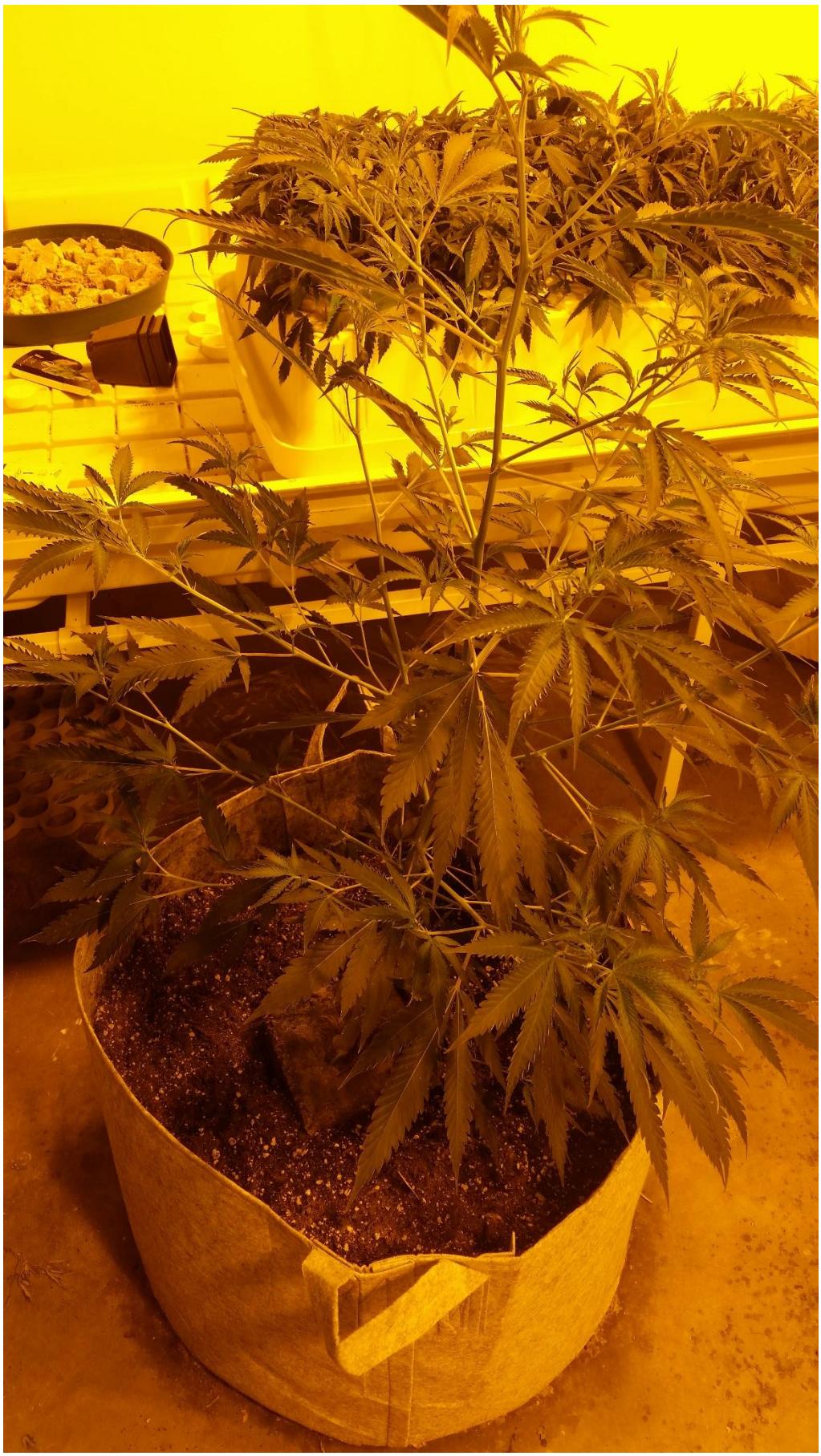
Reduce Fertilizer; studies have shown up to 50% of commercial fertilizer is not available to the plant when needed. If it is not at the roots where is it? The fertilizer gets washed away into ground or surface water, or is released to atmosphere.
Reduce Water; it is mindboggling with all the problems with water in California, and all the research and PEER REVIEWED studies that show how Bio-char sequesters water that it is not being promoted.
Reduce Methane; Studies from Australia and Europe show greatly reduced methane from cows when their feed is supplemented with Bio-char.
Compost; blending Bio-Char with compost eliminates odor. The odor are GHG's escaping to atmosphere. The Bio-char sequesters these chemicals; which end up as food for the plants. It also reduces the composting time.

What can I do to get the State agencies to see the light?

Our latest testimonial; the first picture is without, the second with 20% Karr-Char blended. Grower says he has never seen anything like it.

James Brown
COO
Karr Group of Companies, LLC
360-880-4054

logo



Office of Environmental Farming and Innovation
California Department of Food and Agriculture
1220 N Street
Sacramento, CA 95814

June 19, 2018

Re: Updated List of Management Practices Under Consideration for the Healthy Soils Program

Dear OEFI Staff,

Thank you for the opportunity to comment on the updated list of management practices under consideration for inclusion in the Healthy Soils Program presented at the May 24th meeting of the Environmental Farming Act Science Advisory Panel (EFA SAP).

Based on our review of the publicly available practice proposals and feedback from dozens of farmers, ranchers, scientists, conservationists, and Healthy Soils Program technical assistance providers, we offer the following comments on the Healthy Soils Program. The following is a summary of our recommendations:

Include the Following Proposed Practices (not in order of priority):

1. Nutrient Management: Reduce Fertilizer Application Rate by 15% (CPS 590)
2. Strip Cropping (CPS 585)
3. Forage and Biomass Planting (CPS 512)
4. Conservation Cover (CPS 327)
5. Range Planting (CPS 550)
6. Grassed Waterway (CPS 412)
7. Alley Cropping (CPS 311)
8. Multistory Cropping (CPS 379)
9. Prescribed Grazing (CPS 528)
10. Conservation Crop Rotation (CPS 328)

Modify the Following Existing Practices[1]:

[1] We include these recommendations now because we understand these two modifications will require an update of CARB's Compost-Planner GHG quantification tool.

1. Modify Existing Compost Application Practices to Allow the Application of Compost Produced On-Farm in Accordance with CalRecycle's, the National Organic Program's and/or the Food Safety Modernization Act's Pathogen Reduction Standards.
2. Modify Existing Rangeland Compost Application Practice to Allow for Single-Year Rangeland Compost Application

Reject the Following Proposed Practice:

1. Nutrient Management: Slow release fertilizers

Below, we provide more detailed comments on some of the practices, responding to questions or concerns raised in CDFA's slides or during the May 24th EFA SAP meeting.

Nutrient Management: Reduce Fertilizer Application Rate by 15% (CPS 590)

At the May 24th EFA SAP meeting, staff expressed uncertainty about how to verify a 15% reduction. First, we suggest the baseline for the 15% reduction be calculated as the average of the previous three years of fertilizer application rate. For growers required to submit nitrogen management plans under the Irrigated Lands Regulatory Program (ILRP), CDFA could ask to review those plans to both establish a baseline and verify at least a 15% reduction. If a grower is currently exempt from ILRP reporting requirements but has an established method of documenting fertilizer application and a sufficient record to establish a baseline, CDFA should work with the grower during the grant contract agreement phase to verify the method and baseline and set clear expectations for documentation and verification as part of the grant agreement.

Prescribed Grazing (CPS 528)

We support the requirement for a Grazing Management Plan signed by a State Board of Forestry certified professional rangeland manager or USDA-NRCS rangeland specialist.

Conservation Crop Rotation (CPS 328)

We support the requirement for an implementation plan or conservation plan for the 3-year duration of the project period.

Modify Existing Compost Application Practices to <u>Allow the Application of Compost Produced On-Farm</u>

In recognition of the climate, soil health, and public health benefits of compost application, multiple agencies, businesses, and nonprofits are working to boost compost production and application within the state. We believe the role of the Healthy Soils program in that effort is to incentivize compost application for the benefit of soil health, utilizing the source of compost that makes the best use of resources for the individual farming or ranching operation.

The program currently only allows farmers to apply compost that was produced from "organic wastes that are source separated from the municipal solid waste stream, or which are separated at a centralized facility" (per the "definition of compost eligible for the program" in the compost white paper). The effect of this unnecessary restriction has been to exclude the

application of compost generated on-farm, which is often the most cost-effective source of compost in rural areas of the state where compost from large municipal waste streams is either non-existent or prohibitively expensive to transport. Further, on-farm composting plays an important role in closing the nutrient cycle and conserving carbon on farm while also aiding in soil health development and supporting a sustainable food production system. For these reasons, Healthy Soils Program stakeholders have been consistently advocating for this modification since the spring of 2017.

At the May 24th EFA SAP meeting, staff expressed concerns about compost quality verification. If CDFA wishes to verify that compost produced on-farm is in compliance with the standards set forth in the Food Safety Modernization Act (FSMA), we recommend that CDFA add the following to their "Project Verification" section in the program guidelines:

"Applicants receiving payments to apply compost that has been produced on-site must monitor the compost and maintain records to demonstrate the compost was produced through a process that:

1. Maintained a temperature of between 131 °F and 170 °F for 3 days using an in-vessel or static aerated pile system; or
2. Maintained a temperature of between 131 °F and 170 °F for at least 15 days using a windrow composting system, during which period, the materials were turned a minimum of five times.

These records must be available to CDFA or a third-party contracted entity to inspect in order to verify program compliance. Composting records/logs maintained for compliance with CalRecycle pathogen reduction standards, the National Organic Program or Food Safety Modernization Act are required."

If CDFA and/or CARB require a C:N ratio test for the finished compost for GHG quantification, then CDFA can also require applicants to have available the results of such a test that was conducted within 180 days prior to the application of the compost.

Modify Existing Rangeland Compost Application Practice to <u>Allow for 1-Year Rangeland Compost Application</u>

The program's compost application practices currently require farmers and ranchers to apply compost in three consecutive annual applications. On rangelands, three consecutive applications are not practical. Compost hauling and equipment-hours for application and spreading are among the highest cost factors for compost application. This cost tends to be much higher on rangelands than croplands, due to extensive land area, topographic variability and distance from sources of compost. Ranchers traditionally have very low input systems with narrow profit margins in their operations. As such, their business models most often contain very little, if any, capital for input investment, and upfront costs are especially burdensome.

We heard from four CDFA-funded technical assistance providers that many of the ranchers they worked with, who initially expressed interest in compost application, ultimately decided not to apply to the Program because of the requirement to make three consecutive applications of

compost. We also heard directly from ranchers in our networks who were awarded funds and remain concerned about and frustrated by the three-year requirement.

By making this modification, CDFA will reduce the considerable GHG emissions associated with compost hauling and equipment-hours needed for rangeland application, while reducing financial and logistical barriers for rancher participation in the program.

Nutrient Management: Slow release fertilizers
We strongly recommend rejecting this practice for three reasons.

First, as we pointed out in our Nutrient Management Proposal in December, 2017, limited research has been done on slow release fertilizers in California's unique and diverse agricultural context. In fact, we were unable to find a single California-based study on slow release fertilizers' impact on GHG emissions in our review of the scientific literature. Given the key role climate, irrigation, and soil factors have on the efficacy of slow release fertilizers, it is critical to have research specific to California's unique combination of a Mediterranean climate, advanced irrigation systems, and soils.

But even if we were to consider research conducted outside of California and the U.S., the conclusions of many international studies on enhanced efficiency fertilizers (also known as EEF, which include slow release fertilizers and nitrification inhibitors) and GHG emissions have been called into question.[2] The California Nitrogen Assessment states: "The results of the research on EEF and N_2O may be confounded by experimental design. Some evidence suggests that although EEF present lower initial fluxes, N_2O production may extend for longer periods and therefore may show higher total losses (Delgado and Mosier, 1996) or similar total annual losses (Parkin and Hatfield, 2010)…" [3]

The limited California-based studies we found on the *agronomic* impact of slow release fertilizers in California had lackluster or no positive results. For example, Hartz and Farrara (2013) monitored the efficiency of slow release fertilizer across three strawberry fields in Monterey County and found that: 1) the rate of N release from the slow release fertilizer was much faster than the rate of strawberry N uptake and 2) the fertilizer had minimal effect on crop N uptake. [4]

Summarizing the potential agronomic and environmental impacts of EEF in California's unique agricultural context, the California Nitrogen Assessment says the following:

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[2] Rosenstock T, Brodt S, Burger M, Leverenz H, Meyer D. 2016. Appendix 7.1: Technical options to control the nitrogen cascade in California agriculture. In: The California Nitrogen Assessment. Available from: http://asi.ucdavis.edu/programs/sarep/research-initiatives/are/nutrient-mgmt/california-nitrogen-assessment/appendices-and-supplemental-information-1/ch7-appendix-7-1-final.pdf
[3] Ibid.
[4] Hartz T, Bottoms T, Cahn M, Farrara B. Improving nitrogen use in strawberry production. University of California Cooperative Extension – _Monterey County. 2013. Available from: http://cemonterey.ucanr.edu/files/170996.pdf

> "**Utility and likelihood of switching to EEF in California is questionable**[5], especially in the near term. To begin with, **EEF are more expensive, with prices estimated to range from 9%** (Snyder et al., 2009) **to nearly double** (California Nitrogen Assessment (CNA), stakeholder meetings) **the prices of conventional synthetic fertilizers**. This additional cost is often unwelcome to growers without clear yield increases. EEF in recent California vegetable crops trials raised yields only twice in nine experiments, 22% of the time (Hartz and Smith, 2009). In the late 1970s and mid-1980s, it was shown that nitrification inhibitors did increase N recovery in strawberry, cauliflower, and lettuce (Welch et al., 1985, 1979). **Under current farming conditions, however, it is not clear if EEF will produce comparable benefits in California as in other regions where they are being promoted. Benefits of EEF are maximized when periodic and uncontrolled soil moisture decrease control of N, conditions only found during winter in some parts of California agricultural valleys. The more common production conditions–hot, dry, and fertigated–can provide equivalent or greater control of nutrients if managed astutely**."[6] (emphasis added)

Second, adding a specific fertilizer product to the Healthy Soils Program would likely result in fertilizer companies recruiting applicants and offering to fill out the complex application on their behalf in exchange for the grower applying for and using their slow release fertilizer products (even if it is not in the grower's best interest). We have seen this type of grower exploitation happen in the SWEEP program and would like to avoid it in the Healthy Soils Program, especially for a practice with dubious GHG and soil health benefits.

Third, no stakeholders – in EFA SAP meetings or publicly submitted practice proposals – have requested this practice be added to the program. All of the other practices (including the modifications to existing practices) still under consideration for the program were proposed by stakeholders through a public process. Considering that there is no publicly available proposal for the practice to review, no stakeholders requesting the practice, scientific uncertainty about the merits of the practice, and likely exploitation of the practice by the fertilizer industry, continuing to propose the inclusion of slow release fertilizers could raise concerns about CDFA's transparency and fertilizer industry influence.

Thanks again for the opportunity to submit comments. We believe adopting our recommendations will increase the participation in and impact of the Healthy Soils Program while maintaining its integrity. Thank you for your consideration of our input.

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[5] Strawberry is the only cropping systems where the use of slow release fertilizer is currently the industry standard (Strand, 2008; Reganold et al., 2010).

[6] Rosenstock T, Brodt S, Burger M, Leverenz H, Meyer D. 2016. Appendix 7.1: Technical options to control the nitrogen cascade in California agriculture. In: The California Nitrogen Assessment. Available from: http://asi.ucdavis.edu/programs/sarep/research-initiatives/are/nutrient-mgmt/california-nitrogen-assessment/appendices-and-supplemental-information-1/ch7-appendix-7-1-final.pdf

Sincerely,

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June 19, 2018

Office of Environmental Farming and Innovation
California Department of Food & Agriculture
1220 N Street
Sacramento, CA 95814

RE: Comments on Practices to be added to the Healthy Soils Program

Dear OEFI Staff,

Thank you for your continued work with stakeholders to improve and grow the Healthy Soils Program. I appreciate your openness to expanding the program with other proven practices and refine the process and opportunity for agricultural producers to take advantage of these funds to help the state restore soil health, increase drought resilience and sequester carbon. In addition to this letter, I have also signed-on to a group comment letter with the Healthy Soils Coalition supporting the following:

Addition of the below practices (not in order or priority):

- Nutrient Management: Reduce Fertilizer Application Rate by 15%
- Strip Cropping
- Forage and Biomass Planting
- Conservation Cover
- Range Planting
- Grassed Waterway
- Alley Cropping
- Multistory Cropping
- Prescribed Grazing
- Conservation Crop Rotation

Modification of the existing practices:

- Modify Exiting Compost Application Practices to Allow the Application of Compost Produced On-Farm
- Modify Existing Rangeland Compost Application Practice to Allow for 1-Year Rangeland Compost Application

Rejection the following proposed practice:

- Nutrient Management: Slow release fertilizers

Additionally, and importantly, after my own successful application to the HSP and months of conversation with other producers and stakeholders we have clearly seen that the current economics of compost application to rangelands is still out of reach for many producers who would like to institute the practice but did not apply due to the

still existing cost barrier under last year's program. In light of this, I would **also like to recommend that CDFA move the full funding amount provided in last year's rangeland compost practice, which covered consecutive years, to cover the cost of the new 1-year rangeland compost application**.

As elaborated in the group letter, compost hauling and spreading are among the highest costs for compost application. Our conversations with various stakeholders have shown that there is a wide range in these costs across different farmers or ranchers, but that the costs are undeniably significant. The current Healthy Soils Program subsidy rate for compost is $35 per dry ton. At this rate, the break-even cost for compost would be $12 per dry cubic yard. However, compost realistically costs between $10 -45 per yard, with averages hovering between $19-$25 per yard. Adding to the additional costs, hauling and spreading can range between $9-23 per cubic yard, and at 35 cubic yards of compost per acer the costs quickly become outside of the financial range of a rancher who's traditional business model does not include inputs to support their rangelands. Because of these economics and the strong stakeholder interest in the practice should they be adequately addressed, I urge you to accept the 1-year rangeland compost application practice AND direct all previously available funds for the multi-year version of the practice towards the single application.

Thank you again for the opportunity to submit comments, and for your consideration of my input. The economic and cost numbers I have cited above are attached here for your reference.

Sincerely,

John Wick

Office of Environmental Farming and Innovation 19 June 2018
California Department of Food and Agriculture
1220 N Street
Sacramento, CA 95814

Re: Updated List of Management Practices Under Consideration for the Healthy Soils Program

Dear OEFI Staff,

Thank you for the opportunity to comment on the updated list of management practices under consideration for inclusion in the Healthy Soils Program presented at the May 24th meeting of the Environmental Farming Act Science Advisory Panel (EFA SAP).

We have enthusiastically signed on to the joint comments prepared by California Climate and Agriculture Network (CalCAN). Here we add a few complementary comments to those detailed joint comments.

We fully support the inclusion of the following practices for inclusion, modification and omission as described in the joint letter.

Include the Following Proposed Practices (Conservation Practice Standards):

1. Nutrient Management: Reduce Fertilizer Application Rate by 15% (CPS 590)
2. Strip Cropping (CPS 585)
3. Forage and Biomass Planting (CPS 512)
4. Conservation Cover (CPS 327)
5. Range Planting (CPS 550)
6. Grassed Waterway (CPS 412)
7. Alley Cropping (CPS 311)
8. Multistory Cropping (CPS 379)
9. Prescribed Grazing (CPS 528)
10. Conservation Crop Rotation (CPS 328)
11. Integrated Pest Management (CPS 595) – **NEW ADDITION**

Modify the Following Existing Practices:

1. Modify Existing Compost Application Practices to Allow the Application of Compost Produced On-Farm
2. Modify Existing Rangeland Compost Application Practice to Allow for 1-Year Rangeland Compost Application

Reject the Following Proposed Practice:

1. Nutrient Management: Slow release fertilizers

We fully support the goals of the Healthy Soils Program:

> … implementation of conservation agricultural management practices that sequester carbon, reduce atmospheric greenhouse gases and improve soil health. (https://www.cdfa.ca.gov/oefi/healthysoils/)

As such, we argue for first, the inclusion of additional practices (including CPS 595) that involve the reduction in use of hazardous pesticides that pose serious threats to the goals of building and maintaining healthy soils and reduction in GHG emissions. Secondly, we argue that the goal of 15% reduction in use of synthetic N fertilizer is inadequate and the proposed use of slow-release fertilizers is inappropriate.

Background and context

According to the 2017 Human Rights Council of the UN General Assembly "Pesticides can persist in the environment for decades and pose a global threat to the entire ecological system upon which food production depends. Excessive use and misuse of pesticides result in contamination of surrounding soil and water sources, causing loss of biodiversity, destroying beneficial insect populations that act as natural enemies of pests and reducing the nutritional value of food."[1]

The soil biological community plays a fundamental role in nutrient cycling. As such, any pesticide-mediated changes in organic matter decomposition and N and C transformations will likely also affect the use or release of N (including release of N_2O into the environment). It would be inappropriate to dismiss the impacts of pesticides both on soil health generally and on nutrient cycling specifically (especially N and C). We therefore, strongly encourage the inclusion of practices ranging from organic production to use of integrated pest management (IPM) as a means to protect the vital soil biological community from the negative impacts of pesticide use. Furthermore, as described below, significant reductions in pesticide use will directly reduce GHG emissions — a key goal of the Healthy Soils Program.

Pesticides harm the soil biological community and its functions

Only about 0.1% of applied pesticides reach the targeted organism while the remaining amount contaminates the soil and surrounding environment.[2] The soil biological community associated with healthy soil is extraordinarily diverse — from spatial heterogeneity, organism diversity and function (e.g. nutrient cycling and acquisition, suppression of phytopathogens, and providing resistance to biotic and/or abiotic stressors). Unfortunately, while the research on the detrimental impacts of pesticides on the soil biological community is not well-developed, it is strongly suggestive that pesticides can significantly alter fundamental roles of soil organisms in organic material decomposition and nutrient cycling, among other functions.

The impacts of pesticides on N cycling bacteria is perhaps most clearly relevant to N_2O emissions, though the interactions among diverse soil organisms will necessarily influence the function of N-cycling bacteria and other N-cycling organisms.[3,4,5,6,7] Martinez-Toledo et al. (1998) documented that applications of the fungicide Captan led to decreases in the population of aerobic diazotrophs (nitrogen-fixing bacteria and archaea). Nitrogenase activity, which is the key enzyme involved in nitrogen fixation has also been shown to be less prevalent in soils exposed to pesticides.[8] If N fixation is inhibited, then greater N applications will be required, and hence

probability of increased N_2O emissions, especially with synthetic N applications. More directly however, Martinez-Toledo et al. also found that applying the recommended doses of Captan increased the population size of denitrifiers, and potentially production of N_2O.

Treatment of soils with broad-spectrum soil fumigants leads to multiple negative impacts on the soil biological community and its multiple functions. Fumigation with chloropicrin is associated with 7-8-fold increases in the production rate of N_2O[9] with the suggested mechanism being primarily from aerobic fungal processes rather than the commonly described anaerobic bacterial denitrification as the source of N_2O.[10] In another study, fumigation with the fumigant MITC alone and in combination with chloropicrin also increased N_2O emissions significantly.[11] A study of the impacts of the fumigant metam sodium on soil microbial community showed persistent changes (lasting at least 4 months) in heterotrophic activity and fatty acid composition of the microbial biomass suggesting alteration of important microbially mediated functions such as nutrient cycling.[12]

Neonicotinoid insecticides can cause significant adverse effects on key soil organisms and persist in soils for several years. At realistic field concentrations, the leaf-borne residues of the pesticide imidacloprid resulted in a significant reduction in leaf litter breakdown, causing detrimental effects to earthworms and soil microbes. Imidacloprid has also been shown to be associated with decreased fungal abundance and significant changes in levels of nitrate-N, ammonium, nitrite-N, and nitrate reductase enzyme activity, among other impacts.[13]

Pesticide reduction practices

"Agroecology, considered by many as the foundation of sustainable agriculture, replaces chemicals with biology. It is the integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions."[14,15]While agroecology is much more than a set of practices, it does "promote(s) agricultural practices that are adapted to local environments and stimulate beneficial biological interactions between different plants and species to build long-term fertility and soil health."[16] All of the 'healthy soil' practices listed above to be included or modified are consistent with agroecology and generally reduce problems of pests and diseases, and hence the "need" for pesticides. As an important element of agroecology and a complement to the practices listed, we strongly encourage the addition of IPM as a practice —a strategy of "long-term prevention of pests or their damage by managing the ecosystem" [17] designed to reduce use of hazardous pesticides by building the agroecosystem's ability to resist pests and disease. A few specific pesticide alternative practices are described below.

When preventative measures fail to keep pests below economic threshold levels, IPM calls for the use of "softer" non-chemical alternatives. In the case of highly hazardous fumigant pesticides, those alternatives include the use of several Brassicaceae species as biofumigant green manures — exploiting their glucosinolate (GL)-myrosinase (MYR) defensive system. The use of natural compounds with a high biological activity presents several environmental benefits, mainly due to the renewability and biodegradability of these materials, that generally allows a reduction in greenhouse gas emissions compared to the use of conventional pesticides.[18] Anaerobic soil disinfestation[19] and solarization[20] are two other non-chemical processes showing great promise as substitute for chemical fumigant pesticides.

Reducing pesticide use (and production) reduces GHG emissions
Reducing synthetic pesticide use will have important secondary effects on reducing GHG emissions as well. Chemical production is an energy-intensive process, accounting for approximately 20% of the total industrial US energy used. The range of energy required for production of some common organic chemicals ranges from 10-70 gigajoules per tonne. We do not know the precise amount of energy consumed per tonne in the production of the different fumigants, but in California, approximately 13,600 tonnes of fumigants are used every year, accounting for approximately 17% of the total agricultural pesticide use. A central estimate of energy use per tonne of 35 gigajoules per tonne would indicate that fumigant production utilizes approximately 500,000 gigajoules of energy in California. A reduction in fumigant use would thus result in decreased greenhouse gas emissions.[21]

Synthetic fertilizers: 15% reduction goal inadequate
The target fertilizer reduction rate of 15% is far less than it reasonably can and should be. The contribution of N inputs from synthetic fertilizers to accelerating nitrous oxide emissions from soil microbial communities is well-documented and on the order of 19.8 kg of N ha^{-1} $year^{-1}$ of NO_x emissions compared to 1.0 kg of NO_x ha^{-1} $year^{-1}$ from natural ecosystems[22] that are largely mimicked by multiple agroecological practices including those identified above for inclusion or modification. The effective substitution of synthetic N fertilizers by organic amendments (e.g. compost and legume cover crops) is well-documented in the burgeoning CA organic industry.[23,24]

We reiterate the CalCAN-led comments regarding the proposed and misguided addition of a specific fertilizer product to the Healthy Soils Program. As explained (and observed), this would likely result in fertilizer companies recruiting applicants and offering to fill out the complex application on their behalf in exchange for the grower applying for and using their slow release fertilizer products (even if it is not in the grower's best interest). Furthermore, the practice has dubious and unsubstantiated GHG and soil health benefits and has not been requested by any EFA SAP stakeholders.

Thanks again for the opportunity to submit comments. We believe adopting our recommendations will increase the participation in and impact of the Healthy Soils Program while maintaining its integrity. Thank you for your consideration of our input.

In appreciation of this opportunity to comment,

Margaret Reeves, PhD
Senior Scientist
Pesticide Action Network

Sarah C. Aird, Esq.
Co-Director
Californians for Pesticide Reform

[1] UN General Assembly, Human Rights Council, Thirty-fourth session, 27 February-24 March 2017. Agenda item 3, Promotion and protection of all human rights, civil, political, economic, social and cultural rights, including the right to development, Report of the Special Rapporteur on the right to food. A/HRC/34/48. Paragraph 32, p.9.

[2] Hussain S, Siddique T, Saleem M, Arshad M, Khalid A. 2009. Chapter 5 Impact of Pesticides on Soil Microbial Diversity, Enzymes, and Biochemical Reactions. In: *Advances in Agronomy*. Vol. 102 of. Elsevier. 159–200; doi: https://doi.org/10.1016/S0065-2113(09)01005-0.

[3] Druille M, Cabello MN, Omacini M, Golluscio RA. 2013. Glyphosate reduces spore viability and root colonization of arbuscular mycorrhizal fungi. Applied Soil Ecology 64:99–103; doi: https://doi.org/10.1016/j.apsoil.2012.10.007.

[4] Zaller JG, Heigl F, Ruess L, Grabmaier A. 2015. Glyphosate herbicide affects belowground interactions between earthworms and symbiotic mycorrhizal fungi in a model ecosystem. Scientific Reports 4; doi: https://doi.org/10.1038/srep05634.

[5] Nicolas V, Oestreicher N, Vélot C. 2016. Multiple effects of a commercial Roundup® formulation on the soil filamentous fungus Aspergillus nidulans at low doses: evidence of an unexpected impact on energetic metabolism. Environmental Science and Pollution Research 23:14393–14404; doi: https://doi.org/10.1007/s11356-016-6596-2.

[6] Casabé N, Piola L, Fuchs J, Oneto ML, Pamparato L, Basack S, et al. 2007. Ecotoxicological assessment of the effects of glyphosate and chlorpyrifos in an Argentine soya field. Journal of Soils and Sediments 7:232–239; doi: https://doi.org/10.1065/jss2007.04.224.

[7] Yasmin S, D'Souza D. 2010. Effects of Pesticides on the Growth and Reproduction of Earthworm: A Review. Applied and Environmental Soil Science 2010:1–9; doi: https://doi.org/10.1155/2010/678360.

[8] Martınez-Toledo MV, Salmeron V, Rodelas B, Pozo C, Gonzalez-Lopez J. 1998. Effects of the fungicide Captan on some functional groups of soil microflora. Applied Soil Ecology 7: 245–255; doi: https://doi.org/10.1016/S0929-1393(97)00026-7.

[9] Spokas K, Wang D. 2003. Stimulation of nitrous oxide production resulted from soil fumigation with chloropicrin. Atmospheric Environment 37 (2003) 3501–3507

[10] Spokas K, Wang D, Venterea R, Sadowsky M. 2006. Mechanisms of N_2O production following chloropicrin fumigation. Applied Soil Ecology 31 (2006) 101–109.

[11] Spokas K, D Wang, Venterea. R. 2004. Greenhouse gas production and emission from a forest nursery soil following fumigation with chloropicrin and methyl isothiocyanate. Soil Biology & Biochemistry 37 (2005) 475–485

[12] Macalady JL, Fuller ME, Scow KM. 1998. Effects of Metam Sodium Fumigation on Soil Microbial Activity and Community Structure. J. Environ. Qual. 27:54-63.

[13] Madeleine C, Kreutzweiser D, Mitchell EAD, Morrissey CA, Noome DA, Van der Sluijs JP. 2015. Risks of large-scale use of systemic insecticides to ecosystem functioning and services. Environ Sci Pollut Res (2015) 22:119–134.

[14] UN General Assembly Human Rights Council, Thirty-fourth session, 27 February-24 March 2017. Agenda item 3, Promotion and protection of all human rights, civil, political, economic, social and cultural rights, including the right to development, Report of the Special Rapporteur on the right to food. A/HRC/34/48 Paragraph 92, p. 20.

[15] International Foundation for Organic Agriculture, Organics International, Biovision and Millennium Institute. 2015. Agroecology: Briefing note, 11 July 2015.

[16] Watts, M, Williamson S. 2015.Replacing Chemicals with Biology: Phasing Out Highly Hazardous Pesticides with Agroecology. Pesticide Action Network Asia and the Pacific.

[17] UC Integrated Pest Management (IPM) website. http://www2.ipm.ucanr.edu/WhatIsIPM/

[18] Lazzeri L, Malaguti L, Cinti S, Ugolini L, De Nicola GR, Bagatta M, Casadei N, D'Avino L, Matteo R., Patalano G. 2013. Brassicaceae biofumigation system for plant cultivation and defence. an Italian twenty-year experience of study and application. International Society for Horticultural Science, Vol 1005, 375-382.

[19] Shennan C, Muramoto J, Koike S, Baird G, Fennimore S, Samtani J, Bolda M, Dara S, Daugovish O, Lazarovits G, Butler D, Rosskopf E, Kokalis-Burelle N, Klonsky K, Mazzola M. 2018. Anaerobic soil disinfestation is an alternative to soil fumigation for control of some soilborne pathogens in strawberry production. Plant Pathology 67, 51–66.

[20] Hodson A, Lewis E. 2016. Managing for soil health can suppress pests In: California Agriculture: The evolving berry industry Vol 70, No. 3. July-September. http://calag.ucanr.edu

[21] Worrell E, Phylipsen D, Einstein D, Martin N. 2000, Energy Use and Energy Intensity of the U.S. Chemical Industry, Lawrence Berkeley National Laboratory, http://industrial-energy.lbl.gov/node/86.

[22] Almaraz, M, Bai E, Wang C, Trousdell J, Conley S, Faloona I, Houlton BZ. 2018. Agriculture is a major source of NO_x pollution in California. *Science Advances* 31 Jan 2018: Vol. 4, no. 1, eaao3477.

[23] Stillerman KP. 2016.Organic Farming is Growing (But Not Everywhere). Union of Concerned Scientists. https://blog.ucsusa.org/karen-perry-stillerman/organic-farming-is-growing-but-not-everywhere

[24] Johnson B. 2017. California continues to lead nation in organic farms. Ag Alert. 11/16/17 http://www.dailydemocrat.com/article/NI/20171116/BUSINESS/171119884

From: Pauline Seales <paulineseales120@gmail.com>
Sent: Wednesday, June 6, 2018 12:42 PM
To: CDFA OEFI@CDFA
Subject: Healthy Soils Program

Thanks for everything you are doing to improve our soils, including the list of new management practices it is considering adding to the Healthy Soils Program.
This program is good for farmers and consumers and GREAT for the planet!

Pauline Seales
Santa Cruz Climate Action Network

From: Christopher Jennings <jenningsc971@gmail.com>
Sent: Tuesday, May 29, 2018 4:37 PM
To: CDFA OEFI@CDFA
Subject: Medical cannabis in america forging the future of humanity's health.

All natural organic agriculture equals good healthy soil . fruits and vegetables and medical cannabis. I believe whatever the cdfa believe's in and so much more.
Sincerely yours truly believe that Mr.Christopher Daniel Jennings thank you let's stay connected.

From: Kevin Muno <kevin@ecologyartisans.com>
Sent: Thursday, June 7, 2018 3:20 PM
To: CDFA OEFI@CDFA
Subject: practices to add to healthy soils program

We would like prescribed grazing added to the healthy soil program. Thanks for accepting feedback here...

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Cheers,

Kevin Muno
President
805-300-3979

C27 License# 1007530
Ecology Artisans, Inc.
skype: kevinmuno

ecologyartisans.com

From: Pacific Rare Plant Nursery <pacificrare@calcentral.com>
Sent: Tuesday, May 29, 2018 3:55 PM
To: CDFA OEFI@CDFA
Subject: Re: Environmental Farming Act Science Advisory Panel (EFA SAP) seeking comments on Healthy Soils Program

Frustrating application process. We completed everything, spent a whole weekend on the application. Thought we had everything uploaded, noted we didn't get feedback that it had been received. At follow up by phone- our application had not been received at your end. We are working farmers and spent many, many hours on the application. We appreciate everything we learned doing the application - just like being back in school. However, we run a business. it is difficult for us to spend an inordinate amount of time going to meetings to get an application done. Application seems to be oriented toward academic institutions, not working farmers. Was a disappointing experience.