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DEPARTMENT OF PLANT SCIENCES
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COLLEGE OF AGRICULTURAL AND
ENVIRONMENTAL SCIENCES
AGRICULTURAL EXPERIMENT STATION
COOPERATIVE EXTENSION

March 3, 2013

Ms. Shelby Livingston, Chief
Climate Change Program Planning and Management Branch
Air Resources Board
1001 I Street
Sacramento, CA 95814

Dear Ms. Livingston:

The California Agricultural Systems Innovation (CASI) Center seeks an allocation of $1.5M over three years from cap-and-trade auction proceeds to support our goals to increase the adoption of conservation agricultural systems by:

1. Continuing to deliver field, workshop, and online training curricula on conservation agriculture systems for California producers, allied private sector agriculture support industries, public agencies, and the general public;
2. Conducting research aimed at developing and determining the specific GHG reduction potential of various 'next generation' or advanced sustainability practices and conservation agriculture systems. These systems will include, but not be limited to determinations of

    a. The long-term potential of diverse, multi-species cover crop mixtures to reduce fertilizer application needs;
    b. The potential of high surface residue systems to reduce soil water evaporation and thereby decrease irrigation water pumping;
    c. The long-term potential of conservation agriculture systems to reduce fertilizer, herbicide, insecticide, nematicide, and fungicide use and the overall concomitant reduction in energy consumption involved with the fabrication of these materials; and
    d. The capability of conservation agriculture practices for waste, nitrogen, and water management to improve application efficiencies and reduce GHG emissions.

CASI's strengths reside in our diverse, active, and very committed membership. Our ranks include some of California's most innovative farmers, two of whom have recently been awarded the prestigious Leopold Conservation Award. Our members also include private sector, agricultural grower groups, the Natural Resources Conservation Service (NRCS), other public agency, and both Cal State and University of California participation. Our local, farmer-led, grassroots effort maintains very close connections throughout many of the top 10% highest scoring disadvantaged communities in the Central Valley. The overarching goals of CASI as stated in our Strategic Plan are to:

1. Develop, deliver, and demonstrate information on the economic and environmental benefits of conservation agricultural systems and serve as a global clearing house,
2. Increase the adoption of these systems to more than 50 percent of cropping acreage in the San Joaquin Valley by 2028,
3. Partner with national and international conservation organizations to promote conservation agricultural systems, and
4. Increase funding for conservation agricultural systems research, education and adoption in California and beyond.

Broadly defined, conservation agriculture represents a set of principles and practices that include reduced soil disturbance, preservation of surface residues, diverse crop rotations, integrated pest management, single and multi-species cover crops, precision irrigation, and controlled traffic. These practices increase the environmental and economic sustainability of production systems because they require fewer inputs and reduce emissions and nutrient leakage. Use of these principles and systems is increasingly supported by research both in California and worldwide. It is the merging of these advanced sustainability technologies and their broader adoption within California that drives CASI's mission and goals. During the past decade, research has demonstrated a number of clear economic and environmental benefits when conservation agriculture systems are used including:

- Atmospheric carbon and nitrogen are trapped in plant biomass and in the soil,
- Biologically-fixed nitrogen is added to the soil thereby increasing soil carbon levels,
- Fertilizer requirements are reduced,
- Pesticide use is reduced,
- PM emissions are reduced by 50 – 80%,
- Fuel use is lower,
- Soil water evaporation is lower leading to less pumping time required for irrigation,
- Less surface water runoff occurs, and
- Tillage costs are typically reduced by $40 - $150 per acre.

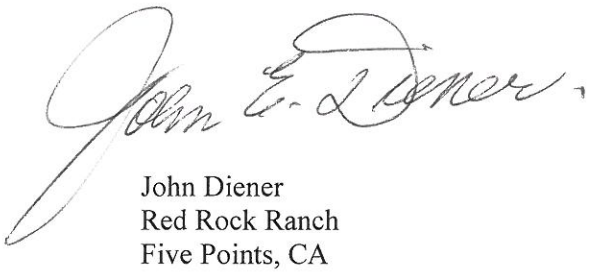
Early adopters of conservation agriculture techniques in the Central Valley have saved an estimated $75,000,000 in production costs since 2004, yet they currently represent only a relatively small sector of producers. Several factors account for this slow adoption rate for conservation agricultural (CA) practices. These factors include a lack of awareness of the practices, too few local demonstrations to view the practices, the need to research the applicability of CA to local soils and crops, cost of machinery, and the need to dispel erroneous information about CA.

We, the undersigned individuals and organizations, write to encourage an allocation of cap-and-trade auction proceeds anticipated from the implementation of AB32 to support the programs and initiatives of the Conservation Agriculture Systems Innovation (CASI) Center. CASI's programs address a critical need for new technologies and innovative cropping systems that will be increasingly competitive and improve the natural resource base on which agriculture relies. The work of CASI is critical to agricultural sustainability and directly addresses a number of the energy efficiency and conservation investment priorities of AB32's Cap-and-Trade Auction Proceeds Investment Plan by both increasing the sinks for GHG's and also by reducing their transmission to the atmosphere.

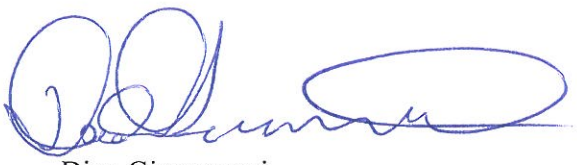
We very enthusiastically endorse CASI as a beneficiary of cap-and-trade auction proceeds and encourage your support of our attached proposal.

Sincerely,

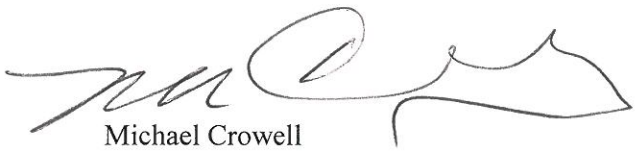
Tom Barcellos
Barcellos Farms
Tipton, CA



John Diener
Red Rock Ranch
Five Points, CA



Dino Giacomazzi
Giacomazzi Dairy
Hanford, CA



Michael Crowell
Bar-Vee Dairy
Turlock, CA

Ron Harben
California Association of Resource Conservation Districts
Templeton, CA

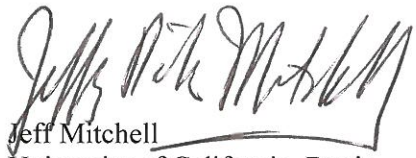
Jesse Sánchez
Sano Farms
Firebaugh, CA

Alan Sano
Sano Farms
Firebaugh, CA

Monte Bottens
Cal Ag Solutions
Madera, CA

Fritz Durst
Durst Farms
Woodland, CA

Steve Fortner
Sun Pacific Farming
Firebaugh, CA



Jeff Mitchell
University of California, Davis
Five Points, CA

Reducing Agriculturally Generated Greenhouse Gases by Increased Adoption of Conservation Agricultural Systems

March 6, 2013

This document establishes the rationale for reducing agriculturally generated greenhouse gasses through the increased adoption of conservation agriculture systems and outlines a comprehensive program for achieving their wider adoption in California's Central Valley (CV).

Justification:

During the past decade, research has demonstrated a number of clear benefits of conservation agriculture (CA) systems (Table 1). Broadly defined, conservation agriculture represents a set of practices and principles that include reduced soil disturbance, preservation of surface residues, diverse crop rotations, integrated pest management, legume cover crops, precision irrigation, and controlled traffic (http://casi.ucanr.edu/?blogpost=8115&blogasset=14128). When these practices are used together, they increase the competitiveness and sustainability of production systems because they require fewer inputs and reduce losses as emissions and leakage. Beneficial use of these principles and systems is increasingly supported by research and is also rapidly expanding in many parts of the world. The full integration of these practices, however, has not been widely realized in California despite the fact that they are widely recognized to lead to improved, more efficient and less leaky systems. It is this comprehensive coupling or merging of these advanced sustainability technologies and their broader adoption within California that drives our mission and goals within California's Conservation Agriculture Systems Innovation (CASI) Center.

Table 1. Economic and environmental benefits achieved when conservation agriculture practices are used

- Atmospheric carbon and nitrogen are trapped in plant biomass and in the soil
- Biologically-fixed nitrogen is added to the soil
- Soil carbon levels are increased
- Fertilizer requirements are reduced
- Herbicide use is reduced
- Insecticide use is reduced
- PM emissions are reduced by 50 – 80%
- Fuel use is lower
- Soil water evaporation is lower
- Less surface water runoff occurs and
- Tillage costs are typically reduced by $40 - $150 per acre

Each of these findings has now been demonstrated by research and farm demonstrations conducted in the CV. Early adopters in the CV have saved an estimated $75,000,000 using conservation agriculture relative to conventional agriculture practices since 2004. Economic analyses of CA systems typically show that tillage costs are reduced by from $40 to $150 per

acre relative to standard tillage practices and that these savings derive from less labor, less fuel used, lower equipment horsepower requirements, and less implement maintenance being required (Mitchell et al., 2009). Reductions in PM emissions on the order of 60 – 80% for silage crops (Madden et al, 2009) as well as for cotton and tomatoes (Baker et al., 2006) have been shown.

The sustained use of winter leguminous cover crops may reduce the need for nitrogen fertilizer by up to 30% (Poudel et al., 2000). Soil carbon levels in a tomato-cotton rotation study conducted in Five Points were significantly higher following eight years of consistent CA management (11.7 tons/acre) in the top foot of soil versus standard till management (9.9 tons/acre), and even higher (12.8 tons/acre) when CA is used in conjunction with cover cropping (Mitchell et al., In revision for Agronomy Journal) (Table 2).

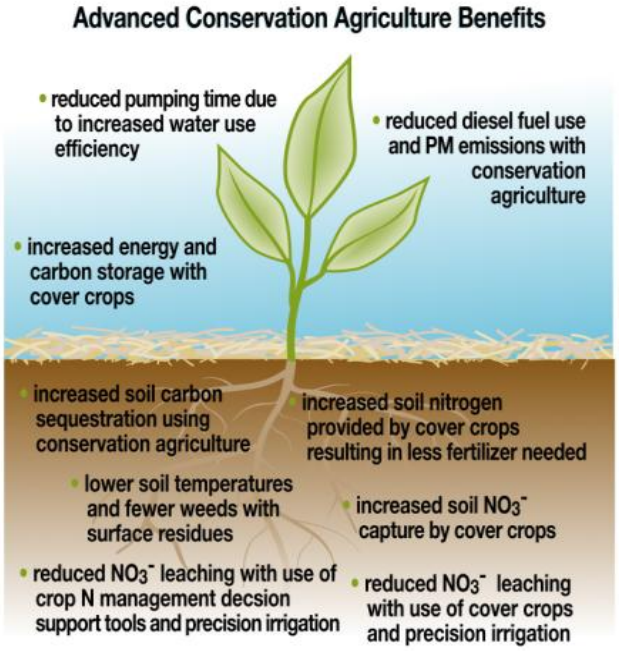
Table 2. Soil carbon mass for tillage and cover crop treatments at two soil depths[†].

	Soil Carbon mass[§]							
Depth	**tons ha^{-1}**							
(cm)	STNO		STCC		CTNO		CTCC	
0-15	10.74	(0.26)	13.68	(0.43)	14.51	(0.61)	15.95	(3.43)
15-30	11.59	(0.43)	13.69	(0.73)	11.69	(0.45)	12.89	(0.54)
Total	22.33	C	27.37	B	26.20	B	28.84	A

[†] ST = standard tillage; CT = conservation tillage; NO = no cover crop; CC = winter cover crop.

([§]Values in parentheses are standard error of the means (n = 8). North and south field means were not significantly different; treatments were combined for analysis. Letters represent significant differences among treatments using a one-way ANOVA analysis with Tukey HSD means comparison.)

Additional benefits of CA and surface residue preservation in CV cropping systems have also recently been demonstrated in terms of reducing soil water evaporation and thereby increasing water use efficiency (Mitchell et al., 2012). Lastly, there is considerable research that has shown the capability of high-residue CA systems to not only reduce runoff, but also sediment, nutrient, and pesticide losses from farm fields to surface water bodies (Hill, 1996) (Figure 1).



Despite the broad evidence in support of GHG-emissions-reducing, water-use-efficient and soil and water quality improving CA systems, there is currently a lack of

appreciation or value of these management goals by most California farmers as shown by a variety of surveys our Workgroup has conducted. The long-term critical importance of soil quality improvement as a goal of sustainable crop production systems and as an alternative to both conventional and organic agriculture is currently not a high priority of California extension education programs and there is what has been called an 'under valuation' of the importance of high quality soils that results from the 'masking' of problems that often occurs with tillage intensive, high input production practices.

To address this gap, or need for information and rigorously-evaluated production system alternatives, the Conservation Agriculture Systems Innovation (CASI) Center was formed in 2012 as an expanded program of the Conservation Tillage and Cropping Systems Workgroup and California's Precision Irrigation Alliance. CASI is a diverse group of over 1900 farmer, private sector, university, NRCS and other public agency members who have come together to develop information and to increase the adoption of conservation agriculture systems alternatives in California. While widely recognized as an alternative to both conventional agriculture and organic agriculture in many regions of the world, conservation agriculture rests fundamentally on principles and practices that link productivity and sustainability over the long term. Worldwide, conservation agriculture increased dramatically during the past fifteen years with major regions of South America projected to soon be at over 85% adoption (Friedrich and Kassam, 2009). Canada, Australia, the Pacific Northwest, Midwest, and Southeast US are also other regions where conservation agriculture is now common.

A program for accelerating the adoption of conservation agriculture systems in California

<u>Demonstrations</u>

To achieve broader adoption of more competitive and sustainable agricultural systems in California that mitigate GHG emissions, we believe two major initiatives are now needed. First, based on extensive surveys our Workgroup has conducted to identify existing barriers to broader-scale adoption of conservation agriculture systems, there is a need for local and successful demonstration evaluations of conservation agriculture systems. These evaluations require three key components: readily-available, high quality equipment; the support from experienced, expert conservation agriculture practitioners (i.e., farmers who have adopted conservation agricultural systems and are willing to assist other farmers transition into CA), and a core of qualified farmer partners who exhibit an openness and commitment to improving their current practices. We propose that at the greatest immediate potential gains can be achieved by emphasizing silage crops as well as cotton, tomato, and small grain rotations because of the existing CA experience base related to these crops. We further believe that the broad reach and organizational structure of CASI can serve as the core mechanism to coalesce and conduct a comprehensive program of CA demonstration evaluations as outlined below. This proposed work is innovative and important, in our opinion, because it represents a new and substantive departure from the status quo by providing a means for farmers to directly gain successful experience with CA systems and to share that experience with other farmers in a local, small-scale setting.

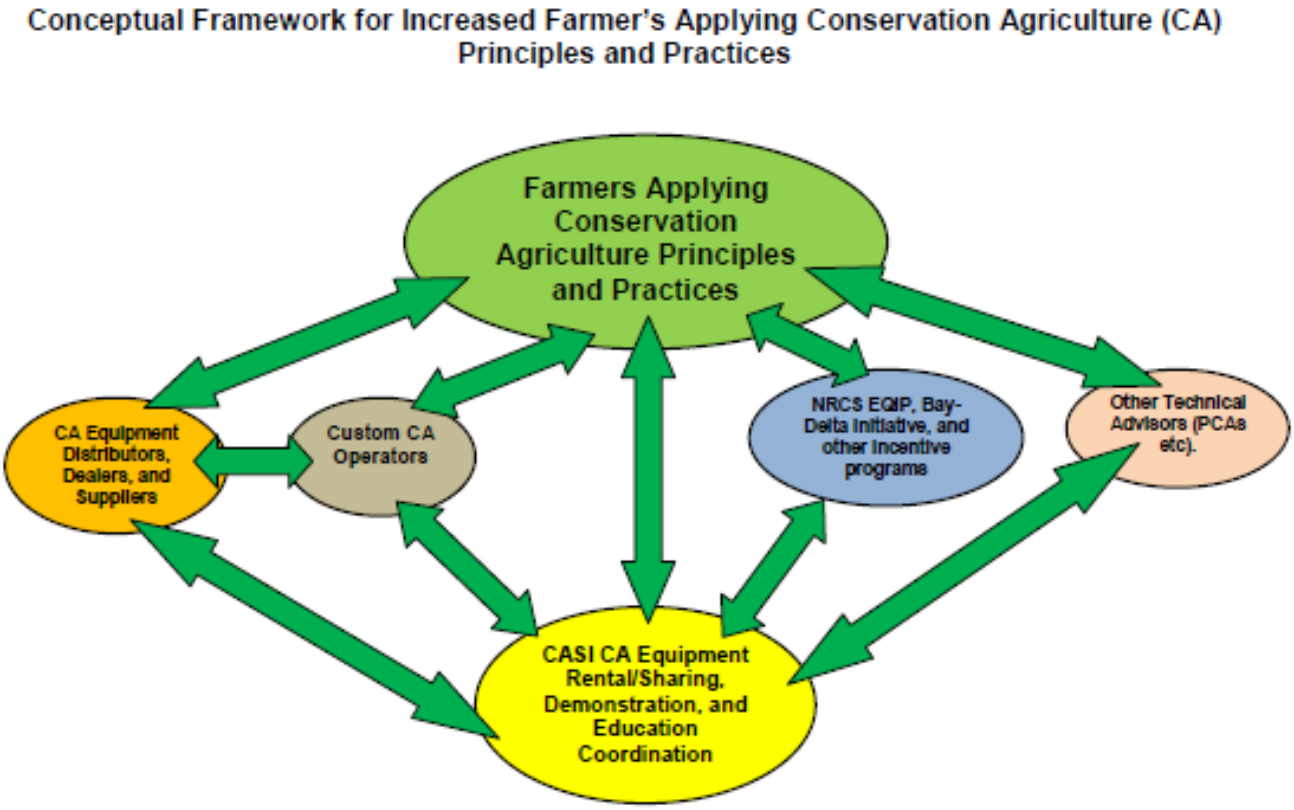


Figure 1. Conceptual Framework for Increased Farmers Applying Conservation Agriculture (CA) Principles and Practices

Build CASI Capacity

Not only is each partner in this organizational scheme important, but so is the core 'organizational' function that CASI will provide to initially bring all parties together to develop the program and to also then sustain the high quality demonstrations and coordinate related educational programs. To increase the capacity of CASI to do this, we propose the development of a comprehensive Valley-wide program of CA demonstration evaluations that will be located in each CV county. Adoption programs that have already been successful in the CV will be used as an implementation model as well as successful programs from the Pacific Northwest (http://pnwsteep.wsu.edu), in South Dakota (http://dakotalakes.com/), in Georgia (http://gcta-ga.org/), and in South America (http://www.aapresid.org.ar/). To facilitate the transition to conservation agriculture from conventional agricultural practices, prospective farmer partners will work directly with two experienced consultants who will be hired to provide technical, 'on the ground' guidance, support, and proactive trouble-shooting to avoid problems and assure success. Dealer and custom operator training will be provided in a coordinated, strategically-developed ongoing series of workshops to build capacity in these key sectors that will be integral contributors to the long-term success of the overall initiative.

Deliverables

A performance-based program of comprehensive record-keeping will be established with each farmer partner who is involved with the CA demonstration evaluations to document and calculate GHG emission reductions using index calculator tools such as COMET-VR 2.0, the Soil Conditioning Index (SCI) and the Soil Tillage Intensity Rating (STIR) that have been developed by NRCS. Ongoing findings of the program will be shared in public field days, workshops, and publications.

Research

A second critical component of this program will be targeted research aimed at developing and determining the specific GHG reduction potential of various 'next generation' or advanced sustainability practices. These systems will include, but not be limited to determinations of:

- The long-term potential of diverse, multi-species cover crop mixtures to reduce fertilizer application needs;
- The potential of high surface residue systems to reduce soil water evaporation and thereby decrease irrigation water pumping;
- The long-term potential of conservation agriculture systems to reduce herbicide, insecticide, nematicide, and fungicide use and the overall concomitant reduction in energy consumption involved with the fabrication of these materials;
- The capability of decision tools for waste, nitrogen and water management to improve application efficiencies and reduce GHG emissions.

Implementation:

Funds are requested of the AB32 Cap-and-Trade Auction Proceeds Program to enable the establishment of a coordinated program providing training, technical support, equipment, trouble-shooting, performance monitoring, and information dissemination to increase the adoption of conservation agriculture production practices in CV small grain and corn silage, tomato and cotton cropping systems as a means for reducing GHG emissions and improving air, soil, and water quality. The program will be developed and conducted by California's Conservation Agriculture Systems Innovation Center and will involve the following activities:

- Creation of a coordinated pool of rental and loan equipment for conservation tillage,
- Annual conservation agriculture farm demonstration evaluations in all CV counties,
- Web-based and locally-organized conservation agriculture information sharing networks on innovative systems,
- Initiation of a conservation agriculture information campaign throughout CV areas where these crops are produced, and
- Outcome and impact evaluation programs to be completed in 2015.

CASI's core executive planning group is made up of the following members:

Jeff Mitchell	University of California, Davis
Monte Bottens	California Ag Solutions, Madera, CA
Ron Harben	California Association of Resource Conservation Districts, Templeton, CA
Robert Roy	USDA Natural Resources Conservation Service, Fresno, CA
Dino Giacomazzi	Dairy farmer, Hanford, CA
Tom Barcellos	Dairy farmer, Tipton, CA
Anil Shrestha	California State University, Fresno
John Diener	Farmer, Red Rock Ranch, Five Points, CA
Steve Fortner	Farmer, Sun Pacific Farming, Firebaugh, CA
Dan Schueler	Senninger Irrigation Company, Clovis, CA
Alan Wilcox	Wilcox Agriproducts, Walnut Grove, CA
Jerry Rossiter	CISCO Ag, Atwater, CA
Fritz Durst	Farmer, Woodland, CA
Dan Munk	University of California, Cooperative Extension, Fresno County
Alan Sano	Farmer, Sano Farms, Firebaugh, CA
Jesse Sanchez	Farmer, Sano Farms, Firebaugh, CA
Michael Crowell	Dairy farmer, Turlock, CA
Robert Wample	Soil Technology Information, Clovis, CA
Jeannette Warnert	University of California Communication Services
Robert Roy	Area Conservation Specialist, USDA NRCS Fresno Area Office
Brook Gale	Area Conservation Specialist, USDA NRCS Fresno Area Office

Evaluation:

The outcomes, impact, and overall success of the project will be evaluated using the following measures or indicators:

a. Direct measurements of
    i. CA performance in each of the annual farm demonstration evaluations,
    ii. Participating farmer satisfaction, familiarity, experience with, and confidence in the likelihood to continue to use CA practices in the future using pre- and post- assessments of annual demonstration evaluations; and
    iii. Numbers of farmers participating in local education events and accessing web-based information.

b. Observations of
    i. Changes in acreage under different tillage management systems by our biennial CA acreage survey and
    ii. Changes in sales of CA equipment during the course of the project.

c. Surveys of
    i. Farmer attitudes and perceptions about their willingness to use CA practices.

AB32 CASI Proposal Logic Model

SITUATION	INPUTS	ACTIVITIES	OUTPUTS	OUTCOMES
Challenges and opportunities in the Central Valley	***What we invest:***	***What we do:***	***Products, services, and events intended to lead to the program's outcomes:***	***Knowledge gained, actions anticipated, and changes expected***
- farmers face increasing challenges and opportunities with respect to AB32 implementation - there are gaps in knowledge base related to long-term agricultural strategies to reduce GHG emissions, high quality soil management, and competitiveness - farmers have expressed need for information on alternative management, but robust, science-based recom-mendations are lacking - there is uncertainty about whether breeding and crop improvement advances may be "masking" soil quality degradation - need for improved and more efficient nitrogen management in the San Joaquin Valley	- a proven research and extension team - UC Davis students - established long-term study site at West Side Research and Extension Center in Five Points, CA - input and evidence of 'need' for this work gathered from our farmer surveys and interactions	- plan, conduct, and evaluate field demonstra-tions - provide training - hold two public field training events annually - create comprehen-sive web-based video and written information materials on project findings - develop four press releases annually ***Who we reach:*** - CV farmers - CV consultants - NRCS - CSU Fresno and UC Davis students - CV community college ag students - CASI – 1900 members - CV Grower Association-s	- two annual public field days - practical knowledge on GHG mitigation strategies and soil management for farmers - quantification of effects of different GHG emissions mitigation practices and soil management systems for CV farmers - web-based project findings summaries - UC Davis student training	- new, quantitative information and adoption program on GHG emission reduction practices and soil management impacts will be developed - increased understanding about possible extent of management impacts in CV cropping systems - new, improved methods for CV soil and crop management - increased adoption of these CA practices - increased carbon in soil - reduced fertilizer and pesticide use - Reduced irrigation pumping time - less dust generated - cheaper crop production systems

Formative evaluations will be conducted quarterly during the course of the project to assess on-going project activities through both formal benchmark gauging of progress on deliverables and lesser formal project group discussion aimed at improving the overall delivery of materials developed by the project and the ultimate success of farm demonstration evaluations. Summative evaluations (impact or outcome evaluations) will be done by holding annual assessment meeting in December of each year of the project WITH ALL PARTNERS to assess the project's success in reaching its stated goals. Basic questions that will be included in this evaluation will be:

- To what extent has the project met its stated goals of increasing the adoption of conservation tillage production systems?
- Has farmer learning been improved as a result of the farm demonstration evaluations?
- Have project educational materials been useful and effective to farmer audiences?

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UCDAVIS

VISION STATEMENT

Conservation Agriculture Systems Innovation (CASI)

Farming in California's Central Valley faces many economic and environmental challenges. A group of university academics, farmers, environmental groups, government and public agencies, and private industry formed Conservation Agriculture Systems Innovation (CASI) to develop improved agricultural production practices for California.

Through CASI's work to conserve resources and improve economically viable production systems, Central Valley agriculture can continue to be an economic engine for California, and a showcase for environmentally sustainable production methods.

March 2013

Conservation Agriculture Systems Innovation

Production efficiency | Sustainable environments | Vibrant farm economies

Toward Improved Conservation Systems

The Central Valley in California is a global center for agricultural production. The leading agricultural state in the U.S., California generates $40 billion per year in farm revenues, with its Central Valley producing 75 percent of the agricultural products.

Farming in the Central Valley benefits California and the U.S. by providing revenue, employment, and high-quality, nutritious food. However, challenges (and opportunities) to farming in the Central Valley, which are addressed by CASI, include:

- Water – water quality, quantity, seasonal availability, and groundwater contamination and depletion
- Air quality – particulates generated from agricultural production
- Climate change - emissions mitigation and expected impacts on agriculture
- Labor – uncertain labor availability impacts agricultural production
- Profitability – environmental and production costs reduce agricultural profitability
- Soil – degradation of soil quality with traditional agricultural practices

Conservation Agriculture Systems Innovation

CASI's research and educational initiative is aimed at developing and implementing agricultural conservation practices throughout California's Central Valley. By accelerating the adoption of conservation agriculture systems in California, agricultural profits can be boosted, and environmental systems can be improved.

CASI is located at the UC research center in Five Points, Calif., and managed through the University of California, Davis. CASI's executive and advisory boards, and 1,800 affiliates, are actively conducting on-farm research and demonstration projects throughout the Central Valley. In addition, CASI produces numerous educational programs (cropping system demonstrations, field days, videos, etc.) to educate the agricultural community about the benefits of improved conservation practices.

CONTACTS:

Dr. Jeffrey Mitchell
UC Cooperative Extension specialist and *UC Davis faculty member, Kearney Agricultural Research and Extension Center*

(559) 646-6565
jpmitchell@ucdavis.edu

Overarching Goals

1. Develop and deliver information on the economic and environmental benefits of conservation agricultural systems, and serve as a global clearing house.
2. Increase adoption of these systems to more than 50 percent of cropping acreage by 2028.
3. Partner with national and international conservation organizations to promote conservation agricultural systems.
4. Increase funding for conservation agricultural systems research, education, and adoption in California and beyond.

Short-term Goals

1. Establish the CASI research and education center for conservation agriculture in Five Points, Calif.
2. Develop field, workshop, and online training curricula on conservation agriculture systems for California producers, allied private sector agriculture support industries, public agencies, and the general public.
3. Conduct Central Valley-wide conservation agriculture demonstration evaluations.

Fritz Durst
1769 Woodside Dr.
Woodland, CA 95695

February 25, 2013

Ms. Shelby Livingstion, Chief
Climate Change Program Planning and Management Branch
Air Resources Board
1001 "I" Street
Sacramento, CA 95814

Dear Cal EPA:

Today I attended your Sacramento hearing for AB 42 and due to the huge participation was unable to give testimony regarding the direction of the research funds for the Cap and Trade program.

I would like to see some of the funding be directed to the Conservation Agriculture Systems Innovation Center, CASI. CASI is a group of over 1900 farmer, University, private sector, Natural Resources Conservation Service, and other public agency members who are working together to develop cropping systems and practices for California that advance sustainability both economically and environmentally.

I am a farmer of over 9000 acres that has been struggling to implement conservation tillage practices for over 30 years. My system has been refined to the point of greatly improved soils, yields and thus profitability. I am one of the few who has stayed the course to make these practices work, most farmers need to be shown how to implement new practices. That is where CASI has filled the roll of "teacher" to our industry.

Conservation tillage/planting can be a huge contributor to the reduction of greenhouse gasses. I have demonstrated an 80% reduction in the amount of fossil fuel required to produce one pound of grain on my farm. Heavy tillage has been eliminated allowing me to sequester, rather than emit soil carbon. Residue management has allowed me to keep a moisture retaining thatch on my fields reducing the amount of irrigation water applied, thus reducing energy required to pump water.

Please help CASI to further the research and demonstration to farmers for conservation practices. Allocate to them a portion of the funds designated by AB 32 for research for the reduction of carbon. California is a very unique place and we need to fine-tune our systems.

Sincerely,

FRITZ DURST

Fritz Durst

UNIVERSITY OF CALIFORNIA, DAVIS

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CASI will use these funds to increase the adoption of conservation agricultural systems. Broadly defined, conservation agriculture represents a set of principles and practices that include reduced soil disturbance, preservation of surface residues, diverse crop rotations, integrated pest management, single and multi-species cover crops, precision irrigation, and controlled traffic. These practices increase the environmental and economic sustainability of production systems because they require fewer inputs and reduce emissions and nutrient leakage. Use of these principles and systems is increasingly supported by research both in California and worldwide. It is this merging of these advanced sustainability technologies and their broader adoption within California that drives CASI's mission and goals.

CASI will use these funds for

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2. Research aimed at determining the specific GHG reduction potential of various sustainability practices. These systems will include, but not be limited to determinations of

    a. The long-term potential of diverse, multi-species cover crop mixtures to reduce fertilizer application needs;

b. The potential of high surface residue systems to reduce soil water evaporation and thereby decrease irrigation water pumping;
c. The long-term potential of conservation agriculture systems to reduce herbicide, insecticide, nematicide, and fungicide use and the overall concomitant reduction in energy consumption involved with the fabrication of these materials; and
d. The capability of conservation agriculture practices for waste, nitrogen, and water management to improve application efficiencies and reduce GHG emissions.

CASI's goals and objectives are very similar to those of the Natural Resources Conservation Service (NRCS). With the mission of "Helping People Help the Land," the (NRCS) provides products and services that enable people to be good stewards of the Nation's soil, water, and related natural resources on non-Federal lands. With our help, people are better able to conserve, maintain, or improve their natural resources. As a result of our technical and financial assistance, land managers and communities take a comprehensive approach to the use and protection of natural resources in rural, suburban, urban, and developing areas.

Please consider an allocation of cap-and-trade auction proceeds from the implementation of AB32 to support the programs and initiatives of the Conservation Agriculture Systems Innovation (CASI) Center.

Sincerely,

Curtis Tarver

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