

# Colusa Almond Project News

## SUMMER 2007: Cover Crops & Bees

### The Colusa Almond Project: *Helping growers protect their natural resources*

Runoff from almond orchards along tributaries to the Colusa Basin Drain in Colusa County contains sediment and pesticides. The Colusa Basin Drain flows into the Sacramento River. Best Management Practices (BMP's) such as cover cropping, insectary hedgerows, grassed swales, and stream-bank stabilization could significantly reduce contaminated runoff. CAFF and the Colusa County RCD have found that farmer-to-farmer information exchange is the most effective way of changing agricultural management. In this project, we will work with local almond growers to implement BMP's and demonstrate their effectiveness to other growers.



#### Goals of the Almond program:

- Assist Colusa County almond growers in implementing biological farming practices that reduce pesticide applications on and erosion from orchards.
- Determine the effects of reduced pesticide use and erosion control practices on runoff from almond orchards.
- Demonstrate and disseminate BMPs and water quality impacts to almond growers and agricultural advisors in Colusa and Glenn counties.
- Build the capacity of local agri-

*Continued on Back Cover*

## Cover Cropping: a little background

The use of cover crops continues to increase as farmers seek to improve soil quality and reduce chemical inputs. Research and grower experience have shown that cover crops can provide multiple benefits related to soil protection, soil fertility, groundwater quality and pest management. Choosing the right cover crop is critical.

Cover crops may include resident vegetation, seeded plants, or combinations of the two. Seeded cover crops often include legumes (clover, medics, and vetch), and grasses, such as cereal grains. Resident vegetation includes plants that most people consider weeds.

#### Benefits:

Cover crops play an important role in successful farming systems. The main purpose of a cover crop is to

benefit the soil and following crops, but it is not intended to be harvested for feed or sale. Some of the primary benefits from cover crops include:

- Soil quality improvements—Soil tilth is improved whenever a plant establishes roots and grows into compacted areas. Water infiltration is improved as well. When the soil surface is bare for a period of time, it tends to seal and water will run off.
- Cover crops protect the soil surface and reduce sealing. Also, beneficial organisms in the soil, such as earthworms, thrive when fresh plant material is decomposing. Organic matter levels tend to improve under cover crops.
- Erosion control—Cover crops reduce water and wind erosion on all types of soils. Holding the soil

in place during the fall, winter, and early spring, loss of soil from erosion is greatly reduced.

- Fertility improvements—Legumes can add substantial amounts of available nitrogen to the soil. Non-legumes can be used to take up excess nitrogen from previous crops and recycle the nitrogen as well as available phosphorus and potassium to the following crop.
- Suppress weeds—A dense stand of a winter cover crop can suppress weeds by soil shading and competition for water and nutrients.
- Insect control—Beneficial insects, such as lady beetles or ground beetles, may be encouraged by planting cover crops.

#### Sources:

Ohio State University Fact Sheet. Department of Horticulture and Crop Science.

## Almond Grower Field Day

About 15 growers attended the Almond Grower Field Day on Wednesday, June 20, at Drew Scofield's Brush Creek Ranch in Arbuckle. Sponsored by CAFF and the Colusa County RCD, the event featured valuable information about cover crops for almond orchards and the health and vitality of the local bee industry.

Fred Thomas of CERUS consulting presented information on the potential benefits and drawbacks of using cover crops in Colusa County orchards. Benefits that growers could possibly achieve with cover crops are

- Improved soil structure and water infiltration
- Improved orchard access on wet soils
- Improved weed suppression
- Improved beneficial insect habitat
- Addition or conservation of nitrogen
- Addition of organic matter to the soil
- Reduced soil erosion and nutrient runoff

Depending on specific orchards conditions, the following are potential drawbacks of cover crops:

- Cost for seed
- Increased management
- Increased water use
- Competition for soil moisture and nutrients
- Increased frost hazard
- Increased vertebrate pests

Fred introduced four possible cover cropping mixes that are commonly used in almond orchards: an organic

builder with grasses and legumes puts down deep and fibrous roots to break up the soil and improve organic matter; plowdown legumes including bell beans and vetch to maximize the nitrogen benefit while building organic matter: perennial cover is a sod of grasses or clovers that requires summer irrigation and mowing, and non-tillage clover—a mix of annual clovers the reseeds itself each spring. Fred noted that given the drip irrigation and other conditions in Colusa County, the annual mix is usually the most appropriate here. He described how with good management most of the drawbacks could be avoided.

Fred formulated the following mix for this area:

### Colusa County Almond Cover Crop Mix

Hykon Rose Clover	20%
Santiago Burclover	20%
Nitro Persian Clover	20%
Dalkeith Subclover	15%
Antas Subclover	15%
Crimson Clover	10%



Patrick Kalfsbeek, a local beekeeper, presented information about threats to bee populations in almond orchards and led a discussion of other challenges facing beekeepers in Colusa County. While Colony Collapse Disorder has not been identified in Colusa County, there is concern in the local farming community about loss of bees. Patrick does not have a definitive answer to why bees are dying in other areas, he explained that many problems arise from basic bee hive care. With poor maintenance of the hives, bees will often show signs of decline and can fail. Off-season feeding of bees is essential to thriving colonies. Patrick also talked about the connection between current collapse and the Varroa mite problem. He explained that Varroa mites are external parasitic mites that attack honey bees and can only reproduce in bee colonies. They can certainly be named as one of the culprits of the current colony collapse.

A significant challenge that Patrick regularly faces is finding good locations for hives when almonds or other crops are not needing pollination. He puts considerable effort into maintaining good relationships with local landowners with suitable habitat.



Cover crop expert Fred Thomas, of CERUS Consulting, presenting cover crop information at Field Day, June 20.

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## Colony Collapse Disorder FAQ's:

**What is CCD?** Colony Collapse Disorder (CCD) is the name that has been given to the latest, and what seems to be the most serious, die-off of honey bee colonies across the country. It is characterized by, sudden colony death with a lack of adult bees in front of the dead-outs. Honey and bee food sources are usually present and there is often evidence of recent brood rearing. In some cases, the queen and a small number of survivor bees may be present in the brood nest. It is also characterized by delayed robbing (taking of honey and bee bread by other bees) and slower than normal invasion by common pests such as wax moth and small hive beetles.

**What causes CCD?** Although there is much attention being given to this situation, it is not yet clear what is causing the die-off. From two intensive surveys of many of the beekeepers involved, some potential causes have been eliminated and others have been identified as important to investigate. However, at this point it does seem likely that a number of factors may be involved.

**Who is being impacted?** As of February 2007, many of the beekeepers reporting heavy losses associated with CCD are large commercial migratory beekeepers, some of who have lost 50-90% of their colonies. Surviving colonies are often so weak that they are not viable pollinating or honey producing units. Losses have been reported in migratory operations wintering in CA, FL, OK, and TX.

**When was it first discovered and how long has it been going on?** The first "report" of CCD was made in mid-November 2006 by a Pennsylvania beekeeper over-wintering in Florida. Soon after the initial report, other migratory beekeepers reported heavy losses of colonies under similar circumstances.

**The beekeeping industry has experienced heavy losses of colonies in the past. Is this something new?** Symptoms similar to CCD have been described in the past, and heavy losses have been documented. Whether or not the current die-off is being caused by the same factors that caused heavy losses in the



past or if new factors are involved is not yet clear.

### How do I know if a colony has CCD?

- The complete absence of adult bees in the hive, with no or little build-up of dead bees in the hive or at the hive entrances.
- The presence of capped brood.
- The presence of food stores, both honey and bee bread, which is not immediately robbed by other bees. Invasion of common hive pests such as wax moth and small hive beetle is noticeably delayed in dead-out equipment left in the field.

### What are the early signs of CCD?

- There is an insufficient workforce to maintain the brood.
- The workforce seems to be made up of young adult bees.
- The queen is present, appears healthy and is laying eggs.
- The cluster is reluctant to consume feed provided.
- Foraging populations are greatly reduced/non-existent.

### What has been eliminated as a potential cause of CCD?

While these items have been removed from our list of "causes" they may increase the risk of developing CCD.:

Feeding: The practice of feeding was common to most of the beekeepers interviewed and surveyed who experienced CCD. Some feed HFCS, others sucrose however, some did not feed.

Chemical use: While most used antibiotics, the type, frequency of application, and method varied. Most beekeepers had applied a miticide treatment during 2006. The products used and method of application varied.

Use of bees: Some beekeepers reported that their bees were used primarily for the production of honey, while others received most of their income from pollination contracts. Some produced honey and used their colonies for pollination.

Queen Source: All beekeepers purchased at least some queens throughout the year. Some beekeepers reared the majority of their own cells, but most bought either mated queens or queen cells. Queens were bought from at least 5 different states (FL, CA, TX, GA, HI) and 2 foreign countries (Canada and Australia).

### What potential causes of CCD are being investigated?

- Chemical residue/contamination in the wax, food stores and bees.
- Known and unknown pathogens in the bees and brood.
- Parasite load in the bees and brood.
- Nutritional fitness of the adult bees.
- Level of stress in adult bees, indicated by stress induced proteins.
- Lack of genetic diversity and lineage of bees.

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comes. Partners in this project include: Colusa County RCD, NRCS, Audubon, UC Davis Agriculture GIS labora-

• Coordinate the efforts of a wide variety of organizations whose expertise will improve local environmental out-

• Measure water quality improvements resulting from implemented BMP's.

filter strips, streambank stabilization, insectary hedgerows and intensive pest monitoring.

• Work with Colusa County almond growers to implement practices on their farms that demonstrate bio-intensive

IPM (Integrated Pest Management) and ecological restoration principles, including cover cropping, grassed swales,

Features of the program:

cultural and environmental organizations to address water quality issues.

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