ALMOND ENVIRONMENTAL STEWARDSHIP

JUNE, 2004 • VOLUME 1, ISSUE 2

Air quality challenges met by Valley almond growers

Industry research fine-tunes dust control...

by Marni Katz
Special to the Almond Board of California

The sweet smell of molasses drifts off the unpaved access road to Tom Steffen's 200 acre almond orchard in Fresno County. This spring, Steffen tank-mixed a lightweight solution of molasses with the water he uses to spray down the orchard perimeter's dirt roads. The molasses forms a sticky coating that suppresses dust long after the water has dried.

Steffen says the molasses is a cheap, environmentally friendly and downright pleasant solution to prevent dust from rising off the perimeter dirt road. And it's just one of nearly a hundred dust-control solutions growers might consider in complying with new regulations that require them to reduce their dust emissions in and around the orchard.

California almond growers face challenges on three air quality fronts:

- Burning brush piles, orchard removals and prunings.
- Controlling emissions from internal combustion engines.
- Controlling particulate matter known as PM^{10} or as it is more commonly known-dust.

Beginning in 2005, growers will be required to move away from burning brush piles, orchard removals and prunings. General burning will phase out on July 1, 2005. Burning orchard removals ends July 1, 2007; and harvested prunings cannot be burned after July 1, 2010.

All almond growers who operate diesel or natural gas fired engines within the eight-county San Joaquin Valley Air Pollution Control District must obtain permits to operate and pay a filing fee by July 1 if their NO^x or VOC emissions from those internal combustion engines exceed 12.5 tons.

photo by Marni Katz

Almond grower Tom Steffen says the molasses and water mixture helps keep dust down on his unpaved access roads.

Finally, the recently enacted state law SB700 requires all almond growers with 100 or more contiguous acres to file a Conservation Management Practices (CMP) plan that demonstrates their individual emission reduction efforts in each of the following five categories: land preparation; harvest; unpaved roads; unpaved equipment yards; and other. While CMP plans are not due until Dec. 31, the practices must be in place by July.

Gene Beach, a Merced County grower and president of the Almond Hullers and Processors Association, says almond growers share a common concern about air quality in the Valley. "Our families live here and breathe the air every day," he says. "We have a real commitment to doing our fair share to clean up the air for the benefit of our friends and neighbors. We've been leaders for years in this arena and we plan to continue to be known as innovators when it comes to cleaning the air."

That strong commitment goes beyond just talk, points out Beach: "Through the assessment that growers pay on each pound of almonds they grow, they help fund research through the Almond Board of California that is cataloging emissions from almond farming and looking at ways to further reduce emissions."

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The current emphasis on controlling dust from agricultural operations is spotlighting the almond industry's ongoing air quality practices and the industry's strong tradition of conducting scientific research with the University of California.

UC Cooperative Extension Fresno County Farm Advisor Mark Freeman says that while the requirements of filing a CMP plan at first appear daunting, it is likely many growers and almond harvesters are either already implementing many practices that can help them reduce dust emissions in at least some of the five areas, or could easily change their farming and harvesting operations to comply with the CMP plan requirements.

"It means growers are going to have to spend a little bit more time doing what they are already doing," Freeman says. "We're not talking about steps that are real drastic. It's just being conscientious, like going the right speed recommended for the harvester or leveling back down the crown left from harvesters the previous year."

The purchase of new harvesting equipment within the last five years or so would likely qualify as a CMP plan improvement, as would managing the floors to avoid digging harvesters or sweepers into the dirt. Reducing tillage with mowing or flailing qualifies as a conservation management practice, as does leveling out windrows and chemical mowing.

Steffen, who also does custom harvesting for neighboring almond growers, says simple steps such as leveling the ground prior to harvest and aligning pickup and sweep machines properly so that they just sweep nuts off the top of the surface can help reduce PM^{10} emissions considerably.

"A lot of guys run their harvesters too deep trying to get every single nut," Steffen says. "But if you adjust the height properly, you don't get as much dust in the equipment and you don't sacrifice very many nuts either."

Steffen uses an orchard float right after harvest while the ground is good and dry to finish the middles so they are completely flat before the next season begins.

Steffen also says that existing practices such as integrated pest management and micro-irrigation help reduce dust emissions simply by reducing the number of passes through the orchard.

photo by Marni Katz

Steffen says harvesters should adjust equipment properly and drive at the right speed to minimize the amount of dust almond harvesters and sweepers kick up during harvest.

"Many growers use these practices," he says. "So, these new regulations really aren't anything new to almond growers. It's really all about using common sense out in the orchard."

Some of the other practices that qualify in the CMP for nut crops include conservation tillage, chemigation and fertigation, IPM, night farming, precision farming, cover crops, and wind barriers. A series of workshops were held in late May and June to help growers navigate a CMP plan for their orchards as well as calculate whether or not they need to apply for a local permit to operate from the air district.

As growers prepare to deal with this flood of new regulations, the Almond Board of California is taking the lead by funding production research that will give growers a stronger footing as they address air quality issues.

"As growers grapple with how to meet the increasing regulatory requirements related to air quality, it is important the Almond Board continue funding research that puts more practical knowledge, tools and resources in their corner to help them comply," says Chris Heintz, research director for the Almond Board of California.

The Almond Board recently approved nearly $500,000 for research programs dealing with a broad range of environmental issues facing the California almond industry, and air quality this year is among the issues that top the list.

One key ongoing project will help accurately assess the amount of PM10^{s} currently being emitted during almond harvesting procedures using conventional and modified harvesting equipment. The study will assess the quality of baseline PM^{10} emission factors from pick-up operation of almonds for use in PM^{10} emissions inventories.

In addition, a newly funded study will investigate commercially-available sensors for measurement of airborne particulate matter and develop a calibration method to compare in-line sensing of generated dust with established filter deposition measurements. Ultimately the goal of this project is to develop an in-line, real-time sensor, mounted on a machine during operation, and to instantaneously estimate the dust generated and discharged by almond harvesting equipment.

Another study funded for next year's crop season will contribute scientifically based information to the development of CMPs and options for growers. One aspect of that study is to identify differences in emissions based on a range of factors including soil types.

Additionally, the Almond Board has demonstrated its commitment to air quality concerns by funding ongoing research on alternatives to burning, such as studying the benefits of chipping almond brush, and minimizing emissions from soil fumigant alternatives to methyl bromide.

Innovation is the key in air quality solutions

Tradition has been a byword of the California almond industry for nearly a century. But as air quality issues rise to the forefront of public concern, it is the industry's well-established knack for innovation that is helping to produce practical solutions.

On the surface, growing almonds appears fairly routine. The growing cycle doesn't change-from the development of the tiny bud in the fall, through its winter dormancy, until the first warm weather of February coaxes the first buds into bloom. The harvest season, which lasts from August to October, has evolved from the brandishing of large wooden poles to knock the nuts from the trees to today's impressive array of mechanized harvesting equipment. Mechanical tree "shakers" knock the unshelled nuts to the orchard floor, where they dry before they are swept into rows by "sweepers" and then hauled off in carts to be towed to the hulling operation.

This efficient form of mechanization is invaluable at harvest time. But as the state's vast Central Valley, nestled between the Sierra Nevada mountains and the Pacific Coast Ranges, faces increased concern over air quality, the California almond industry's harvest equipment manufacturers and the Almond Board of California are turning to innovation to meet the challenges posed by high velocity discharge emissions.

One of the almond industry's innovators is orchard manager Doug Flora of Golden Valley Ag, headquartered in Stanislaus County. He is farming the same acres his great grandfather farmed and plans to pass on the same opportunity in California agriculture to his children. Notwithstanding this tradition, he helped start create Exact Corp, a company that designs and manufactures innovative harvesting equipment that will reduce orchard dust. Exact Corp has developed a harvester with a patented regenerative air system that eliminates high velocity discharges by recirculating the air that is often at the root of orchard dust problems.

"Our generation strives to be better stewards of the land so we need machines that are as effective as the old system but more efficient and with less environmental impact," says Flora. "We've put considerable financial resources and 25 years of farming experience into the research and development for this equipment and farmers are very excited about the improvements." Flora explains, "Our developments in harvesting machinery do not require a change in cultural practices in the orchard. Farmers can continue to farm successfully if we give them innovative and effective tools to farm with."

Several manufacturers are working with the University of California, Davis and other agricultural universities to develop more environmentally progressive machinery and to measure the results with scientific data.

Larry Demer, general manager at Weiss McNair Ramacher in Chico, California, is quick to point out that concern for the environment is not a new focus. For over 20 years Weiss McNair Ramacher has been developing patented systems that address dust issues. According to Demer, "The challenge for today's harvesting machines is that they need to handle greater capacity and at the same time create less dust." In addition to developing machinery, Weiss McNair Ramacher works with growers on implementing growing and harvesting practices that limit dust.

Flory Industries, a harvesting equipment manufacturer in Salida, California, has been producing nut-harvesting equipment since 1961. "Flory Industries and the almond industry have addressed the challenge of dust control in nut harvesting equipment long before regulations were a reality," says Norm Layman, engineering manager at Flory Industries. "Beginning in 1994, we and several other manufacturers participated in an industry advisory group to begin considering ways to reduce dust in harvest. Our engineers have always developed improvements based on input from farmers and end users who have first hand experience with the challenges."

Says Layman, "The industry needs to continue to work with farmers to deliver tools that are environmentally sound and at the same time allow them to keep up with the demands of harvesting."

Gene Beach, a Merced County grower and president of the Almond Hullers and Shellers Association, says he enjoys working in the almond industry because the farmers are constantly working to improve their operations. "I get such a charge going over to a grower's farm and having him show me his latest improvement that will reduce dust or improve crop quality," he says. "There is a very real and personal commitment growers make to these improvements because they and their families live here and are concerned about the air they breathe."

photo courtesy of Exact Corp.

Reducing dust emissions by eliminating high velocity discharges is the goal of equipment such as this sweeper displayed by Doug Flora, Golden Valley Ag, and his sons Grant and Justin.

Thirty years of research, funded by assessments paid on every pound of almonds harvested, has led the almond industry's innovations over the years. "For this crop year, the Almond Board has approved nearly $500,000 for research programs dealing with a wide variety of environmental issues," points out Chris Heintz, the Board's director of production research and the environment. "This industry is very strongly committed to the concept of gathering the scientific data needed to deal with today's complex environmental issues."

Harvest equipment manufacturers have made presentations to the Board's Environmental Committee to keep them informed of their innovative approaches to dust control, notes Heintz. "By partnering with growers and harvest equipment manufacturers, the Board and the industry are taking solid steps to find innovative solutions to the air quality concerns that we all have," says Heintz. "The almond industry has been an important part of the Valley throughout this century and is looking forward to helping growers pass this land on to the next generation for its enjoyment."

Air quality regulations of importance to almond growers

New rule and regulations dealing with farming practices in the San Joaquin Valley (SJV) took effect July 1. Here is what almond growers need to know:

1) Conservation Management Practices (CMP) Plans
   a. The SJV Air Quality Control District requires all farmers with 100 or more contiguous acres to implement and file CMP plans with the district.
   b. Growers must implement one farming practice in each of five categories to help reduce PM10 emissions. Growers are able to substitute an extra farming practice in one of the five categories in order to complete their CMP. Dust control practices must be implemented by July 1, 2004. The CMP plan must be filed by Dec. 31, 2004.

2) Title V local permits for NOx or VOC emissions
   a. All farms within the eight-county SJV Air Pollution Control District must obtain permits to operate if their annual NOx or VOC emissions exceed 12.5 tons.
   b. Local permits must be filed by June 30, 2004
   c. Calculated emissions must encompass all natural gas and propane engines, as well as both stationary and portable internal combustion engines (excluding tractors.)
   d. Filing fees and regulatory requirements will be required with the application for operations exceeding the 12.5-ton threshold.

3) SB700 Deadlines for burning prunings or brush piles
   a. General burning phases out July 1, 2005.
   b. Burning orchard removals ends July 1, 2007
   c. Prunings cannot be burned after July 1, 2010.

Workshops were held in late May and early June to assist almond growers with new air quality reporting and permitting requirements. For those growers who did not attend a workshop, the California Air Resources Board created a website to help producers determine if their operations fall under the new rules. Located at http://www.valleyair.org/farmpermits the web-based "calculators" will assist producers in determining if they are required to file a CMP plan or obtain air permits.

Inside...
Almond growers implement methods to improve air quality.

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