

Improving Particulate Matter (PM₁₀ and PM_{2.5}) Emissions from Almond Sweeping and Harvesting Operations

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PROJECT SUMMARY

This summary covers reports from the most recent year of PM₁₀ measurements by the TAMU group, as well as a report by Brock Faulkner analyzing the 8 years of PM₁₀ emissions factor work in almonds.

Objectives for year:

- Evaluate the effectiveness of reduced-pass sweepers for reducing PM emissions from almond sweeping operations relative to conventional sweepers.
- Evaluate the effect of reducing harvester separation fan speeds on PM emissions from almond conditioning operations.
- Identify changes in composition of windrowed materials and conditioned almonds based on sweeper treatment and harvester separation fan speed.

Objectives for overall project:

- Develop revised PM emissions factors for almond harvesting.
- Develop better methods for measuring PM emissions factors in agricultural settings.
- Summarize data from eight years of almond dust emissions research and provide basis for the San Joaquin Valley Air Pollution Control District and California Air Resources Board to revise emission factors for almond harvest operations.

Background:

Fine particulate matter (dust) less than 10 microns (PM₁₀) and less than 2.5 microns (PM_{2.5}) contributes to poor air quality, especially in the San Joaquin Valley. Based on very limited data,

the Air Resources Board found almond harvesting was the largest agricultural source of PM₁₀ dust in the SJV.

Initially Robert Flocchini's group at UC Davis undertook studies to re-evaluate the PM₁₀ emissions factor from almond harvesting using a LIDAR-based system. In 2004 TAMU joined the project and compared a dispersion modeling system to the LIDAR. The two methods provided comparable results with the dispersion modeling system much easier to work with in the field.

Work by Ken Giles's group (09-AIR1-Giles) at UC Davis provided guidance on which dust reduction measures to pursue in the emission factor effort. Brock Faulkner (09-AIR7-Faulkner) wrote a report summarizing the findings of 8 years of PM factor research.

Discussion:

Reduced-pass sweepers showed the potential for reducing PM emissions and demonstrated nut recovery comparable with conventional sweeping.

The review of the 8 years of research found that the PM₁₀ emission factor for almond harvesting should be reduced by 40% from the current factor in use. The data has been submitted to California air regulators for their review.

The research also found that PM_{2.5} levels were so low that no real measurements could be made, indicating that PM_{2.5} is not a large part of agricultural dust.

Project Cooperators over 8 years: Theresa Cassel, Robert Flocchini, Ken Giles, UC- Davis; Mike Flora, Flory Industries; Barry Goodrich, TAMU; Paramount Farms; Gerry Rominger; Charles Krauter, CSU-Fresno; Doug Flora, Exact Harvest

For More Details, Visit

- 2009-10 Annual Report CD (09-AIR3-Capareda and 09-AIR7-Faulkner); or on the web (after January 2011) at AlmondBoard.com/ResearchReports
- Related Project: 09-AIR1-Giles