Improving PM Emissions from Almond Sweeping and Harvesting Operations

Project No.: **08-AIR3-Capareda**
(Continuation of Project 07-ENVIR10-Capareda)

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Objectives:

The objectives of the proposed work are as follows:

1. To determine the PM_{10} and $PM_{2.5}$ emission factors for sweeping and harvest operations with proper and improper implement adjustment.
2. To determine the amount of dust collected by the harvesting machine which is brought to the huller and compare with the potential dust particles on the windrow samples.

Interpretive Summary:

The overall goal of this project is the continued update and improvement of PM_{10} emission factors for almond harvesting operations as well as evaluation of potential mitigation options. The highlight of this year's work is the understanding of the PM_{10} emission factor for sweeping and pickup operations as affected by the depth adjustment of the sweeper head. Emissions from sweeping and pickup operations were monitored for plots in which the sweeper head was adjusted properly (i.e. per manufacturer's specification) as well as plots in which the sweeper was set to have one-half inch ground interference from the metal teeth. In addition, comparisons were made on the amount of dust collected by the harvesting machine with those from the windrow samples as a function of sweeper setting.

Materials and Methods:

Sampling was conducted during harvest of Nonpareil varieties in Arbuckle, California, in August 2008. Downwind and upwind sampling locations were used to measure the net increase in particulate matter (PM) concentrations using total suspended particulate

(TSP) and federal reference method (FRM) PM_{10} samplers. Two treatments were used to determine the effects of a possible conservation management practice. The first treatment was a control in which the sweeper head was adjusted as recommended by the manufacturer. The second treatment consisted of adjusting the sweeper head so that one-half inch ground interference occurred between the metal sweeper teeth and the orchard floor. Test plots consisted of ten tree-rows, and samplers were moved between plots. Subsequently, dispersion modeling was used to determine the emission flux from the source of interest. True PM_{10} and $PM_{2.5}$ emission fluxes were determined using particle size analysis of the TSP samples along with FRM PM_{10} fluxes. The fluxes were then annualized to create emission factors for almond sweeping and harvest operations. Emission factors between treatments were also compared.

Dust samples collected from windrow samples and from the harvesting machine were analyzed using a RoTap machine with staged siezes to compare the potential amount of dust carried by the harvester to the huller.

Results and Discussion:

Filters have been conditioned and post-weighed. Particle size distribution analyses are currently being conducted. Dispersion modeling runs have been completed to determine unit flux concentrations, which will be used to determine emission fluxes and emission factors once gravimetric and PSD analyses are completed. Sieving analyses are also in progress.