19TH ANNUAL ALMOND RESEARCH CONFERENCE, 12/3/91

Project No. 91-Z12 - Air Quality Aspects of the Production of Almonds

Project Leaders: Dr. Robert G. Flocchini (916) 752-1460 or 3607
Dr. Thomas A. Cahill (916) 752-4674 or 1120
Air Quality Group
Crocker Nuclear Laboratory
University of California
Davis, CA 95616-8569

Cooperating Personnel: Robert T. Matsumura, Project Manager (916) 752-4186
Omar F. Carvacho, ZhiQiang Lu, Kyle Noderer, Sandra Berry, Bennett Corrado

Objectives:

1. Quantify PM-10 aerosols due to harvest operations, both inside and outside (downwind) of an almond orchard.

2. Identify harvest operations generating the most PM-10 aerosols and their primary means of production.

3. Resolve the size and species composition of dust from almond harvesting to help isolate their sources of PM-10 aerosols.

Summary:

The California Central Valley has persistently elevated levels of fine, inhalable aerosols as measured by California Air Resources Board PM-10 aerosol samplers. PM-10 stands for Particulate Matter below 10 micrometers (about 1/100 the thickness of a human hair) which can be ingested deep into the human respiratory system posing potential health affects. Under the National Clean Air Act and their amendments as well as the California Clear Air Act, Air Pollution Districts violating national and state standard levels will have to form plans and regulation reducing PM-10 levels. To help address these tasks, the role of California agriculture needs to be understood. The U. C. Davis Air Quality Group has undertaken the project of measuring the impact of agriculture operations on PM-10 levels. The operations of almond harvesting - shaking, windrowing (sweeping), and pickup - have been the focus of our research for the Almond Board in 1990 and 1991.

From our 1991 study near Fresno, the pickup operations generated the most PM-10 aerosols. Pickup is the last harvest operation performed, after the ground surface has been abraded by sweepers and tires. Downwind PM-10 concentrations from sweeping were second highest, about half of harvest pickup, while the shaking operations generated far less dust than either of the operations (almost negligible when measured 200 yards downwind of an orchard unless the outer edge rows were shaken).

The amount of PM-10 material which escapes an almond orchard can be greatly affected by soil type and conditions, machinery used (especially air blowers), the amount of tree canopy, meteorological conditions, etc. as well as harvest practices themselves. This year we have identified the harvest operations producing the most PM-10 from one typical set of orchard conditions (inside and downwind) so an appropriate level of effort can be put into finding effective ways of minimizing PM-10 aerosols from each almond production operation.