**Condition Change: UC ANR contributed to improved air quality**

**Issue**

More than 90% of Californians breathe unhealthful sometime during the year. California’s San Joaquin Valley is home to 10% of the state’s population and has some of the most polluted air in the United States. This pollution causes 1,300 premature deaths per year, as well as asthma attacks, emergency room visits, and lost school and work days costing valley residents $11 billion each year. California has been at the forefront of developing ways to mitigate air pollutant concentrations and the impacts of existing air pollution.

**Methods**

UC ANR partners with public, governmental, and private groups to extend new knowledge and develop agricultural management practices to improve air quality.

The UC Agriculture Experiment Station scientists at the UC Davis location are examining nitrogen spillovers from agriculture fertilizers to the air, by tracing nitrogen oxides and nitrous oxide gases in the air. The data will aid resource managers in designing regulations to guide proper management of nitrogen that improves nitrogen efficiency at the farm-scale, and reduces the social costs of excess nitrogen in the environment (Benjamin Houlton). Another project has focused on measuring nitrogen oxide emissions from soil in the Central Coast mountains to understand natural soil emissions in unmanaged landscapes. This type of monitoring will improve understanding for national and regional regulations of greenhouse gases and air pollutants (Ian Faloona).

University of California Cooperative Extension (UCCE) scientists identified how to safely and more efficiently spray pesticides in almonds to reduce the loss of spray evaporating into the air. The research found that when temperatures were high and humidity low, spray deposition in the upper canopies of large trees was reduced by 50% versus spraying early in the morning at cooler temperatures and higher humidity. Results along with general best management practices for spraying were extended directly to growers inside and outside the region through newsletters and twenty grower talks (Franz Niederholzer).

UCCE scientists research by testing a steam machine as an alternative to soil fumigants to reduce plant diseases at strawberry fruiting fields and in strawberry nurseries. UCCE scientists tested soil disinfestation of strawberry fields using a steam machine that covers a 10 foot-wide swath and treats soil with steam to a depth of twelve inches. Research findings were shared through popular articles and presentations (Steve Fennimore).

UCCE provides research and science-based information to support policy development on a variety of issues. The California Air Resources Board funded a UC ANR research team to improve the methodology to estimate greenhouse gas emissions on dairy facilities and promote understanding within the regulatory community of the diversity of dairy management practices. Research identified the practices that have been implemented on dairies to reduce methane emissions. Previous estimates indicated that 2.2 million metric tons of greenhouse gas emissions have been reduced annually, which is approximately 25% of the 2013 levels, or more than halfway to the state’s 2030 goal of a 40% reduction. Information on management practices was used to improve the existing estimates of emissions reductions to date (Deanne Meyer, Betsy Karle, Jennifer Heguy, and Peter Robinson).

As a result of UC ANR research, outreach, and education, participants learned and adopted practices that lead to improved air quality. Outcomes with specific measured indicators follow.

**Outcomes**

**Participants intend to adopt optimal use practices and pesticide alternatives.**

* The finding that strawberry plant production in steam treated soils was the same as plant production in soils treated with methyl bromide/chloropicrin has caught the interest of the strawberry nursery industry, and they expressed intent to explore steam on a commercial scale. (Steve Fennimore)

**Participants adopted optimal use practices and pesticide alternatives.**

* In response to relaying best management practices for spraying, the use of 10 PM to 10 AM spraying is becoming more common in almond orchards around California during late spring and summer. As a result, growers are increasing spray coverage and reducing pesticide loss into the air, contributing to improved pest control and improved air quality. (Franz Niederholzer)

**Science-based information was applied to air quality policy and decision making.**

* The California Air Resources Board is using the activity-based information on dairy management practices as they refine their greenhouse gas inventories. The inventories will be used to determine if the targeted emissions reductions are being achieved, are likely to be achieved, or if mandatory reductions will be required. (Deanne Meyer, Betsy Karle, Jennifer Heguy, and Peter Robinson)

These measured outcomes demonstrate the state’s ability to identify practices to reduce pollution from pesticides. This type of research and extension can lead to reductions in toxic air contaminants from pesticide use. For example, from 2016 to 2017 there was a 2.9 million pound reduction in the toxic air contaminants from pesticides in California. In these ways, UC ANR contributes to improved air quality and the public value of promoting healthy communities.