Avoiding Pesticide Drift Impacts on Organic Farms

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PESTICIDE DRIFT

Pesticide drift occurs when pesticide dust or droplets move to any site other than the target area. Several factors increase the risk of pesticide drift occurrence, including small droplet size and windy conditions. Pesticide drift is a problem in agricultural areas and residential areas where pesticides are applied, as pesticides contain chemicals that pose risks to human health and environmental quality.

Pesticide drift can occur as spray drift at the time of application, or as post application drift after it has been applied. Certain pesticides have higher risks of drift, especially fumigants, which are volatile gases that move easily through air and soil (CDPR, 2013). Conventional agriculture that is reliant on synthetic pesticides can have negative consequences for the environment and neighboring organic farms.

In California, there have been 880 reported illnesses caused by agricultural pesticide drift from 2010-2014 (CDPR, 2017). These incidents most commonly affected field workers. Drift occurred from pesticides applied to many different crops such as strawberries, grapes, pistachios, leafy greens, oranges, and corn, and from different application methods including fumigation, ground spraying (Figure 1), and aerial spraying (CDPR, 2017). The Central Coast of California has experienced several drift incidents that have affected groups of farmworkers in 2017. In June 2017, there were two pesticide drift incidents, one in Monterey County and one in Santa Cruz County, which led dozens of farmworkers to fall ill (Goldberg, 2017). Incidents such as these in California and elsewhere highlight the importance of education and policies that protect human health from pesticide drift.

Spray drift is a public health concern and a concern for organic farmers who suffer negative consequences should their organic fields become contaminated by pesticide drift. This report is an introduction to the topic of spray drift and organic farming, with recommendations for how both organic and conventional growers can reduce pesticide drift impacts.

Figure 1. Pesticide application (Photo from USDA).

BACKGROUND ON ORGANIC FARMING

Organic agricultural producers face unique challenges, including managing weeds, diseases, and pests without pesticides and only using approved organic methods. Organic agriculture uses methods that protect the environment, avoiding the use of synthetic pesticides and fertilizers, antibiotics, and genetically engineered crops. Because organic farmers cannot use synthetic pesticides to control weeds and pests, they must rely on practices that holistically promote agroecosystem health and protect against pest infestations and soil degradation. Careful organic management includes:

- Selecting varieties suited for local soil, pest, and weather conditions.
- Managing the soil fertility specific to the past and present conditions of the land.
- Using rotations and crop diversity to protect against crop diseases and pests (Figure 2).

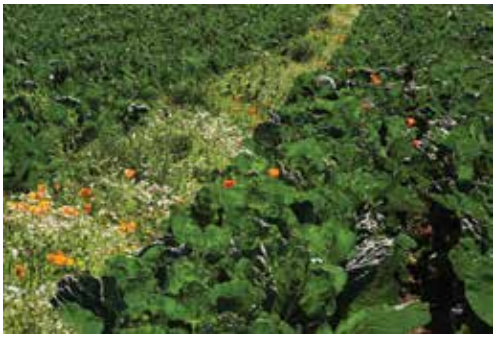

Figure 2. Riverside organic farm with flowers planted to attract beneficial insects (Photo from Lakeside Organic Gardens).

Organic methods, free from synthetic pesticide use, have many benefits for the environment, surrounding communities, and farm workers.

Organic farms face certain risks from pesticide drift, including contamination of the crops, economic losses associated with contaminated products not being able to be sold and labeled as organic, and in some cases, loss of certified status of the contaminated land for up to three years (Maynard et al., 2012).

FINDINGS FROM THE 2015 SURVEY ON PESTICIDE SPRAY DRIFT

In 2015, OFRF conducted an electronic survey of organic farmers in the US to understand their challenges and research needs (Jerkins and Ory, 2016). The survey received a response rate of 1,403 organic farmers, which represents approximately 10% of the current population of U.S. organic farmers (USDA, 2016). Survey responses came from every state, yet there was a predominance of responses from the Western (45%) and North Central (28%) regions, as defined under the USDA Sustainable Agriculture Research and Education (SARE) program.

Survey participants were asked if they had lost sales or certified organic status of organic products in the past five years due to pesticide drift. Thirty respondents (3.3% of the 905 responses to this question) stated that they had experienced losses due to pesticide drift. Nineteen people, representing 63% of respondents reporting drift losses,

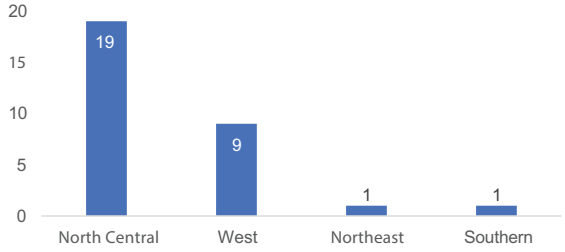

Figure 3. Regional frequency of losses due to pesticide drift among survey participants.

were from the North Central region (Figure 3).

Of the participants that reported impacts due to pesticide drift, total acreage impacted was equal to 366 acres. The types of impacts ranged from having buffer strip and crop growth impeded by herbicide runoff, to rejection from buyers due to contamination. Survey participants reported having many different crops affected, including grapes, corn, soy, apples, herbs, potatoes, and pasture land.

RECOMMENDATIONS FOR REDUCING DRIFT IMPACTS FOR ORGANIC FARMERS

Through enhanced communication with neighbors and knowledge about what is being sprayed in adjacent areas, organic farmers can take steps to avoid drift onto their farms. Some of the important actions organic farmers can take include:

- Create buffer zones of adequate size, location, and type.
  - Planning for and maintaining buffer zones is a key part of an organic system plan in order to protect the organic land from contamination from adjacent properties.
  - The size of the buffer zone may vary depending on particular circumstances, but generally it is advised to maintain a minimum of 50 feet in width to prevent drift (AMS, nd).
  - The USDA organic regulations define a buffer zone as "an area located between a certified production operation or portion of a production operation and an adjacent land area that is not maintained under organic management. A buffer zone must be sufficient in size or other features (e.g., windbreaks or a diversion ditch) to prevent contact by prohibited substances applied to adjacent land areas."
- Inform neighboring farms of organic production status and ask when and where pesticide applications occur (Figure 4).
- Register organic farms with Fieldwatch at www.Driftwatch.org.
  - This free service automatically notifies commercial applicators in the surrounding area who have requested to receive such notices in order to avoid drift onto organic farms and sensitive areas (Maynard et al., 2012).

Figure 4. Sign indicating organic status

- Report a drift event.
  - If people are ill and it is an emergency, call 911.
  - If you believe that drift has occurred and has harmed people, plants, wildlife, or the environment, call your County Agricultural Commissioner to report the incident.
  - If you have been exposed to spray drift and have health-related questions, contact your doctor or the Poison Control Center.
  - Contact the State Department of Agriculture's Pesticide Enforcement Department to document and investigate the incident.

RECOMMENDATIONS FOR REDUCING DRIFT FOR CONVENTIONAL FARMERS

(adapted from UCANR, US EPA, and CDFA resources).

There are several practices that conventional farmers can implement when using pesticides in order to reduce impacts on organic farms, farm workers, and adjacent communities. It is critical to communicate to neighboring farms which products are sprayed and when. It is beneficial for pesticide applicators to understand the risks of possible drift onto organic land. To avoid drift, applicators can develop good communication with neighbors about organic status, or check for neighboring organic farms by contacting the state agricultural agency or certifiers for a list or map of organic farms near the application location. One important step to avoid drift onto organic fields is to maintain proper application practices and buffer zones. Some key best practices include the following:

- Use as coarse of a spray formulation as possible (droplets greater than 150 microns) and at as low pressure as possible.
  - Large droplet size is extremely important in reducing drift, and can be achieved by using a larger nozzle and lower pressure to produce a coarse spray.
- Check weather and wind conditions, and avoid pesticide application if windy or gusty conditions are present.
  - Do not apply at wind speeds over 5 mph.
  - Determine wind direction. If the wind direction is moving pesticide droplets away from the target area, do not make an application.
  - Do not spray during thermal inversions, when air closest to the ground is warmer than the air above it.
  - When possible, avoid spraying at temperatures above 90°-95° F, ideally not over 85° F.
  - It is usually best to apply pesticides in the early morning or late evening when there is less wind. However, avoid very calm and stagnant air conditions, which have the potential to cause a persistent "chemical cloud" that can slowly move downwind.
  - Lower the boom height to reduce the chance of wind related drift.

- Allow for adequate buffer zones during application to ensure that drift does not occur off the target area.
  - Buffer zones may include field borders that are not sprayed and planted areas and filter strips that serve to trap pesticide drift and runoff. For more information on buffers to reduce pesticide impacts, see additional resource #9.
- Only use products, formulations, and application methods that are least likely to cause drift.
  - Water-based sprays will volatilize more quickly than oil-based sprays. However, oil-based sprays can drift farther because they are lighter, especially above 95° F.
  - Use drift control/drift reduction agents called adjuvants. These materials minimize the formation of droplets smaller than 150 microns by thickening the formulation to produce a more consistent spray pattern and deposition.
- Use a solid cone or fan spray nozzle that will produce larger droplet sizes.
  - These produce larger droplet sizes than hollow cone nozzles.
- Check your system for leaks.
  - Leaking nozzles under pressure can emit very fine droplets which may leave the target area.
- For applications of liquid and dry formulations, use shrouds or skirts attached over or behind the application equipment to prevent spray droplets and pesticide particles from becoming airborne.
- Reduce the impact from air blast sprayers in orchards.
  - Ensure the machine is adjusted to direct the spray into the tree canopy. Use only the nozzles that actually deliver spray to the tree, which may require turning off one or more of the upper nozzles that do not deliver spray to the tree.
  - Orchard crops – use "Interference Perimeter Spraying" http://plantingseedsblog.cdfa.ca.gov/wordpress/?p=11681
- For ground rigs and hand sprayers, use low pressures and don't spray too close to the target surface to reduce spray-back aerosol.

CONCLUSIONS

Pesticide drift poses serious threats to agricultural communities due to health impacts on farmworkers and residents. Additionally, pesticide drift poses risks for organic operations, which can suffer economic losses due to drift. There is a need for increased monitoring, research, and education on the topic of reducing pesticide drift and its impacts. Research on drift impacts and the frequency of occurrence is a priority among organic farmers. Recent pesticide drift incidents in California, which resulted in farmworker illnesses, highlight the need for increased awareness and education on this topic in order to avoid future drift incidents.

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Organic Farming Research Foundation works to foster the improvement and widspread adoption of organic farming systems. OFRF cultivates organic research, education and federal policies that bring more farmers and acreage into organic production.

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