DRIFT PREVENTION

Protecting People, Crops and The Environment From Pesticide Drift

KERN COUNTY
DEPARTMENT OF AGRICULTURE
AND MEASUREMENT STANDARDS
December, 2015

DRIFT PREVENTION

- ***"Pesticide Drift"*** means the physical movement of pesticide through the air at the time of pesticide application or soon thereafter from the target site to any non- or off-target site.

National Coalition on Drift Minimization

DRIFT PREVENTION

Why be concerned about Drift?

- Illnesses and Complaints
- Off-target damage
- Environmental impact
  - Water and Air Quality
- Wasted chemicals
- Spotty pest control

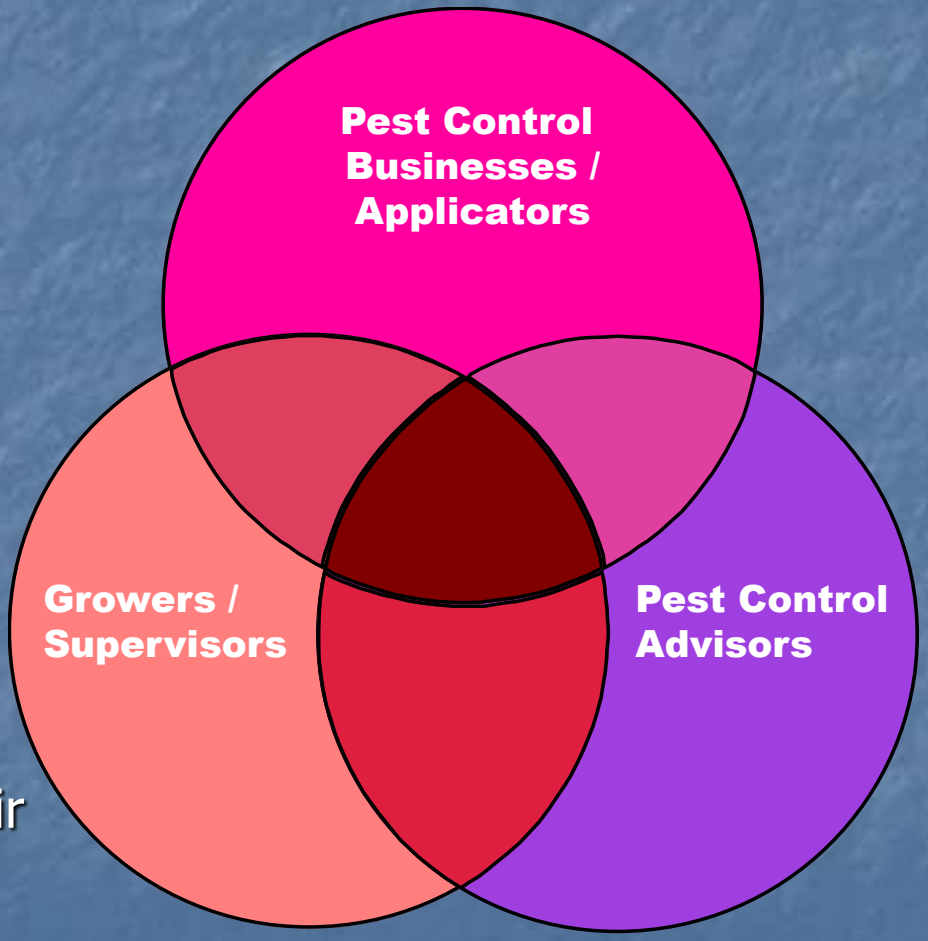
Result

- Negative perception of Agriculture
- More Regulation
- Higher costs-$$$

DRIFT PREVENTION

Who is responsible for Preventing Drift ?

- Everyone Involved!
  - Applicators
  - Growers
  - Pest Control Advisors.
- Preventing drift is a shared responsibility that will require all involved to do their part.
  - Make sure that you, and the people you work with, do their part.



DRIFT PREVENTION

Factors Affecting Drift:

- Equipment & Application
  - Nozzle type/size
  - Nozzle pressure
  - Nozzle orientation
  - Height of release
  - Speed / Volume
  - Other Technology
- Spray Characteristics
  - Chemical/Formulation
  - Additives
- Weather, etc.
  - Air movement (direction and velocity)
  - Temperature
  - Humidity
  - Inversions

DRIFT PREVENTION

Factors to consider when evaluating a possible application and Drift Prevention:

- Spray/Chemical Characteristics
- Equipment & Application
- Weather
- Property Treated
- Surrounding Properties
  - Sensitive areas (Residential, Schools, Environmental, Etc.)
  - Sensitive crops

To determine the likelihood of harm or damage.

FAC 12003 (f)

- Each written Rec shall include: A warning of the possibility of damages (or hazards) … known by the PCA to exist.

CCR 6614(a)

- An applicator … shall evaluate the equipment, meteorological conditions, the property to be treated, and surrounding properties to determine the likelihood of harm or damage.

DRIFT PREVENTION

Factors Affecting Drift:

Importance of Droplet Size

The single most important factor affecting drift potential!

Droplet size

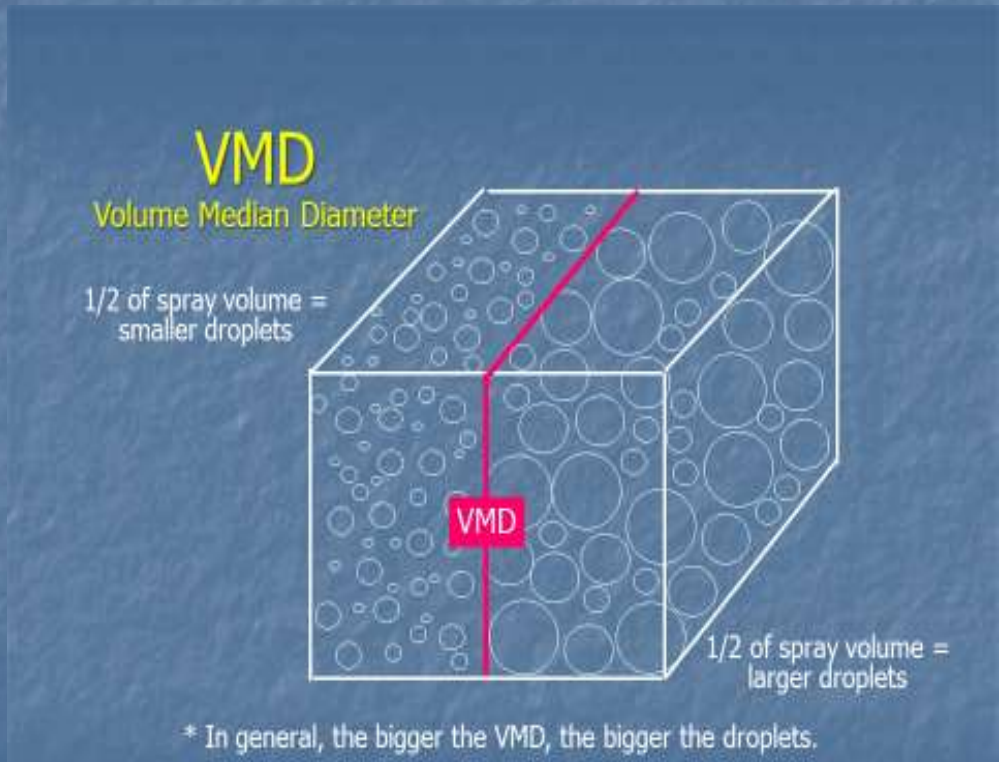
Interacts with all other factors affecting drift.

Select Nozzle Type, Size, Orientation & Pressure to produce the largest droplet size possible to ensure adequate coverage.

DRIFT PREVENTION

Factors Affecting Drift:

- Spray droplets are measured in microns and expressed as Volume Median Diameter (VMD).
  - One micron (µm) =1/25,000 inch
  - Human hair = 100 µm
- Monitor your whole droplet spectrum to minimize drift.
  - % < 200 µm, % < 150 µm



DRIFT PREVENTION

Factors Affecting Drift:

Nozzle Dropsize Classification
Selection based on droplet size:

- Very Fine <119 μm
- Fine 119-216 μm
- Medium 217-353 μm
- Coarse 354-464 μm
- Very Coarse >464 μm

Insecticides and Fungicides

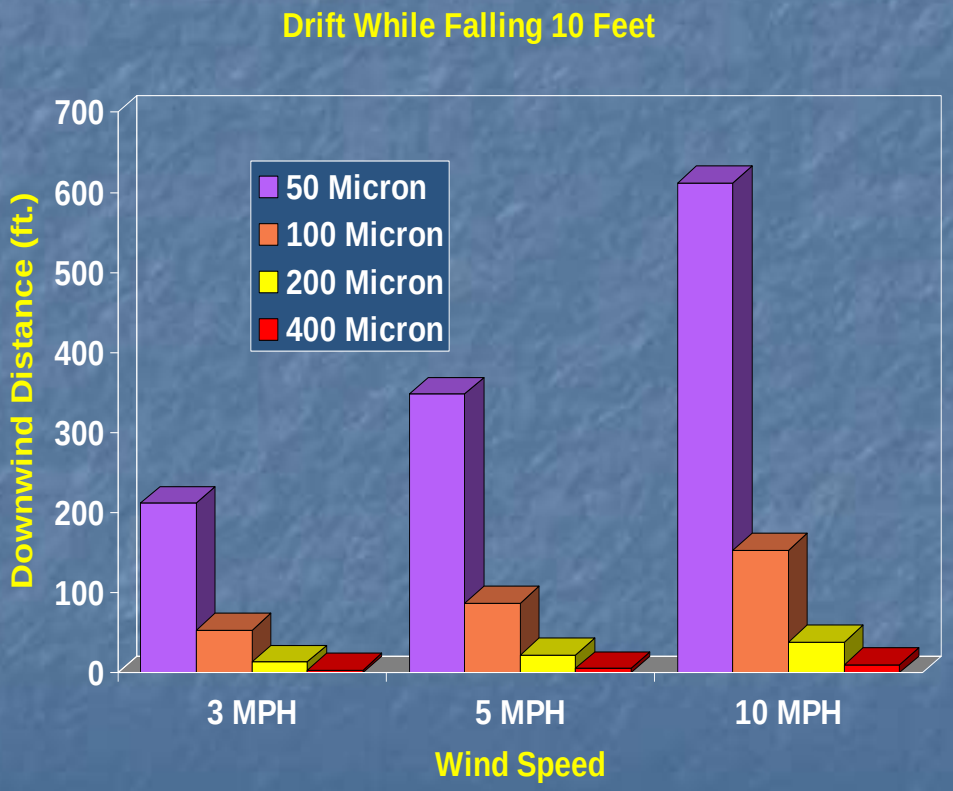
Herbicides and Postemergence

Soil Applications of Herbicides

DRIFT PREVENTION

Factors Affecting Drift:

- Large droplets have less potential to drift because they:
  - Fall more quickly
  - Evaporate more slowly
  - Are less affected by wind
- Small droplets often result from:
  - High spray pressure
  - Small nozzle tips
  - Wind shear across the nozzles



Modified from:
Concentrated Spray Equipment by S.F. Potts

DRIFT PREVENTION

Factors Affecting Drift:

Select nozzle to increase droplet size.

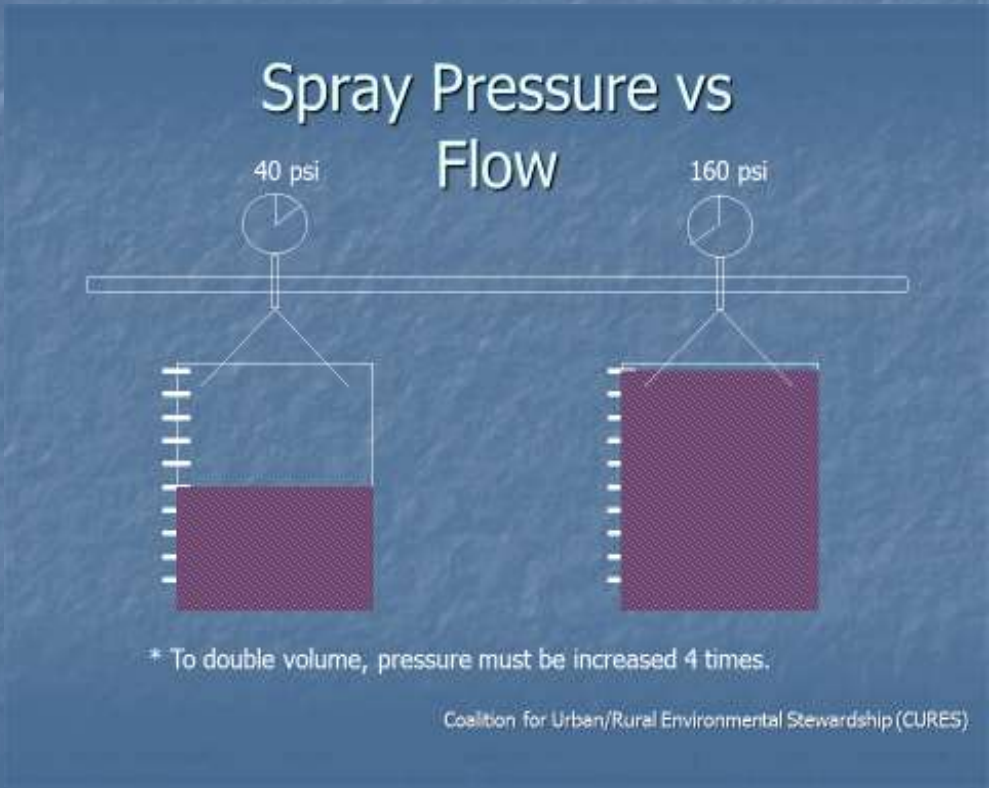
- Select larger nozzle capacity sizes when appropriate.
- Manufacturers make "low drift" nozzles that produce the same pattern as standard nozzles except with larger droplets.
  - Low Pressure – (Extended Range)
  - Pre-Orifice & Pre-Orifice w/ Turbulence Chamber
  - Air Induction
- Nozzle catalogs are an excellent source of information.
- Always consult the product label as well as state and local regulations before choosing a nozzle.

DRIFT PREVENTION

Factors Affecting Drift:

Use lower pressures.

- Higher pressures create smaller droplets
  - Increase nozzle size or slow application speed to increase volume
  - Stay within the manufacturer's recommended operating pressure range, preferably towards the lower end.
- To double volume, pressure must be increased 4 times which can create driftable fines.



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Factors Affecting Drift:

Orientation

- Wind-shear breaks droplets up creating driftable fines
  - Aerial and Airblast
- Equipment setup for job at hand.
  - Point only at target
- Nozzle relation to wingspan/rotor length
  - Vortex

DRIFT PREVENTION

Factors Affecting Drift:

Height of Release

- The further the spray has to fall, the larger the potential for drift.
  - Weather
    - Wind
    - Evaporation
    - Inversion

DRIFT PREVENTION

Factors Affecting Drift:

Speed of Application /
Volume of Material Applied.

- Slow application speed if necessary to reach required volume and ensure good coverage.
  - Increasing pressure creates driftable fines
- Spray volume does not directly affect droplet size, but:
  - Increasing the spray volume can effectively compensate for reduced coverage while ensuring a larger droplet size.
  - Increasing volume lowers concentration of a.i. in droplets.
    - Droplets that drift will contain less active ingredient.

DRIFT PREVENTION

Factors Affecting Drift:

Other Technology

- Shields & Hoods
  - Can effectively target material to the desired location
- Electrostatic sprayers
  - Electrostatic charge pulls the spray towards the plant
  - This causes the spray to cling to the plant surface rather than drifting away or falling to the ground.

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Factors Affecting Drift:

Spray Characteristics

- Chemical/Formulation
  - Volatile solvents evaporate more quickly than oil based, water based or dry formulations.
  - Evaporation of solvents is affected more by temperature than by humidity.
- Volatile compounds may drift as a gas (or smaller droplets due to evaporation) causing damage, odor & illnesses.
- Some applicators tell me the addition of ammonium sulfate, crop oil, silicon-based spreaders, UN-32 dramatically increase drift potential
  - Maybe a result of VMD of these materials through nozzels.

Drift Control Additives

- Two basic groups:
  - Thickeners, increase droplet size by increasing viscosity of the spray.
  - Evaporation inhibitors reduce droplet evaporation.

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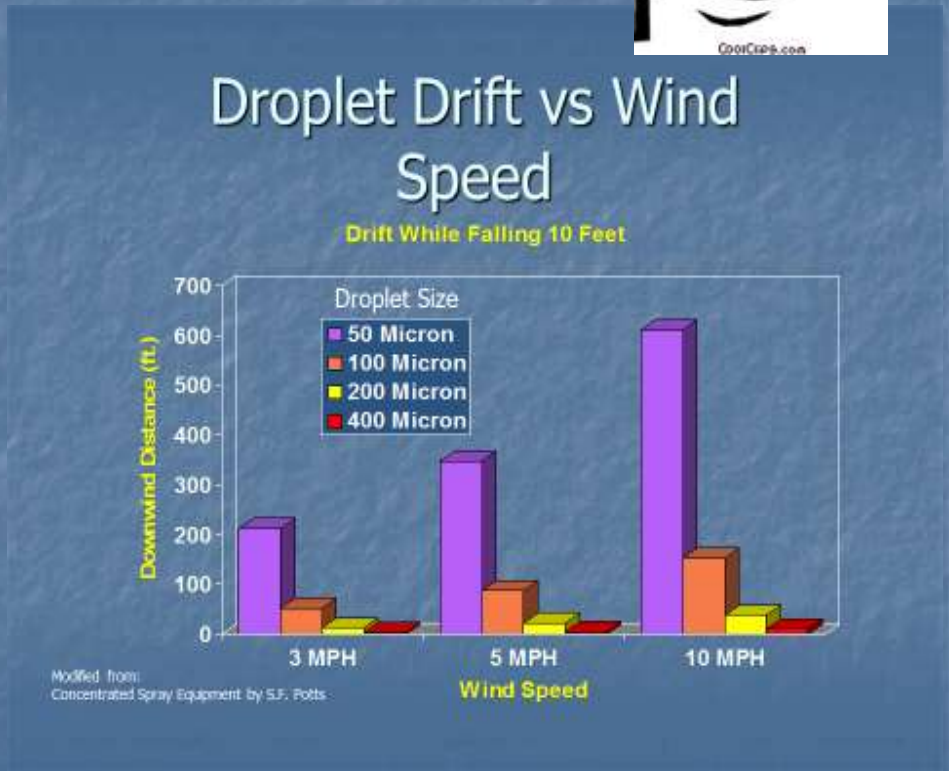
Factors Affecting Drift:

Weather / Wind Speed

- Drift potential usually increases with increasing wind speed.
  - However, many factors (droplet size and boom height) can influence drift.
- Use a wind gauge and avoid gusty conditions.
- **"Dead calm" conditions are never recommended.**
- Drift potential is lowest at wind speeds between 3 and 10 mph (gentle but steady breeze) blowing in a safe direction.



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Factors Affecting Drift:

Weather / Wind Direction

- Spray when breeze is gentle, steady, and blowing away from sensitive areas.
  - Do not spray at any wind speed if it is blowing towards nearby sensitive areas - all nozzles can drift.
  - Know the location of sensitive areas - consider safe buffer zones.
- **"Dead calm" conditions are never recommended.**

DRIFT PREVENTION

Factors Affecting Drift:

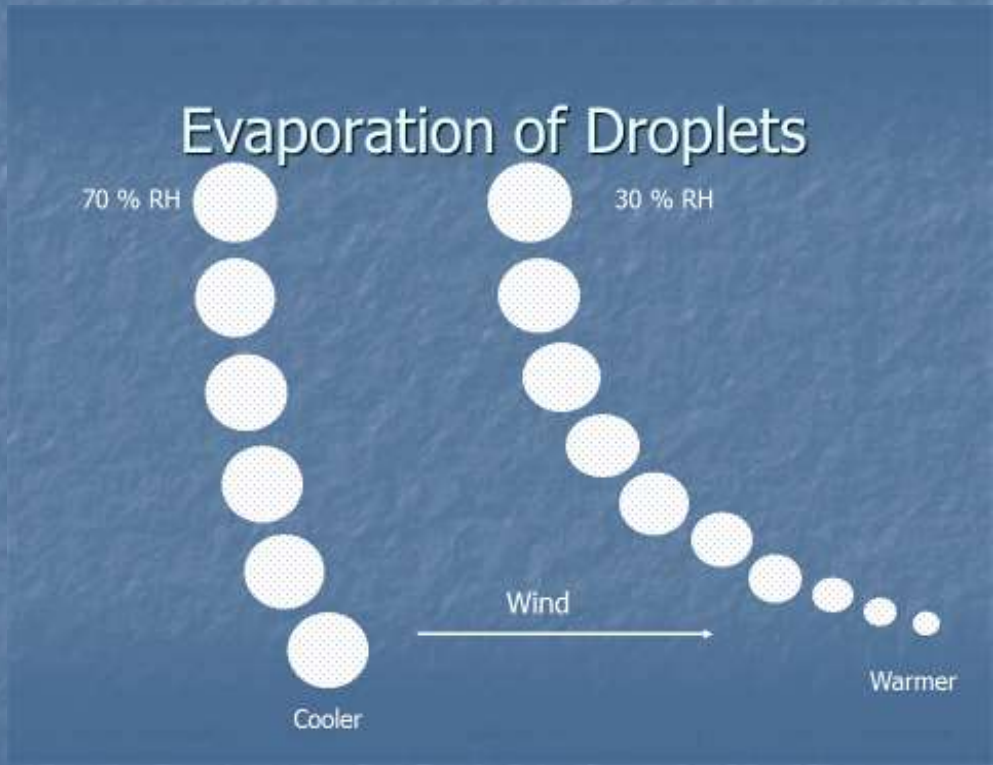
Weather

Temperature

- Affects the speed at which spray droplets evaporate.
  - Evaporation of solvents is affected more by temperature than by humidity.

Humidity

- Also affects the speed of evaporation of sprays.
  - The higher the humidity, the slower the evaporation rate.
- Small droplets (less than 150 - 200 µ) evaporate quickly which increases drift potential.

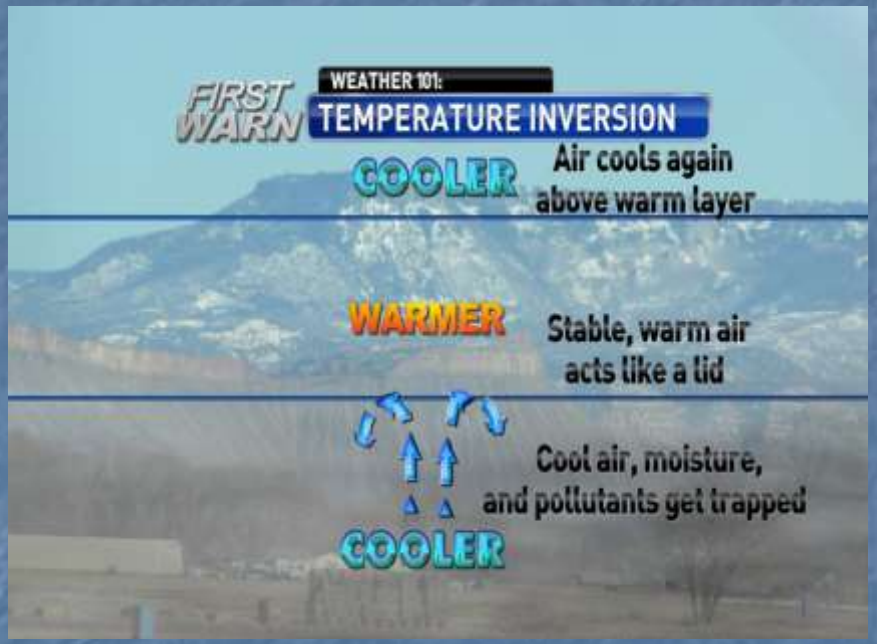


DRIFT PREVENTION

Factors Affecting Drift:

Weather / Inversions

- A temperature inversion is a highly stable atmosphere in which there is very little vertical air mixing.
- Warmer air traps cooler air close to the surface.
  - The most common cause of surface inversions is radiant cooling of the ground.
  - Clear skies favor radiant cooling and favor the formation of surface inversions.
- This stable air mass traps and holds pollutants (including pesticides) in the air near the surface.



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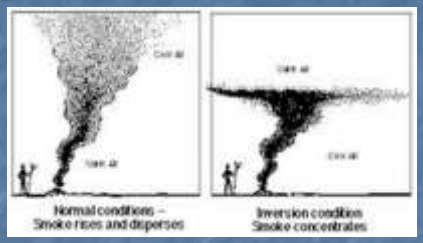
Factors Affecting Drift:

Weather / Inversions

- Under clear to partly cloudy skies and light to no winds, a surface inversion can form as the sun sets and continue into the morning until the sun begins to heat the ground.
- Fog is an indicator of inversion
  - High fog prevents the ground from being warmed by radiant heat allowing inversion conditions to continue late into the day.

DRIFT PREVENTION



Factors Affecting Drift:

Weather / Inversions

- Calm and low wind conditions may indicate presence of a temperature inversion.
  - Potential for Off-target Damage increases with little to no wind movement.
  - Light winds tend to be unpredictable and variable in direction.
- Drift potential is lowest at wind speeds between 3 and 10 mph (gentle but steady breeze) blowing in a safe direction.
- During an inversion a concentration of small droplets can remain relatively intact until the inversion dissipates.
- A higher potential for off-target effects exists because small droplets remain in a concentrated cloud that stay suspended and can move great distances.

DRIFT PREVENTION

Factors to Consider:

Property Treated

- Need for pest control (Criteria)
  - Preventative
  - Pest threshold met
- Alternatives
  - Control Techniques
  - Material options
  - Methods of application

CCR 6556 - Recommendations.

(d) Criteria used for determining the need for the recommended treatment

(e) Certification that alternatives and mitigation measures that would substantially lessen any significant adverse impact have been considered and, if feasible, adopted.

DRIFT PREVENTION

Factors to Consider:

Surrounding Properties

- Sensitive areas
  - Residential
  - Schools
  - Other Human Activity
- Environmental concerns
  - Water
  - Livestock / Wildlife
  - Endangered Species (plants & animals)
- Sensitive crops
  - Damage
  - Residue issues
  - Field work

FAC 12003 (f)

- Each written Rec shall include: A warning of the possibility of damages (or hazards) … known by the PCA to exist.

CCR 6614(a)

- An applicator … shall evaluate the equipment, meteorological conditions, the property to be treated, and surrounding properties to determine the likelihood of harm or damage.

DRIFT PREVENTION

Review:

- BOOM HEIGHT - Ground applications should be made at the lowest height that allows for adequate coverage and control.
- WIND SPEED - Drift potential is lowest when wind speeds are between 3 & 9 mph.
- INVERSIONS - Small droplets do not disperse and can move long distances in a concentrated cloud.
- **DROPLET SIZE - Minimizing small droplets will reduce potential for drift.**

- **Evaluate site and surrounding area for potential Hazards and Damages**

Kern County Herbicide Application Drift Prevention Conditions

- Numerous drift incidents over the past few years
- Growers look to Commissioner for help
- Commissioner requires Permit for some Non-Restricted Herbicides (FAC 14006.6(a))
- Permit Conditions *(for Restricted & Non-Restricted Materials)* put in place to mitigate issues
- Awareness
  - Problem
  - Factors affecting drift
  - Surrounding Environment

Kern County Herbicide Application Drift Prevention Conditions

These Conditions apply to the following Herbicides:

- 2, 4-D* (Weedar®*, Envy®*, Dri-Clean®*, Weedaxe)
- 2, 4-DB* (Butyrac®)*
- 2, 4-DP*
- Bromoxynil (Buctril®)
- Carfentrazone (Shark®)
- Dicamba* (Banvel®, Clarity®)*
- Flumioxazin (Chateau®)
- Glyphosate (Roundup®, Glyfos®, Touchdown®)
- MCPA*
- Oxyfluorfen (Goal®)
- Paraquat* (Gramoxone®, Firestorm®, Parazone®)*
- Propanil*
- Pyraflufen (ET®, Venue®)

* Designates Restricted Materials

Kern County Herbicide Application Drift Prevention Conditions

These Conditions apply:

Time Period:

- Between January 1st and April 30th

LOCATION:

- Portion of Kern Co. lying west of State Hwy. 99 and south of State Hwy 119 (Taft Hwy.)

Kern County Herbicide Application Drift Prevention Conditions

Exemptions: These Conditions **Do Not** apply to:

- Applications with hand held Equipment
  - Backpack sprayers, Hand wands, Etc.
- Applications with Hooded/Shielded sprayers
- Chemigation herbicide applications.
- Applications to Right-of-Ways
  - Roadsides, Ditch banks, Fence lines, Etc.

Kern County Herbicide Application Drift Prevention Conditions

Conditions for All Applications (Ground or Air) :

- The herbicides must be included on the grower's Restricted Materials Permit.
- An NOI must be submitted.
- A written recommendation shall be submitted with the NOI.
  - The recommendation (or map) shall identify all susceptible crops located within one (1) mile of the treatment site.
  - PCAs who write Recs must have attended an approved drift prevention training.
- All applications must be supervised by a certified applicator (PAC, QAL or QAC)
  - Certified applicators must have attended an approved drift prevention training.
- No application may begin prior to one (1) hour after sunrise and must be completed one (1) hour before sunset.

Kern County Herbicide Application Drift Prevention Conditions

Conditions for All Applications (Ground or Air) :

- No application may take place within an inversion.
- All applications must take place with a minimum wind speed of 3 mph and not more than 10 mph.
  - The applicator shall record wind speed and direction prior to and at least every hour during the application.
  - These wind speed and direction records shall be retained by the applicator.
- Ground applications within ¼ mile of a susceptible crop and all aerial applications shall employ a smoke column.
  - The smoke column, vertically oriented shall indicate to the applicator any temperature inversions and the direction and velocity of air flow.
  - Any use of smoke must be in accordance with any applicable local air pollution rules.

Kern County Herbicide Application Drift Prevention Conditions

Conditions for All Applications (Ground or Air) :

- No pesticide application shall be made or continued if the material is unable to be confined to the target area.

Kern County Herbicide Application Drift Prevention Conditions

Additional Aircraft Application Conditions:

- **No aerial applications of these herbicides shall be made by air between January 1 and April 30**
  - Unless expressly granted by the Agricultural Commissioner.

Kern County Herbicide Application Drift Prevention Conditions

Additional Aircraft Application Conditions:

- Each pilot and aerial pest control business must have attended an approved drift prevention training.
- Aerial applications must have an individual on the ground that monitors conditions and has the ability to waive off the application if unfavorable conditions exist.
- For fixed-wing aircraft, application nozzles shall span no more than 67% of the wing span.
- For rotary-winged aircraft, application nozzles shall span no more than 75% of the rotor length.

Kern County Herbicide Application Drift Prevention Conditions

Additional Aircraft Application Conditions:

- Aircraft nozzles shall be equipped with orifices directed backward parallel to the horizontal axis of the aircraft in flight.
- Spray material shall not be discharged at a height of more than ten (10) feet above the crop or target.
- Each individual nozzle shall be equipped with a check valve and the flow controlled by a suck-back device or a boom pressure release device; or each individual nozzle shall be controlled by a positive shutoff system.

Protecting People & the Environment

We Must Protect People and the Environment From Pesticide Drift during Applications.

- Code Sections to keep in mind.
- Laws
  - FAC 12972, 12973
- Regulations
  - CCR 6600, 6614, 6702

Protecting People & the Environment

FAC 12972. The use of any pesticide by any person shall be in such a manner as to prevent substantial drift to nontarget areas.

- **"Substantial drift"** means the quantity of pesticide outside of the area treated is greater than that which would have resulted had the applicator used due care.
  - An applicator who uses “Due Care” will prevent any drift off site.
  - Any detectable amount of pesticide outside the target area is substantial according to many.

Protecting People & the Environment

FAC 12973. **The use of any pesticide shall not conflict with labeling…**

- Most pesticides have label statements that prohibit drift and/or exposure.
  - Do not apply in a way that will contact workers or other people not involved with the application.
  - Do not apply under conditions that involve possible drift…
  - Do not allow spray to drift from the application site and contact people, structures people occupy at any time and the associated property, parks and recreation areas, non-target crops, aquatic and wetland sites, woodlands, pastures, rangelands, or animals.

Protecting People & the Environment

FAC 12973. **The use of any pesticide shall not conflict … with any …conditions of any permit**

- Kern County Herbicide Application Drift Prevention Conditions
- General Permit Conditions
- General Drift Minimization Permit Conditions
- Other Permit Conditions

Protecting People & the Environment

CCR 6600. General Standards of Care.

Each person performing pest control shall:

(a) Use only pest control equipment which is in good repair and safe to operate.

(b) Perform all pest control in a careful and effective manner.

(c) Use only methods and equipment suitable to insure proper application of pesticides.

(d) Perform all pest control under climatic conditions suitable to insure proper application of pesticides.

(e) Exercise reasonable precautions to avoid contamination of the environment.

Protecting People & the Environment

CCR 6614. Protection of Persons, Animals, and Property.

(a) An applicator prior to and while applying a pesticide shall evaluate the equipment to be used, meteorological conditions, the property to be treated, and surrounding properties to determine the likelihood of harm or damage.

Protecting People & the Environment

CCR 6614. Protection of Persons, Animals, and Property.

(b) Notwithstanding that substantial drift would be prevented, **no pesticide application shall be made or continued when:**

(1) There is a reasonable possibility of contamination of the bodies or clothing of persons not involved in the application process;

(2) There is a reasonable possibility of damage to nontarget crops, animals, or other public or private property; or

(3) There is a reasonable possibility of contamination of nontarget public or private property...

Protecting People & the Environment

CCR 6702. Employer – Employee Responsibilities.

(b) The employer:

(3) Shall assure that safe work practices, including all applicable regulations and pesticide product labeling requirements are complied with.

Protecting People & the Environment

Growers and Pest Control Advisors who compel applicators to make unsafe or questionable applications will bring about more Regulations and a tougher environment in which to do business in.

DRIFT PREVENTION

Minimizing spray drift is in the best interests of everyone. Do your part to keep agrichemical applications on target.

DRIFT PREVENTION

Questions ?

Thank You