**Pesticide Drift: Keeping It on Target (Script)**

**Slide**

1. This presentation is designed for those seeking information on pesticide drift and practices to minimize it from occurring.
2. After we complete this presentation, you should be able to: \*define what spray drift is, \*describe how various environmental factors affect drift, \*describe the effects of droplet size on drift and how droplet size can be managed, and finally, \*describe how your decisions can affect spray drift.
3. According to the National Coalition on Drift Minimization, “*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.
4. This Coalition also has definitions for what is not pesticide drift. These incidents include \*movement of pesticides to non- or off-target sites caused by erosion, migration, volatility, or windblown soil particles that occurs after application unless specifically addressed on the pesticide product label with respect to drift control requirements. Some examples of such movement would include applicator error problems such as overspray past the intended target and equipment malfunction.
5. There are two basic types of drift, vapor and particle drift. Vapor drift is associated with the volatilization of the pesticide formulation in the form of gases or fumes. Although on the previous slide it was just mentioned that volatility is not considered drift, \*it is if it’s specifically addressed on the pesticide product label with respect to drift control requirements. Is the applicator responsible for vapor drift? Yes. The applicator should be familiar enough with the product to know if there is a potential for vapor drift. If there is a potential for vapor drift, steps should be taken to avoid this – such as soil incorporation. \*Particle drift is probably what most people think of when they think of drift. Particle drift is the actual movement of spray particles, usually by wind.
6. There are a number of reasons why we hear more about spray drift than we have in the past. Spray drift can have serious consequences, such as poisoning of farm workers, fish kills, and crop damage. Consequently, the public is much more aware of all types of spray applications. The public’s tolerance for misapplications is very low, if any, and hundreds of complaints are investigated in this state every year. Our communications systems are much better, so any errors that are newsworthy are seen by a lot of people within a short period of time. In addition, as urban areas expand into rural areas some spray applications are made closer to homes than in the past. This is a reality in Florida. Off target drift in these areas is immediately noticed and can lead to increased friction between applicators and homeowners.
7. As the previous slide showed, those are all the more reason why managing spray drift is critically important for pesticide applicators. Off-target spray drift can cause injury to humans, nearby crops, livestock, and wildlife. Spray drift also costs money. There must be restitution for damaged crops. If the pesticide application drifts off-target then there can be a lack of control of the intended target pest. If large numbers of drift problems continue to occur you can be sure that regulators will be forced to implement additional rules and regulations. Companies spend relatively large sums of money to train applicators and purchase expensive application equipment. It is in their best interest to avoid any problems. And, they want to keep their customers and can’t afford to lose any. Also, applicators are like everyone else – part of the community, so their presence and actions are known.
8. This chart categorizes and shows the breakdown of the factors related to misapplication. The source is a major agricultural insurance agency and it is based on their investigations and payouts in 1996. Thirty-three percent of the time the misapplication was due to drift. Another 33% of the time it was due to an improper tank mix. The application equipment was the source of the misapplication 24% of the time. Applications to the wrong field or site were the cause of 8% of the misapplications. Off-label applications were responsible for only 2% of the misapplications.
9. This chart shows the breakdown of factors that contribute to pesticide drift. Thirty-eight percent of the time the applicator, or the decisions made by the applicator, are responsible for pesticide drift. The type of nozzle or nozzle problems are responsible 26% of the time. Physical effects such as wind, inversions are responsible 23% of the time. Other factors that are unknown resulted in drift 13% of the time. Many times the source or cause of a complaint is hard to isolate if several applications take place in the nearby area.
10. There is specific wording in the Florida Pesticide Law that addresses damage or injury to property, animals, and people from applications of pesticides. The Bureau of Compliance Monitoring is the division of the Florida Department of Agriculture and Consumer Services responsible for investigating such cases involving agricultural pesticides. Drift is one of the most common misuses for them being contacted to conduct an investigation.
11. Within the Florida Law, there is also a very restrictive rule that specifically addresses organo-auxin herbicides. These herbicides are defined as those which produce hormonal auxin type effects on plants similar to the effects of 2,4-D. These herbicides include 2,4-D, MCPA, 2,4-DP, MCPP, MCPB, dicamba, and triclopyr. The sale and use of highly volatile forms of these herbicides in the state is prohibited except for those products labeled for use as plant growth regulators on citrus. The law also specifies wind speed and direction and distance restrictions concerning the use of these herbicides near susceptible crops. Susceptible crops are defined as tomatoes, peppers, watermelons, eggplant, and ornamental broadleaf plants. In addition to taking this into account, applicators are required to keep records that include wind speed measurements and direction, and they must follow application equipment restrictions regarding spray droplet size, type of nozzle, and application pressure. These records must be kept a minimum of 2 years.
12. Organo-auxin, also known as phenoxy, herbicides were first developed during the 1940s and have been used extensively in the United States since then. This group of chemicals has found a place in weed control schemes for peanut, corn, small grains, sugarcane, turf, pasture and forage crops and many other areas. On a worldwide basis more phenoxy herbicides are used than any other class of herbicides presently manufactured. The phenoxy herbicide group's unique ability to remove broadleaf weeds from grass crops has been exploited for successful weed control in many areas.
13. Although ester formulations are more active herbicidally than amine formulations, they do have serious drawbacks associated with their use. Specifically, ester formulations are typically very volatile and possess the ability to move away from the target site up to several days after the initial herbicide application has been made. Volatilization problems have led to the complete destruction of nearby sensitive crops if conditions were favorable for volatilization to occur. Sub-lethal doses of organo-auxin herbicides cause very visual effects, indicative of hormonal action. Due to volatilization problems, many states have totally banned the use of high-volatile ester formulations and discouraged use of lower volatile esters in sensitive areas. Florida is one such state with these regulations. Due largely to phenoxy herbicide applications in south Florida on sugarcane and drift or volatilization to nearby tomato crops and their subsequent destruction, the Florida Department of Agriculture and Consumer Services enacted the Organo-Auxin Herbicide Rule. This rule applies to the application of organo-auxin herbicides anywhere within the state.
14. When the Florida Department of Agriculture and Consumer Services conducts a routine agricultural pesticide use investigation, they will use a check-list to query an individual about their practices of handling these materials. \*They will ask if any of these specifically-regulated herbicides were used in the vicinity of one of the defined susceptible crops. \*They will also check your records for wind speeds that you measured and the direction and distance from a susceptible crop for both aerial and ground applications.
15. Remember, the sale and use of highly volatile forms of these herbicides in the state is prohibited except for those products labeled for use as plant growth regulators on citrus. So, they will ask about this concern. \*While applying organo-auxins, wind speed and direction is to be recorded every hour, so recordkeeping can’t be stressed enough. Wind speed measurements are to be taken at spray boom height for ground application and at least six feet above the ground for aerial application.\*Also, application pressure, in psi, must be recorded – inspectors will ask. It can be no higher than 35 psi. \*And finally, the inspector may wish to look at your spray equipment to determine if a flat fan nozzle was used for the application. Hollow cone-type nozzles are not allowed for applying organo-auxin herbicides. What is meant by a “fairly large droplet?” We’ll go into some more details on that subject shortly.
16. There is a form available from the Department to help applicators take records of organo-auxin herbicide applications. Keeping these records will save headaches from occurring. \*Remember, this is only a suggested form to use; you can keep records in any manner. But, the important thing to remember is that they need to be kept. \*A nice feature of this particular form is that it provides space at the bottom for the wind speed and direction recording. \*The form may be obtained by linking to the web address shown here. Now, let’s discuss factors that affect drift.
17. There are many factors that affect the amount of spray drift during an application. There are the characteristics of the spray itself. The chemical and its formulation as well as any additives can affect the droplet size and the rate of evaporation. Both of these can affect the amount of spray drift. \*Droplet size is the one factor that seems to have the biggest impact on its final location after release. Any property change that affects particle size will have a potential impact.
18. The spray equipment also affects the potential for spray drift. Nozzle type, size, orientation, pressure, and boom height also affect droplet size and the potential for drift. Large droplets are one of the keys to reducing spray drift. By adjusting these various nozzle factors you can increase the number of large droplets and minimize the formation of small droplets. There is continuously new nozzle and spray equipment technology that helps applicators keep the application on target. Take the time to become familiar with these new advancements and incorporate any applicable technology into your spray program.
19. Environmental factors can also play a big part in the potential for drift. Wind speed and direction, especially if it is towards sensitive areas, are a major cause of many spray drift problems. High temperatures and low humidity can increase the evaporation rate of spray particles which leads to smaller droplet size and more drift potential. Temperature inversions can lead to long distance migration of concentrated pesticide drift. The topography or “lay of the land” can also influence the movement of spray particles.
20. Under temperature inversion conditions the temperature increases as you move upward. This prevents air from mixing with the air above it. This causes small-suspended droplets to form a concentrated cloud that can move in unpredictable directions for long distances. If large numbers of small droplets are captured in this warm or inversion layer, the deposition control is lost. Records indicate that movement of these inversion layers may transport chemicals for several miles. \*The most common cause of temperature inversions close to ground level is radiant cooling of the ground – the ground cools off quicker than the air above it. Clear skies favor radiant cooling and therefore favor the formation of surface inversions. Early morning and late afternoon are the times when surface inversions are most likely to occur. Low heavy cloud cover, strong to moderate winds, greater than 5-6 mph, a temperature rise of 5 degrees, and bright sunshine are all conditions that do not favor inversions.
21. It is important to be able to recognize when inversions are present. Bodies of water or well-irrigated fields both favor the formation of inversions. Under clear to partly cloudy skies and light winds, a surface inversion can form as the sun sets. Under these conditions a surface inversion will continue into the morning until the sun begins to heat the ground. Usually, if you will wait for a 5-degree increase in temperature after the sun is up, the chances for an inversion decrease greatly.
22. Inversions only affect the small droplets from an application that don’t settle quickly. There is a higher potential drift and therefore off-target effects if the application is made during a surface inversion. The small droplets can remain in a concentrated cloud until the inversion dissipates or until the cloud moves out of the area where the inversion conditions exist. Minimizing the production of small droplets will minimize the potential of drift under inversion conditions. You should take precautions for inversions because surface inversions are common at certain times of the year. Be especially careful near sunset and an hour or so after sunrise unless there is low heavy cloud cover, the wind speed is greater than 5-6 mph at ground level, and there is a 5-degree temperature rise after sun-up. It may be illegal to start a fire to determine the presence of an inversion or wind direction. But there are smoke bombs or smoke generators that are legal to use and their use is recommended to identify inversion conditions.
23. Pesticide labels will vary in the amount of information they relay concerning drift, but practically all will address it to some extent. This particular herbicide label addresses it in several places on its label, the first place being in \*the Environmental Hazards statements and then several pages down, \*specific information on how to minimize it can be found. These instructions will provide directions to applicators addressing factors including droplet size, volume, pressure, number of nozzles, nozzle orientation, nozzle type, and other factors. \*Practically every herbicide label will mention to apply “large” droplets to reduce drift potential. Since the label is the law, it is up to the applicator for adhering to those directions. Injury from drift is ultimately the applicator’s responsibility.
24. But, what is meant by “large” droplets? Applicators commonly review droplet size charts to choose nozzle types, sizes, and pressure levels that will meet a specified droplet classification listed on the label. The droplet size created by a nozzle becomes very important when the efficacy of a particular plant protection product is dependent on coverage, or when the minimization of material leaving the target area is a priority. Droplet specifications given on the label are provided to guide applicators in selecting how to best apply that material. Thus, consulting the nozzle manufacturers’ droplet sizing charts is essential. Applicators should also remember the effect of changing speed when using an automatic rate controller. Major speed fluctuations will cause pressure adjustments that, while maintaining the GPA, may shift the droplet spectrum resulting in possible off-label applications. A droplet size standard was developed by the American Society of Agricultural and Biological Engineers and is described in this table. These sizes are recommended dependent upon the type of pesticide that is applied. As one would reason, droplets in the medium to extremely coarse size are recommended for herbicides.
25. To help applicators select nozzles according to droplet size, spray equipment manufacturers are including drop size charts with their respective catalogs and web sites. These charts classify the droplet size from a given nozzle at various pressure levels according to a standard set up by the American Society of Agricultural and Biological Engineers (ASABE). The standard (S-572) rates droplets as very fine, fine, medium, coarse, very coarse, and extremely coarse. Droplet size categories are color-coded as shown in this table.
26. This is part of a nozzle selection chart table from a popular application equipment supplier. \*Droplet size categories are color-coded as shown in this table for various nozzle sizes and application pressures to deliver various spray volumes at selected speeds. Similar information can be found on all popular nozzle manufacturers’ web sites.
27. One of the most critical factors in minimizing spray drift is reducing the number of small spray droplets. Particle drift often results from the smaller drops created during the spray process. The smaller droplets are more easily transported by any wind that occurs. Spray droplets are measured in microns using laser beams. \*One micron equals 1/25,000 of an inch. The average size of all the spray droplets for a given spray is usually referred to as the \*Volume Median Diameter (VMD). VMD indicates that half of the volume is in droplet sizes that size or larger and half of the spray is in droplet sizes that size or smaller.
28. As a comparison, a pencil lead is approximately 2,000 microns in diameter. A paper clip is 850 microns, a staple is 420 microns, a toothbrush bristle is 300 microns, a sewing thread is 150 microns, and a human hair is approximately 100 microns in diameter. One hundred to one hundred fifty microns in size is very small. \*Magnification may be necessary to simply see droplets that are this small.
29. Large spray droplets reduce the potential for drift because they fall or settle more quickly, evaporate more slowly and are less affected by wind. The key is to set up your spray equipment to produce the largest droplets that will still provide adequate control of the target pest. There is a balancing act between the size that is best for drift control and one that is best for product efficacy. In some cases, efficacy may have to be sacrificed a little bit to avoid drift potential. \*Small droplets often result from high spray pressure, small nozzle tips, and wind shear across the nozzles. Shear is especially significant for high-speed aerial applications.
30. The drift potential for a spray application depends not only on the VMD but also the total droplet spectrum or the span of droplet sizes. A VMD of 300 could mean that half the droplets were 250 microns in diameter and half were 350 microns. Or it could mean half the droplets were 50 microns, which are very susceptible to drift, and half were 650 microns. The total VMD plus the droplet spectrum gives a more accurate estimate of the droplet size relative to drift. \*Generally speaking, 150-200 microns in diameter is the lower limit for spray droplets in order to minimize drift.
31. Here is a graphical illustration of what is meant by VMD. One-half the droplets are smaller than the VMD and ½ are larger. Applicators would want to set up spray equipment to increase the VMD for minimizing drift potential. Simply knowing the VMD alone is not significant for either efficacy or drift potential.
32. An important point to remember is that when you reduce the size of the spray droplets you greatly increase the number of droplets. That means there will be more droplets likely to drift. \*The diagram shows that if you cut the droplet size in half you produce eight times the number of droplets.
33. You must imagine the image is in 3-D so there is an additional droplet on the backside for a total of six droplets fitting in the sphere. The remaining two droplets can fill the spaces around the edges.
34. You may believe that small droplets coupled with high pressure will provide the best coverage. In reality, it is almost impossible to force a small droplet to move more than a few inches. This table shows the terminal velocity, the final drop diameter, time of evaporation, and the deceleration distance in inches for spray droplets of various sizes. For instance, the fastest a 20 micron droplet will fall is 4/100 of a foot per second. Due to evaporation the final droplet diameter will be approximately 7 microns in diameter and it will fall less than one inch. Therefore this droplet size is very susceptible to drift. In contrast, a 200 micron droplet falls at 2.4 feet per second, has a much larger final droplet size because it evaporates more slowly, and will fall at least 25 inches.
35. When making a pesticide application there are certain factors you can control in order to minimize drift. You can control the selection of the applicator or operator, the equipment selection and setup, the field conditions, and the choice of the product.
36. The applicator, as we discussed earlier, can be a big factor in the amount of spray drift produced during an application. Make sure your applicator is competent for the application required. You may want to hire a commercial applicator for some applications. In some situations an aerial application may be more appropriate while in others a ground application may be better. The knowledge base and skill of the applicator can increase the productivity and safety of almost any chemical application.
37. If you decide to use a commercial applicator, make sure you find a reputable professional one. Contract the job with the commercial applicator as early as possible. Discuss the specifics of the application and any precautions about the application site. Give the commercial applicator the freedom to apply their experience and training. A reputable, conscientious commercial applicator should provide you with a quality job.
38. The trend in spray nozzle design is emphasizing low drift. Most nozzle manufacturers have designed nozzle types with the low drift emphasis. Additional design has incorporated the use of air as a means to provide larger droplets in the spray volume further attempting to minimize spray drift. New technology shows major improvements in drift reduction potential. As spray operators, become familiar with this new technology and adapt it where appropriate. The improvements in drift reduction should be noticeable.
39. Obviously the nozzle type selected for the application scenario will influence coverage as well as drift. For some fungicide and/or insecticide application scenarios the medium/fine option would be very close to the desired specifications for adequate coverage and efficacy. However, when applying certain herbicides, a larger droplet spectrum may be essential to minimize the drift potential. An influencing factor then becomes the necessity for applicators to have a good knowledge of the mode of action for the crop protection product being used. It is commonly thought that a systemic material such as glyphosate can work well with a medium, coarse, or maybe even a very coarse droplet spectrum while a contact material such as paraquat will need a droplet spectrum promoting more leaf coverage, that is, medium droplets.
40. There are various types of suitable spray equipment - make sure yours’ is in good operating condition and is calibrated on a regular basis. Select your equipment to produce the largest droplet size possible for drift control – remember, think greater than 150 microns is best. But be aware that some products require relatively smaller droplets to ensure good coverage, such as fungicides and insecticides.
41. Some strategies to reduce drift are: selecting nozzles to increase droplet size, increase the flow rates of your application, that is, more gallons per acre, use lower pressures, and lower boom heights. Some of the newer technology has introduced drift reduction nozzles.
42. Consider using shielded or hooded sprayers, electrostatic applicators, or air-assist spray equipment. A hooded sprayer is a type of shielded sprayer where the spray pattern is fully enclosed, including the top, sides, front and back. Several manufacturers provide shields for nozzle spray pattern protection. Some cover the entire spray boom with a solid cover, others are perforated shields while others are individual nozzle spray shields. It is to be noted that shields only reduce the amount of drift and DO NOT ELIMINATE drift completely. Care must be used when spraying near susceptible crops as some drift still occurs.
43. Research conducted at Oregon State University found that the use of a hood over a spray boom greatly reduced the amount of drift when using the 8002 nozzle. Drift was reduced about two-thirds over an unshielded boom. It was also found that drift from hooded sprayers is highly dependent upon the droplet spectrum. Decreasing drop size from 320 microns when using an 8002 nozzle to 130 microns when using the 800025 nozzle produced a three-fold increase in drift. A shield can significantly reduce drift but if smaller nozzles are installed to reduce application rates, drift will again occur.
44. Previous research during the 1990’s by North Dakota State University added a fluorescent dye to the spray tank and spray drift was collected on a cotton string which was analyzed with a fluorometer. The collection site was laid out with 100 feet of string placed horizontal above ground plus an 18 foot vertical section at the far end of the horizontal. This was placed downwind of the sprayer and parallel with the wind. Three types of shields were compared to an unshielded spray boom. It was found in this study, as indicated by the amount of dye collected shown in this table, that all shields significantly reduce the drift as compared to an unshielded boom. There is no significant difference among shield types, but it appears that full boom shields reduce the drift slightly better than the windcone type. All shields reduced drift by at least 50%.
45. Results from laboratory tests conducted at the University of Missouri indicated that a mechanical shield could reduce spray drift deposit by up to 70 percent. Tests conducted in Ohio under field conditions generally showed reduction in drift deposits of up to 65 percent with a shield. However, in three of the 11 tests, there was an increase in drift deposits with the shield. The researchers indicated that operating conditions, prevailing wind velocity, and size and configuration of the shield greatly influence the reduction of drift deposits. For example, a shield was most beneficial at the highest wind speed/ground-speed combinations tested.
46. Many technological changes have occurred in the spray industry in recent years. Much attention has been given to application equipment to increase efficiency and minimize spray drift. Equipment design changes have occurred in all forms of ground application. Much of the improvements have been directed at the reduction of spray drift.
47. Air-assist sprayers are popular for applications of fungicides and insecticides in heavy crop canopies. The systems are designed with either a solid tube or canvas bag that will distribute high volumes of air along the boom. Openings along the boom allow the air to be directed at the crop canopy. In some designs the spray and air are combined prior to exiting the boom, while in others a shield of air is directed parallel or into the spray stream. The addition of the air boom and components adds dramatically to the cost of the spray machine. When used in dense canopies the air stream will aid in deposition into the target by moving the canopy to open it to allow deeper penetration. However, when used in bare ground type applications the added air movement from the sprayer can increase the drift potential.
48. The use of electrostatic sprayers has been developed for spraying agricultural chemicals. The spray solution is charged prior to distribution to the boom in the white container shown on the screen. The card, on the right of the screen, represents the underside of a leaf that would not receive a direct spray. Coverage to all sides of the target leaf is improved as shown on the lower water sensitive paper where the charge was on.
49. Sensor-controlled precision spray systems are designed to tailor pesticide delivery to individual tree canopies. When used with foliar application equipment, sensors trigger the opening of valves so that pesticide is sprayed only in the zones where foliage is present. The same sensor systems can be used with herbicide or fertilizer applicators, but for these uses, application is triggered by the absence of foliage above a specified height, tailoring applications for better reset management. Precision spray systems can greatly decrease the quantity of spray materials used without compromising effectiveness, and can reduce the potential pollution arising from off-target deposition, but must be used properly to achieve these benefits. There are currently two basic types of systems available: those using ultrasonic devices and those that use lasers, pictured here. All systems include an onboard computer that can be used to program basic sprayer functions and monitor savings from use of the sensor-controlled system.
50. The purpose of drift retardants as an additive to the spray mixture is to increase viscosity. Increased viscosity results in shift in the droplet spectrum that reduces fine drops. There are many commercially-available retardants on the market; most are some type of long chain polymer or gum. \*A few examples of these polymers are listed here. Unfortunately, their performance in reducing spray drift has not been consistent according to data from unbiased sources. While some university research will show positive findings, research conducted by another university or the USDA will report completely different findings. For example, Ohio State University found that all of the materials listed on this slide reduced volume of small droplets compared to spraying water only, but to varying magnitudes. Their findings showed that the reduction in droplets smaller than 100 microns ranged from 30% with the least effective product, to 68% with the most effective product.
51. Researchers at the University of Nebraska investigated the relative effectiveness of nozzle type and drift retardants, and concluded that drift-reduction nozzles are a more efficient method of managing drift than spray additives. The experiment was repeated six times during the years 2000 and 2001 with wind speeds ranging from 3 to 20 miles per hour. The effectiveness of the different tactics was evaluated by determining both droplet size and distance from the boom that herbicide injury symptoms were visible. As droplet size decreases, the number of droplets prone to off-target movement increases. The air induction nozzle produced the least number of small droplets, whereas the flat fan tips produced more small droplets than all other nozzle types as we see in the table here. The distance from the boom at which drift injury was visible was greater with flat fan tips than the other nozzle types. Reducing spray pressure from 40 to 20 psi using the flat fan did not significantly alter droplet size or distance of drift injury.
52. The air induction and flat fan nozzles were evaluated with several types of commercial drift retardants. \*None of the drift retardants caused a significant reduction in the distance that drift injury was observed when using flat fan nozzles. With an air induction tip, \*Border, which is a blend of non-ionic, water-soluble polymers, significantly reduced the distance of drift compared to the other spray additives and the no-additive control. Although the data aren’t shown here, when used with the air induction tips, all of the additives reduced the number of small droplets compared to the control, but no additive reduced the number of small droplets when used with flat fan tips.
53. Laboratory research conducted by the USDA evaluated drift potentials associated with off-target ground and airborne spray deposits discharged with a hollow cone nozzle spraying three different drift retardants at a high operating pressure and various wind velocities in a wind tunnel. The major spray pattern width was not changed after drift retardants were added into the spray carrier. According to the results from this laboratory study, both nonionic colloidal and polyvinyl polymer drift retardants reduced the drift potential compared to the spray carrier containing water only. Remember, no drift control agent will eliminate drift. If you use them, use them in combination with additional control measures.
54. A buffer zone is an area where pesticide is not directly applied thereby providing protection to a defined area. Buffer zones are usually adjacent to sensitive or protected as established by local, state, or federal regulations. An area may also be designated as a buffer zone by \*pesticide product labels, the prevailing environmental conditions, or nearby sensitive or protected areas. Check labels closely for any required buffer zones. As an applicator you are responsible for establishing buffer zones as needed to protect sensitive or protected areas.
55. Consider the field conditions at the application area. What are the adjacent crops? Is the field close to houses or a town? Are buffer zones required? Is this a preventative treatment or have pest thresholds been reached? Make sure you are using all the available integrated pest management (IPM) techniques. Large uniform fields are good candidates for aerial applications while small irregular shaped fields may be better suited for ground applications.
56. When choosing a pesticide there are a number of factors to keep in mind to help minimize drift. Of course you must control your target pest. If you have the option, choose a product that is safer for your application conditions. Understand the product chemistry and label directions such as the need for surfactants, drift control agents, temperature or wind restrictions. Consider worker exposure and safety and any label restrictions. Consider the effect this product may have on homes and gardens near the application site. Also make sure you consider environmental and wildlife safety.
57. When making spray applications you cannot control wind, temperature, and humidity. These factors can all affect the spray application and increase the potential for drift. You also cannot control the presence of susceptible crops or other non-target areas of concern near your application site. Make sure you have the proper application conditions before making a spray application to ensure your spray stays on-target.
58. Common sense tells you the drift potential increases with increasing wind speed. However, many factors can influence drift such as droplet size and boom height. The effects of wind are reduced if small droplets are minimized and the application is made at the proper height. Wind gauges are a very valuable and economical way to determine wind speed. A compass is good to precisely determine the wind direction. Wind speeds, magnetic directions, and a time stamp should be included in the spray record often enough to reflect any changes that occur during the application. Remember: If you end up in court because of a possible pesticide misapplication, the better your application records are the better your defense will be.
59. The wind direction during a spray application is very important. Make sure you know the location of sensitive areas. Wait until the wind is blowing away from these areas or establish safe buffer zones. Do not spray at any wind speed if it is blowing towards sensitive areas – ALL NOZZLES HAVE THE POTENTIAL TO DRIFT. Spray when the breeze is gentle, steady, and blowing away from sensitive areas. Dead calm conditions are never recommended because of the likelihood of temperature inversions.
60. Calm or low wind conditions may indicate the presence of a temperature inversion. Drift potential is lowest at wind speeds between 3 and 10 miles per hour; that is, a gentle but steady breeze, blowing in a safe direction away from sensitive areas.
61. Temperature and humidity are two other related factors that can affect the amount of spray drift. The temperature affects the speed at which spray droplets evaporate - \*the faster they evaporate the more likely they are to reach a driftable size before reaching the target. The temperature also affects the winds at the application site and the ability to get the product down into a dark canopy. Humidity also affects the speed of evaporation of spray droplets. The higher the humidity, the slower the evaporation and the less chance for drift.
62. This illustration shows the relationship between humidity, droplet size, and drift. The lower the humidity, the faster the droplets evaporate. \*As they evaporate they become smaller and more likely to drift. Evaporation is not as much of a problem for large droplets. So minimize the number of small droplets to combat spray drift.
63. There are some other things you need to keep in mind when planning a spray application. Make sure you allow enough time for scheduling and planning the application, obtaining the pesticide products, and setting up the application date. Have contingency plans for delays or maintenance problems, if necessary. Remember that applicator decisions are one of the most important factors in minimizing spray drift. By planning ahead you can avoid the trap of declaring “I need to spray RIGHT NOW”. Forcing a spray application under poor conditions almost always leads to drift or other errors.
64. In conclusion, remember that minimizing spray drift is in the best interests of everyone. Do your part to keep agrichemical applications on target.
65. That concludes the discussion portion of this presentation. If we can be of service, please call on us in Gainesville.
66. We thank these universities and organizations for contributing photographs and information.