Imperial County Agricultural Briefs

Features

From your Farm Advisors

University *of* California
Agriculture and Natural Resources

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Herbicide Drift; Causes, Consequences and How to Avoid It

Oli Bachie

During my early assignment as a farm advisor, I received a complaint of sudangrass "burned down" by a grower. This problem was later discovered that it was caused as a result of herbicide drift from the nearby spray of a round-up ready sugar beet field sprayed under windy conditions. Regardless of the large gap between the two crop fields, the drift has damaged a large area of the sudangrass crop. After having a tour of the fields with one of my collogues and observing the effects, I decided to write this article believing that it may serve as warning; learning and taking necessary measures to avoid such problems. I believe that this may be an important piece of information for growers, pest control advisors and pesticide applicators in minimizing or avoiding herbicide drift.

Sprayed roundup ready sugar beet (right) and drift affected sudangrass field (right). Observe wide land gap in between

An herbicide is simply defined as a chemical substance used to destroy or inhibit the growth of plants; especially weeds. Therefore, it can actually kill any plant unless there are selective control properties within the herbicide. It must also be known that the term weed is user specific, because someone's weed could be the other person's crop.

The depth of drift (left) and close up look at the extent of herbicide drift damage (right) on sudangrass from a nearby field spray.

What is herbicide drift? Herbicide drift is movement of an herbicide away from the target area. There are three main forms of herbicide drift; droplet drift, vapor drift and particulate drift. ***Droplet drift*** is the most common cause of off-target damage, but the easiest to control because under good spraying conditions, droplets are carried down by air turbulence and gravity, to collect on plant surfaces. ***Particle drift*** occurs when herbicide carriers evaporate quickly from the droplet leaving tiny *particles* of concentrated herbicide and may damage susceptible crops up to 30 km from the source. ***Vapor drift*** is confined to volatile herbicides such as 2,4-D ester. It arises directly from spray or evaporation of herbicide from sprayed surfaces and may occur hours after the herbicide has been applied.

It should be noted that the main goal in Herbicide use is to maximize the amount reaching the target and minimize amount reaching off-target areas. Reaching the target would maximize the effectiveness of the herbicide, while reducing damage or contamination of crops and/or areas. Since all pesticides are capable of drifting, one who sprays these materials has the moral and legal responsibility to prevent drift and hence, avoid contamination or damaging of crops and sensitive areas.

Signs of herbicide damage

Herbicide damage is difficult to tell, because similar symptoms may be caused by several other things including; nutrient shortages or excesses, water excess or drought, wind driven sand or soil particles, high or low temperatures, mechanical damage, or other pesticides. However, **general symptoms** can be in the form of reduced leaf size and shortened internodes or that new leaves may turn yellow or have chlorotic spots, curling, cupping, and vein distortion of the leaves on some trees, plants may become more susceptible to disease and other pests, petiole and stem twisting and malformed leaves (such as effects by 2,4-D). An overall symptom from herbicides is the reduction in growth of the affected plant (from inhibition of cell division or other effects) and decline or loss of yield.

How to reduce Herbicide Drift

The first thing an herbicide applicator has to do is to read labels for droplet size requirements of the herbicide and then set up equipment to ensure drift minimization. A drift can be minimized by selecting appropriate nozzle type and pressure with due consideration for the weather conditions, most importantly the wind velocity and temperature inversions. **Transport of herbicide away from the target area could be** under the influence of gravity, buoyancy and wind. In this case, large droplets may fall faster than small droplets. In other words, the higher the droplet is released, the further it will move away from the target area because there is more time for the wind to move the droplet before it lands. Hence, an herbicide drift is closely related to boom or flying height. In drift prone conditions, boom should be operated at lowest height possible. Decreasing nozzle spacing will also allow boom to be operated at a lower height.

Temperature inversions would occur when warmer, less-dense air moves over cooler, denser air. The situation could create subtle horizontal air flows that can move concentrated amounts of spray long distances. Herbicide applicators should make clear understanding of the following aspects before and during herbicide applications;

(1) **Before spraying**

- Always check for susceptible crops in the area.
- Recognize all sensitive areas (wildlife and people).
- Know what is around the application site.
- Notify neighbors of your spraying intentions.
- When spraying, record weather and relevant spray details.

(2) During spraying

- Always monitor weather conditions and understand their effects. Do not spray if unsuitable, and stop if conditions change.
- Minimize spray release height.
- Select herbicide type to minimize potential drift. Always use least-volatile formulation available. If sensitive crops in area, use least damaging herbicides. If possible, add drift retardant.
- Keep a supply of various nozzle types.
- Spray early morning when wind is still calm.
- Have ultimate control of drift management.

There is a legal aspect of herbicide drift from the Agricultural Practices (Disputes) point of view, registration of chemicals and the Environmental Protection Act. In addition to crop yield loss legal suite, the Department of Environmental Protection can prosecute a person that "causes or allows to be caused pollution". Herbicide drifts can be simply prevented or reduced, if properly handled. In all cases, one should avoid spraying during certain weather conditions such as midday turbulence, high temperature, high humidity and still conditions (high wind).

Documenting chemical drift (required information)

- Date of application and herbicide/tank-mix information.
- Herbicide name and rate.
- Wind direction, speed and temperature.
- Type of applicator, boom height, nozzle type, spray pressure, nozzle orientation and spray volume.
- If crop damage occurred, record crop and herbicide history of the damaged field, map of the area, yield loss estimates to predict the extent of damage and of course take a large number of high-quality photographs.

MANAGEMENT OF WEB-SPINNING SPIDER MITE IN ALFALFA SEED PRODUCTION

Eric T. Natwick

Web-spinning spider mites are an annual problem for alfalfa seed producers in the low desert production areas of Southern California and Arizona. Spider mites insert needle-like mouthparts into leaves, removing plant sap and causing chlorotic spot stippling on leaves. Severe feeding damage may turn leaves yellow, then brown from desiccation, causing defoliation. Damage usually starts in the lower plant canopy and moves upward as the mites move to new leaves. Severe feeding damage reduces alfalfa seed production. Several spider mite species are found in low deserts:

- Twospotted spider mite (Tetranychus urticae Koch)
- Carmine spider mite (T. cinnabarinus Boisdival)
- Strawberry mite (T. turkestani Ugarov & Nikolski)
- Desert spider mite (T. desortorum Banks)

A management plan should be developed prior to the start of alfalfa seed production. The plan should include the following components:

- Decision of returning to hay production, seed production or terminating the alfalfa after seed harvest (returning to hay production greatly limits choices of miticides
- Survey surrounding crops and weeds as potential sources of spider mites
- Dust mitigation (critical around alfalfa seed production fields)
- Abatement of sources of spider mites
- Scouting plan for spider mites detection and treatment decisions
- Application of miticides as needed to prevent seed yield losses.

Crops such as melons and many weed species can harbor web-spinning spider mites and may become a source of infestation for an alfalfa seed crop. Spider mites may also be harbored on the lower leaves of alfalfa plant throughout the year. Applications of certain insecticide (organophosphate or pyrethroids) to control insect pests during hay production (aphids, weevils, leafhoppers) or during seed production (lygus bug and stink bug), can flare spider mite populations via destruction of predators or through hormoligosis (chemical stimulation of increased egg production). Many predators feed on spider mites including western flower thrips, minute pirate bugs, bigeyed bugs and predaceous mites.

Web-spinning spider mite colony buildup is favored by dry dusty conditions. Dust from field roads drifting onto alfalfa plants may flare-ups a web-spinning spider mite infestation. Treat field roads with water to minimize dust from vehicle traffic. Post speed limit signs (5 mph) on field roads.

Abatement of sources of spider mites is important to reduce the potential for migration into the alfalfa seed field. Abatement should include weed control and if possible removal or treatments of spider mites in surrounding crops such as melons.

Alfalfa seed production fields should be scouted twice weekly for spider mites beginning early season and continuing until the crop is prepared for harvest. Fields should also be monitored for spider mite predators such as western flower thrips, minute pirate bugs, bigeyed bugs, predaceous mites, and other predators. Proper scouting will lead to accurate assessments of spider mite pressure versus the predator population levels that may result in reduced use of chemicals through improved timing of applications. It may be practical to spot-treat only portions of a field where there are spider mite hot-spots.

When web-spinning spider mites are present in an alfalfa field prior to seed production, a miticide spray may be needed to prevent damage leading to reduction of seed production. Stressing the alfalfa for water can stimulate bloom, but also favors the build-up of spider mites. Historical knowledge of spider mite problems influences whether a grower controls spider mite populations immediately, or delays treatment for a while. Treat fields before populations reach damaging levels to maximize the efficacy of available chemicals. When possible, spot or strip treat localized spider mite infestations. Use ground application equipment when possible (prior to bee placement) to improve coverage. To prevent spider mite problems consider including a miticide with the first insecticide application for lygus bugs. There is historical research trial evidence indicating that an application with a highly efficacious miticide early in the season with the first lygus bug treatment can prevent damaging population levels of spider mites for the remainder of the seed production season. Miticides registered for alfalfa seed production work best when used against low populations; none can resolve a significant spider mite problem.

Photo courtesy of UC IPM Online

The California Alfalfa Seed Production Research Board
and UC Cooperative Extension invite you to attend a

Combine Clinic

July 15, 2013
Desert Research and Extension Center (DREC), El Centro, CA

Join us for a day of classroom instruction and hands-on training on how to set up a combine to improve your alfalfa seed harvest. Topics include improving harvest efficiency, reducing seed losses, and harvesting higher quality seed.
Alfalfa seed growers and combine operators are both urged to attend!

AGENDA

10-12 AM	Classroom Lecture with John Aubin – Handouts will be provided. *John has spent a lifetime helping growers with harvest issues in almost all 50 states and many other countries.*
12-1 PM	LUNCH (Sponsored by the Alfalfa Seed Industry)
1-3 PM	Hands-on training with combines including combine configuration, combine harvesting functions and safety procedures. Location to be specified soon.
3-4 PM	Question and Answer Session, Final wrap-up.

IF YOU WOULD LIKE TO RECEIVE ADDITIONAL INFORMATION OR RESERVE A PLACE IN THE CLASS, PLEASE RSVP WITH YOUR NAME, PHONE NUMBER, AND E-MAIL ADDRESS BY JULY 10TH.

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Our programs are open to all potential participants. Please contact the Desert Research and Extension Center office two weeks prior to the class at 760-356-3060, if you have any barriers requiring special accommodations.

CIMIS REPORT AND UC DROUGHT MANAGEMENT PUBLICATIONS

Khaled Bali and Sharon Sparks*

California Irrigation Management Information System (CIMIS) is a statewide network operated by California Department of Water Resources. Estimates of the daily reference evapotranspiration (ET_o) for the period of July 1 to September 30 for three locations in the Imperial County are presented in Table 1. ET of a particular crop can be estimated by multiplying ET_o by crop coefficients. For more information about ET and crop coefficients, contact the UC Imperial County Cooperative Extension Office (352-9474) or the IID, Irrigation Management Unit (339-9082). Please feel free to call us if you need additional weather information, or check the latest weather data on the worldwide web (visit http://tmdl.ucdavis.edu and click on the CIMIS link).

Table 1.Estimates of daily Evapotranspiration (ET_o) in inches per day

Station	July		August		September	
	1-15	16-31	1-15	15-31	1-15	16-30
Calipatria	0.39	0.38	0.35	0.32	0.30	0.27
El Centro (Seeley)	0.38	0.37	0.32	0.29	0.29	0.26
Holtville (Meloland)	0.39	0.38	0.34	0.31	0.30	0.27

* Imperial Irrigation District.

Link to UC Drought Management Publications

http://ucmanagedrought.ucdavis.edu/