FOR DEFOLIATION, COVERAGE IS KING

SPRAY APPLICATION EXPERT BILL GORDON TELLS HOW TO BEST APPLY DEFOLIANTS TO GET THE BEST RESULTS FROM THIS CRITICAL OPERATION.

- Best practice defoliation means maximising the deposition of chemical on the crop and minimising off target movement.
- The Top third of a cotton plant will intercept 70 percent or more of spray.
- Good coverage becomes a function of droplet size.
- Be aware of application options (i.e. over the top/droppers/aerial).
- Most agricultural aircraft don't have capacity to economically spray at the volumes ground rigs are capable of.
- Significant label changes and the inclusion of no spray zones
- Favourable weather conditions are critical to minimise the potential for damage to native vegetation, aquatic areas and other crops.
- Measuring and recording the weather conditions must occur at the site of at the start, during and completion of the application.

When it comes to effectiveness of defoliation coverage is king, yet can often be compromised as a fully mature cotton plant can have a large leaf area, with each layer of leaves capable of intercepting a percentage of the incoming droplets. As the upper leaves intercept droplets, they reduce the number of droplets that are available to deposit onto the leaves that are situated in lower parts of the canopy.

Typically the leaves in the upper third of a mature cotton plant will intercept around 70 percent (or more) of the incoming droplets. This means that when we are trying to defoliate the crop, good coverage becomes a function of droplet size (for penetration, retention and survival) and the application volume (which dictates the number of droplets produced).

Ground Application

Over the top applications

For ground application, higher water rates (typically above 100 L/sprayed ha) usually provide superior results. Higher water rates often remove more leaf per application. For over the top applications fine spray qualities tend not to penetrate beyond the upper third of the canopy (unless an air assisted sprayer is used or using nozzles situated on droppers within the canopy).

Medium spray qualities strike a good balance between penetration and droplet retention, but still present a risk for off target movement of product. Coarse spray qualities increase droplet penetration and reduce drift potential, but they can also reduce the evenness of the application due to the reduction in the number of droplets produced.

There is roughly a five-fold difference in the number of droplets produced when comparing the medium end of a fine spray quality with the medium end of a coarse spray quality. Hence, using larger droplets (to minimise drift) generally requires higher application volumes to produce a sufficient number of droplets.

Using droppers and directed sprays

If droppers are used to release the spray within the canopy, the use of fine/medium droplets will generally provide the best coverage. Hence for ground application, a good setup for defoliation is to have nozzles producing a medium/coarse spray quality over the top of the row (often using twinjet style nozzles or twin caps), and a number nozzles on droppers/swivels releasing medium/fine droplets within the canopy.

Care must be taken when defoliating wider row cotton with directed sprays not to overdose the crop by having too much overlap on some nozzles, or incorrectly calculating the actual band / application rate. Over application can result in leaf ‘freeze’ on the plant. When using an oil based adjuvant it may be appropriate to select standard low drift (pre-orifice) nozzles or larger orifice flat fans (typically run at pressures above 3.0 bar). If selecting an air induction nozzle, it is suggested to operate them at pressures that produce nothing larger than a coarse spray quality, operated at the higher end of their pressure range.

Aerial Applications

Most agricultural aircraft do not have the ability to economically spray at the volumes that a ground rig is capable of. Most aerial defoliations occur at volumes up to 40-50 L/ha. If the conditions are suitable, many agricultural aircraft tend to utilise fine to medium spray qualities for defoliation, to generate sufficient droplet numbers from the application volume used.

Often the smaller droplet sizes used by agricultural aircraft, combined with the higher release heights they operate at, means that the risk of spray drift moving off target is far greater with an aircraft than using a ground rig under similar conditions. The risk of off target movement from aircraft is further increased when the conditions for spraying are not suitable, particularly early in the morning (typically before the sun has risen more than 20 degrees above the horizon) when surface temperature inversions are still present, or in the process of breaking down, at this time wind speeds of four km/h are not sufficient.

Using cross winds

Aerial spraying is always best done with a relatively consistent cross wind to increase the evenness of the overlap between each spray pattern. When agricultural aircraft fly into, and with the wind when spraying, the spray pattern can be compressed and expanded respectively. In situations where the paddock must be flown into and with the wind for safety reasons, it may be best to utilize a 'race track' pattern or a 'squeeze' pattern, rather than flying 'back to back' patterns into and with the wind.

It is always good practice to discuss the application with the aerial operator, ensuring they are aware of sensitive areas, potential hazards and that you are both understand label restraints on how the products may be used.

Label Changes and Spray Drift Restraints – No Fly Zones

All applicators need to be aware that Australian Pesticides and Veterinary Medicines Authority (APVMA) changes to labels have occurred on new products and those that have been recently reviewed (such as products containing Diuron). One of the significant changes is the inclusion of no spray zones on the label. A no spray zone is an area that cannot be sprayed when the wind is towards an area considered to be sensitive on the label.

One example of a label that has no spray zones is Dropp® UltraMAX. For ground application the no spray zones are quite small: five metres to 15 metres. For aerial application the no spray zones can be significant: 20 metres to 450 metres. Depending on the aircraft type, spray quality used and the wind speed at the time of application. The downwind no spray zones for aircraft may vary between 20 metres and 450 metres to terrestrial vegetation and between 20 metres and 160 meters to aquatic areas. Another interesting restraint on the Dropp® UltraMAX label is "Do not apply Dropp Ultramax by air when citrus is in flush within eight km downwind from the point of application."

Suitable Conditions

All applications need to be made when the weather conditions are favourable. This is critical during defoliation to minimise the potential for damage to native vegetation, aquatic areas and other crops.

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Keep good records of the whole application

Measuring and recording the weather conditions must occur at the site of at the start, during and completion of the application. Many labels now specify the kinds of records that must be kept. These must be read in conjunction with state regulations, such as the requirements of the NSW Pesticide Act or the Qld ACDC Act, where additional information such as Batch no in NSW or APVMA approval number for contractors in Queensland needs to be recorded. Good records include a comment on the outcome of each spray job and noting good or bad results.

Best practice is about doing all the little things well, which add up to a better outcome. For defoliation this means maximising the deposition on the crop and minimising the off target movement and ensuring the products are used in accordance with the manufacturer's recommendations and following all of the label instructions and restraints.