



# Spraying Basta® more efficiently in plantation crops

Sometimes it takes a less than ideal outcome to spark a re-think of the way we do things.

Examination of Basta herbicide efficacy and spray practices in several plantation crops has provided some key learnings for improving spray results.

Basta, 200 g/L glufosinate-ammonium, is a herbicide registered in many plantation crops for control of grass and broadleaf weeds. Glufosinate is identical to a naturally occurring substance which can be found in some soil bacteria. When sprayed onto weeds, this compound controls them by blocking part of the photosynthesis process, resulting in ammonium poisoning. Basta has good environmental compatibility and is highly suitable for use in plantations because of its tree safety characteristics.

When Basta contacts plants it is generally only taken up by photosynthetic (green) plant tissue. This means minimal uptake through the lignified parts of woody plants or through the lower trunk of larger pseudostems in bananas. Basta has very limited movement (translocation) in plants, so that systemic movement does not create a significant crop safety risk. However that limited translocation makes thorough spray coverage a critical requirement for weed control.

Used appropriately, Basta can achieve control of even the toughest tropical grasses. Warm season C4 grass weeds in North East Australia are typically more resilient than the temperate (cool season) C3 grasses and are generally more difficult to control with herbicides.

In a number of plantations it was observed that standard nozzles and application practices were leading to:

- rapid droplet drying;
- inadequate upper leaf coverage, with upright leaves of C4 grasses not being covered;
- a 'shatter and pool effect' with air induction nozzles producing high velocity droplets; and
- deflection of tall weeds under the boom, removing herbicide droplets.

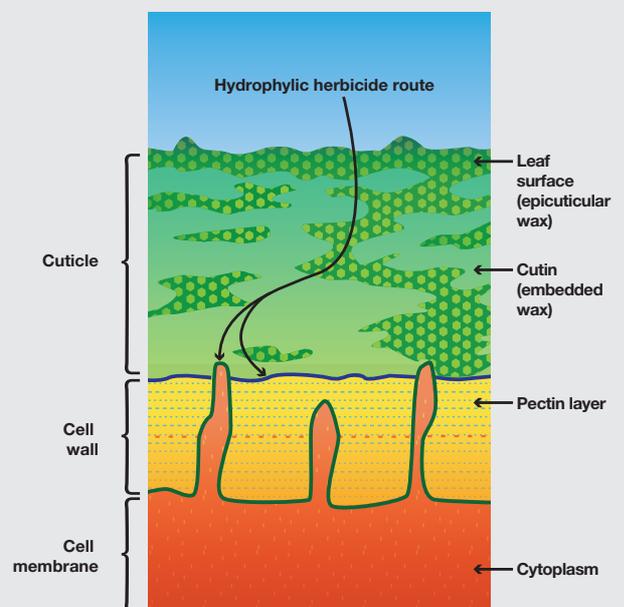
By changing just a few aspects of the spray program it is easy to dramatically improve results from Basta.

## Goal: Maximise penetration into the leaf

Basta is hydrophilic, meaning it is attracted to, and tends to be dissolved by, water. To examine the efficacy of Basta, we must first consider how a hydrophilic herbicide moves in the leaf.

In order to be effective, herbicides must move from the leaf surface to the 'target site'. The target site for Basta is located within the cytoplasm of plant cells. In order to reach the cytoplasm, Basta must first move through the cuticle, then the cell wall, and finally the cell membrane (see Figure 1 below).<sup>1</sup>

Figure 1. Leaf cross-section



The main barrier to foliar absorption of Basta is the waxy leaf cuticle. Hydrophilic substances are slow to move into cuticular waxes. Therefore, Basta moves slowly through the surface wax regions of the leaf. Movement becomes easier as the herbicide approaches the pectin and cell wall layers, as these underlying layers are hydrophilic (water-loving).<sup>2</sup> While Basta is slow to move into the plant, it takes effect quickly once inside the leaf tissue.

Under conditions of low relative humidity or drought stress, the water content of the cuticle is lower, pulling wax units in the cuticle closer together – in effect creating a ‘waxier’ leaf surface. This results in more restricted aqueous routes through the cuticle for hydrophilic herbicides.<sup>2</sup>

The effect of relative humidity (RH) on the uptake and efficacy of glufosinate-ammonium was examined in experiments by R.J.L. Ramsey *et al.* in wild oats.<sup>3</sup> They concluded that high RH was associated with increased uptake and efficacy of glufosinate-ammonium, while low RH was associated with poor efficacy and uptake. They hypothesised that exposure to high RH after spraying may increase the droplet drying time and allow a longer ‘window’ for the herbicide to penetrate the cuticle.

### Summary of key findings for optimal results

	Recommendations for optimal results	Current practice
Nozzle	Larger size fan nozzle or turbo twin-jet fan nozzle	Standard flat-fan nozzle
Spray pattern	Coarse spray pattern with full wetting of weed	Fine spray pattern
Rate	Basta @ 3–4 L/ha Water @ 300–500 L/ha	Basta @ 2.5–5 L/ha Water @ 250–700 L/ha
Additives	NIL	Wetter, oils & buffers
Spray conditions	High relative humidity	Variable

### Key learnings

Higher water volumes, larger droplet size, thorough spray coverage and environmental conditions (relative humidity) that allow maximum spray penetration are of particular importance for the uptake and effectiveness of Basta.

Because Basta penetrates into leaves **only while the spray deposit remains moist**, spray volumes need to be high and droplets large enough to ensure complete coverage of weeds and to slow down the drying time. It is critical that the applied spray stays moist on the plant for as long as possible to allow for maximum uptake.

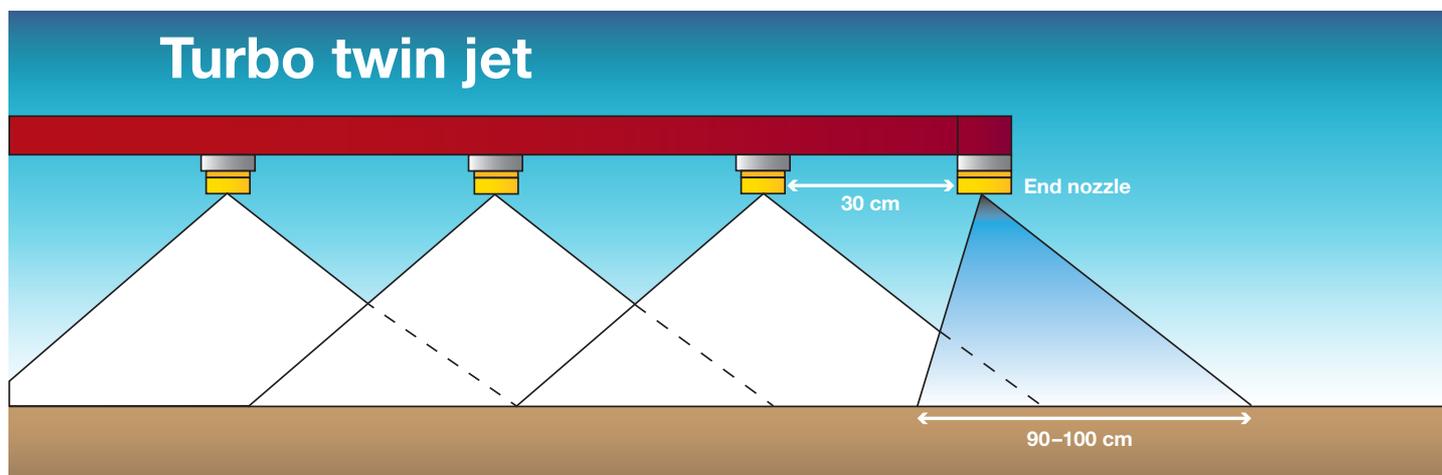
### What can I do to maximise uptake?

Maximise drying time, select the right rate and get complete spray coverage.

The best way to achieve this is to use nozzles delivering larger droplets and water volumes, keep pressures as low as practicable to eliminate very fine droplets, and maximise droplet delivery to the target.

- Use high volumes with no wetters i.e. 300–500 L/ha (Basta contains its own wetting agent).
- Turbo twin-jet nozzles deliver the optimal coverage and droplet size = big/coarse droplets.
- Maintain low pressure to avoid fine droplets.
- Ensure high humidity after spraying (the first 30–45 minutes after application are critical).
- Avoid drying winds.
- Spray the whole of the weed plant.
- Don't spray wet leaves because big droplets will run.
- Ensure that the growing points of weeds are covered with spray.
- Use the correct rate & calibrate the spray boom:
  - Most C4 grasses need 4 L/ha, especially when mature.
  - 3 L/ha is used generally for smaller stands of grass weeds.

Figure 2. Optimal spray pattern – twin jet nozzle



For more information in optimising your Basta spray application, contact your local Bayer Territory Sales Manager.

Always read and adhere to the directions on the product label.

#### References

1. Hartzler B. Absorption of foliar-applied herbicides. Weed Science 2001. Available online at <http://www.weeds.iastate.edu/mgmt/2001/absorp.htm>. Accessed January 2013.
2. Plant & Soil Sciences eLibrary. Foliar absorption and Phloem Translocation. [passel.unl.edu](http://passel.unl.edu)
3. Ramsay R.J.L. *et al.* Effect of relative humidity on the uptake, translocation, and efficacy of glufosinate-ammonium in wild oat (*Avena fatua*). Pesticide Biochem Physiol 2002; 73 (1): 1–8.



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