



Achieving greater efficiency with your herbicide application in orchard crops

Sometimes it takes a less than ideal outcome to spark a re-think of the way we do things. Recent exploration of Basta® Non-Selective Herbicide efficacy and spray practices in avocado and citrus orchards has provided some key learnings for optimising spray results.

Basta, 200 g/L glufosinate-ammonium, is a herbicide registered in tropical and sub-tropical orchards 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 established orchards because of its tree safety characteristics.

Basta has very limited movement (translocation) in plants, with minimal uptake through the lignified parts of woody plants. That limited translocation makes thorough spray coverage a critical requirement. Accidental contact with suckers, low shoots or branches will not harm the tree as a whole.

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 orchards 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.

Summary of key findings for optimal results

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

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.¹

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.²

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.³ 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.

Key learnings

Droplet size, spray coverage, and environmental conditions (relative humidity) that allow maximum spray penetration are of heightened 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.

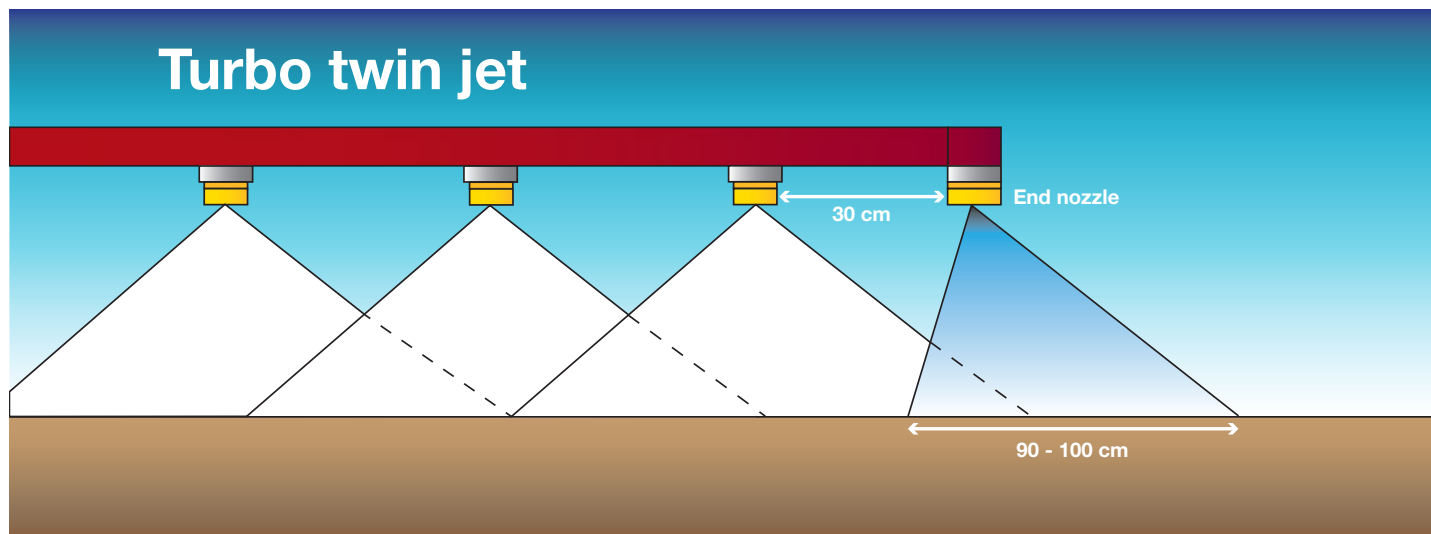
What can I do to maximise uptake?

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

The best way to achieve this is to use nozzles with larger capacity, 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 off.
- Ensure that the growing points of weeds are covered with spray.
- Use the correct rate and calibrate the spray boom:
 - Most C4 grasses need 4-5 L/ha, especially when mature.
 - 3 L/ha is used generally for stands of smaller grass weeds.

Optimal spray pattern – twin jet nozzle



For more information in optimising your Basta spray application, contact your local Northern AgriServices branch or your local Bayer representative.

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References

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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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