

# **Recent application trial results for summer fallow weed management and their implications for nozzle selection to maintain efficacy and drift management**

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## **Introduction**

During the last two summers Bill Gordon Consulting has completed six application trials within the CRDC and GRDC funded project “Drift management extension strategy for the northern region.” The results have reinforced the fact that big droplets do get results on the kinds of weeds we get in our summer fallows, but they also emphasize that the type of formulation or adjuvant used and application volume may impact on the overall level of control with some nozzle types.

## **Focus of this series of trials - Why summer fallow spraying?**

It is hard to escape the fact that most of the large scale drift events in recent years have occurred during the summer months, even after the removal of the high volatile 2,4-D esters from the market. I think we continue to underestimate how far non-volatile products can move, and the contribution that night spraying makes to the overall drift problem. Part of the solution is to reduce the driftable fraction when we are spraying, this can be achieved by using coarser spray qualities.

It is my personal belief that night spraying should only be allowed when using extremely coarse spray qualities, such as those produced by the TTI (TurboTeejet Inducted) nozzles. Even at higher pressures the TTI 02 nozzle produces less than 3% of its’ total spray output in droplet sizes that could potentially move with the wind (based on CPAS wind tunnel studies). Compare this with a standard TT 02 (standard Turbo Teejet) nozzle, which at 2.75 bar which produces at least 20% or more of its total spray output in droplet sizes that could potentially move with the wind. I know which nozzle I would choose to reduce the risk of a drift event, particularly if it provided equivalent efficacy (level of control in the paddock)

Using coarser spray qualities does raise concerns for many growers, machinery dealers and advisors. Common questions are: *Will it get the coverage? Will I need higher water rates? Do I need more adjuvants?* The only way to answer these questions is to produce the trial data. Efficacy, or level of weed control in the paddock, is the best indicator of sufficient coverage. The trial results reported here, and others conducted by the chemical companies, all suggest that for a range of products the coarser spray qualities provide equivalent or better control than the fine and medium spray qualities (such as those produced by standard flat fans or standard TurboTeejet’s operated at higher pressures).

## How were the trials conducted?

**Trial Locations:** Trials were conducted in Central Queensland, on the Darling Downs, and at Wee Waa, NSW during the 2006/07 summer and the 2007/08 summer.

**Weeds Targeted:** Common summer grasses (focusing on barnyard grass) and a range of broadleaf weeds (focusing on sow thistle).

**Treatments:** Products used in this series of trials included Roundup CT alone (or in a tank mix with 2,4-D and Ally), Roundup CT with or without two adjuvant types (Hasten and BS 1000), and comparisons between Roundup CT and Sprayseed. Rates of products were typically below what would be considered commercially acceptable to highlight differences between setups.

Application volumes usually compared 50L/ha or 70L/Ha (or similar) applied using a range of nozzles producing Medium (TT nozzles), Coarse (using TTJ or Low pressure air induction) or Extremely Coarse (using TTI nozzles) spray qualities.

**Application Method:** Treatments were applied using a tractor mounted 12 m boom (6m sprayed) at 20kph. The boom height was adjusted to obtain a double overlap at the target for each nozzle type. Treatments were replicated 3 times, with a 2m wide strip assessed away from the wheel tracks on the downwind side of the boom.

**Conditions during spraying:** All applications were made during daylight hours, with conditions for spraying within label and industry accepted guidelines. This would tend to advantage the medium spray qualities due the good conditions for droplet survival. Given the relatively good conditions, if we could achieve equivalent or better efficacy with coarser spray qualities we would expect that under harsher conditions the coarser spray qualities would still perform as well or better than the mediums (especially with translocated products).



## Two trials using Roundup CT @ 800 mL/ha in 50L/Ha and 70L/Ha with various spray qualities. Wee Waa, NSW and Darling Downs.

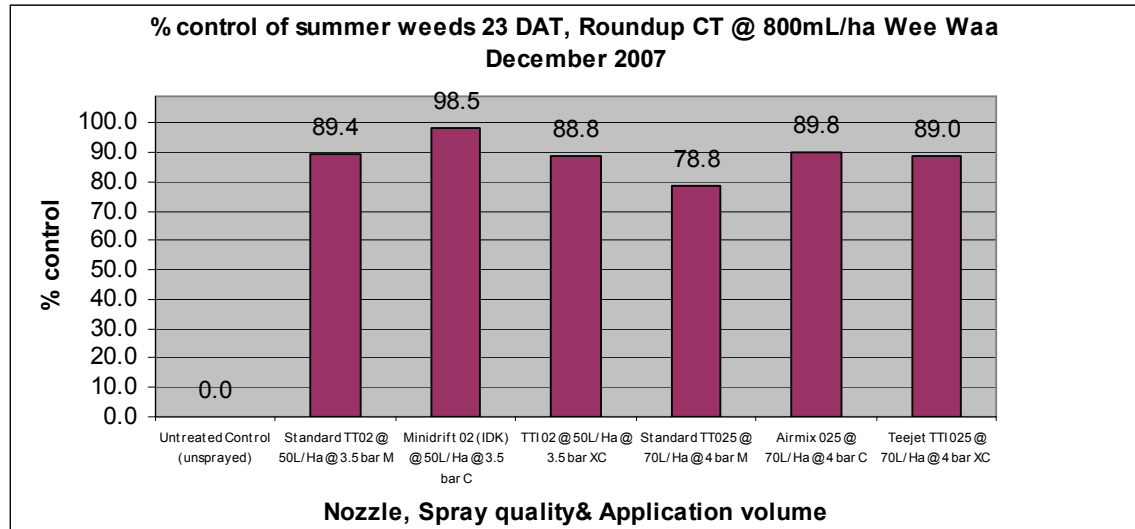
**Treatments:** (7 treatments replicated 3 times)

All sprayed treatments received Roundup CT @ 800 mL/ha applied at a travel speed of 20 kph using a tractor mounted 12 m boom set at a height to achieve double overlap at the target. Nozzles, Pressures and Spray Quality are indicated on the graph

### Trial 1: Main Weeds Present:

Barnyard Grass (small), Wild Gooseberry, Bladder Ketmia, Dwarf Amaranth, Caltrop, Sow Thistle, Wild Turnip (small and large weeds of each species)

### Results:



### Outcomes from this trial:

In this trial a Hardi Minidrifting 02 (older IDK style) @ 3.5 bar (C) at 50L/Ha gave significantly better control with 800mL/ha Roundup CT + LI700 than a standard Turbo Teejet (TT025) @ 4 Bar (M) at 70L/ha.

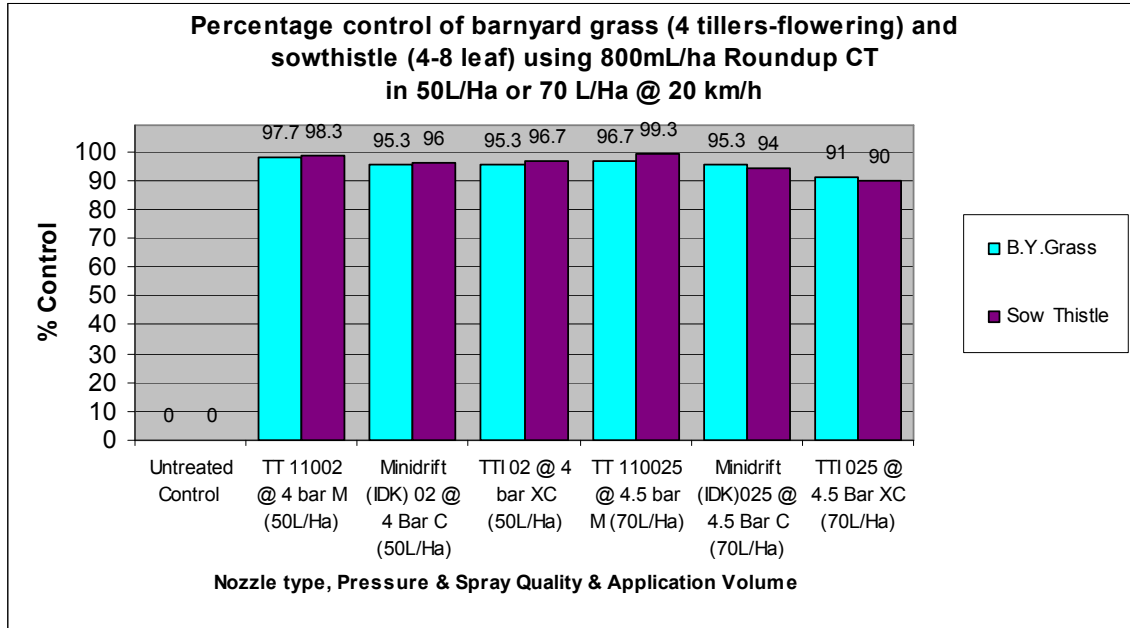
The level of control with all the low pressure air induced nozzles used in this trial were NOT significantly different from each other at 50 L/Ha or 70L/Ha application volumes.

Teejet TTI's producing extremely coarse droplets at 50L/Ha or 70L/Ha provided equivalent levels of control to all other nozzles tested in this trial.

## Trial 2:

**Main Weeds Present:** Barnyard Grass and Sow Thistle

## Results:



## Outcomes from this trial:

Differences in efficacy between treatments were not significant, however the XC droplets at the higher water rate provided a marginally reduced level of control in this trial.

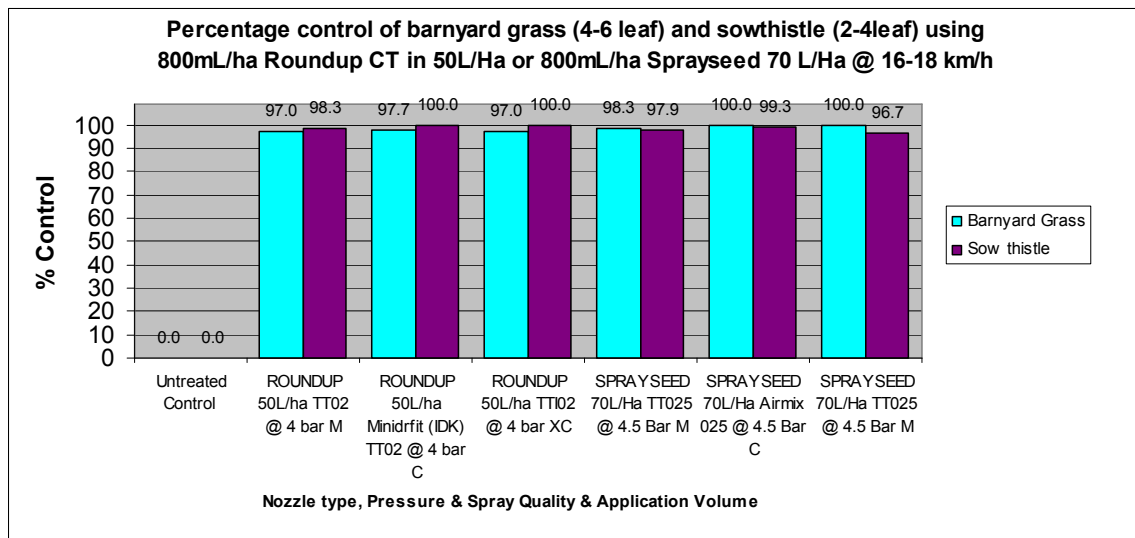
## Roundup CT @ 50L/ha compared with Sprayseed @ 70L/ha using various spray qualities - Darling Downs, December 2007

**Treatments:** (7 treatments replicated 3 times)

Sprayed treatments received either Roundup CT @ 800 mL/ha + LI700 @ 100mL/100L in 50L/ha total application volume or Sprayseed @ 800mL/ha in 70L/ha total application volume applied at a travel speeds of 16-18 kph using a tractor mounted 12 m boom set at a height to achieve double overlap at the target. Products, Nozzles, Pressures and Spray Quality are indicated on the graph

**Main Weeds Present:** Barnyard Grass (4-6 Leaf) and Sowthistle (2-4 leaf)

**Results:**



### Outcomes from this trial:

Equivalent control of the weeds present in this trial was obtained using 800mL/ha Roundup CT +LI700 @ 50L/ha using a Hardi Minidrift 02 (IDK style) @ 3.5 bar (C) or Teejet TTI02 @ 3.5 bar (XC) and using 800mL/ha of Sprayseed @ 70L/ha with an Agrotop Airmix 025@ 4 bar (C)

Roundup CT @ 800 mL/ha+LI700 at 50L/ha with Hardi Minidrift 02 (IDK style) (C) or Teejet TTI02 @ 3.5 bar (XC) gave significantly better control of Sowthistle (2-4 leaf) and Barnyard Grass(4-6 leaf) than Sprayseed @ 70L/ha using a standard TT @4 bar (M) or a TTJ @4 bar (C).

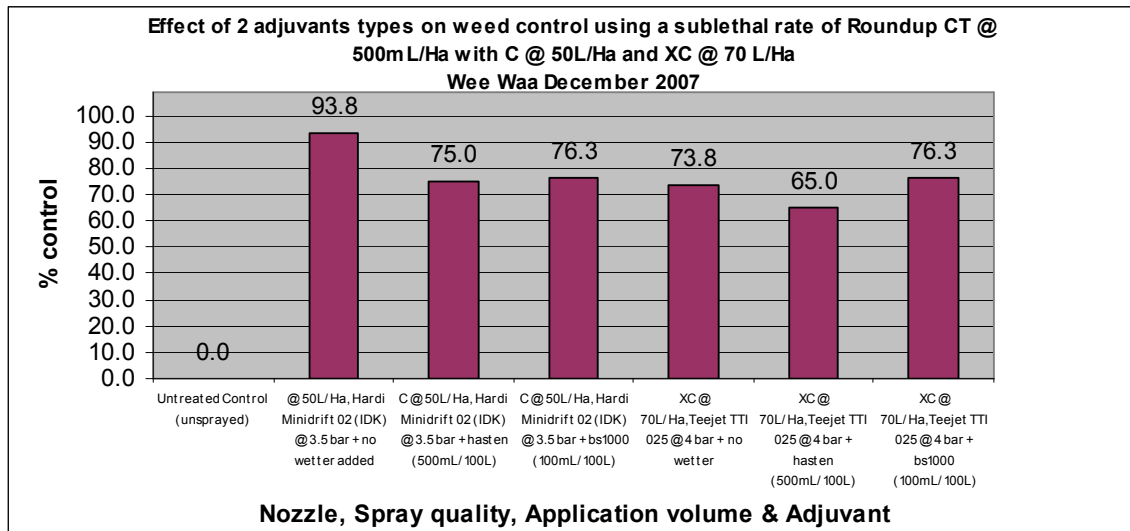
**Effect of two adjuvant types on the efficacy of sub-lethal rates of Roundup CT with two spray qualities and application volumes on various summer weeds (Wee Waa, 2007/8)**

**Treatments:** (7 treatments replicated 3 times)

All sprayed treatments received Roundup CT @ 500 mL/Ha with or without an additional adjuvant (Hasten or BS1000) applied at a travel speed of 20 kph using a tractor mounted 12 m boom set at a height to achieve double overlap at the target. Nozzles, pressures and adjuvants added are listed on the graph below.

**Main Weeds Present:** Barnyard Grass, Wild Gooseberry, Bladder Ketmia, Dwarf Amarath, Caltrop, Sow Thistle, Wild Turnip (small and large weeds of each species)

**Results:**



**Outcomes from this trial:**

When applying sub-lethal rates of Roundup CT with no additional adjuvant to the weed spectrum present in this trial the Hardi Minidrifi 02 (older IDK style) @ 3.5 bar (C) at 50L/Ha performed significantly better than the Teejet TTI 025 @ 4 bar (XC) at 70 L/Ha

When using the Hardi Minidrifi 02 (older IDK style) @ 3.5 bar (C) to apply Roundup CT @ 500 mL/Ha at 50L/Ha in this trial the addition of BS1000 or Hasten significantly reduced efficacy on the weed spectrum present in this trial.

When using the Teejet TTI 025 @ 4 bar (XC) to apply Roundup CT @ 500 mL/Ha with an extremely coarse spray quality at 70L/Ha the addition of BS1000 did not improve or reduce efficacy, however the addition of Hasten appeared to reduce the level of weed control (not significantly) in this trial.

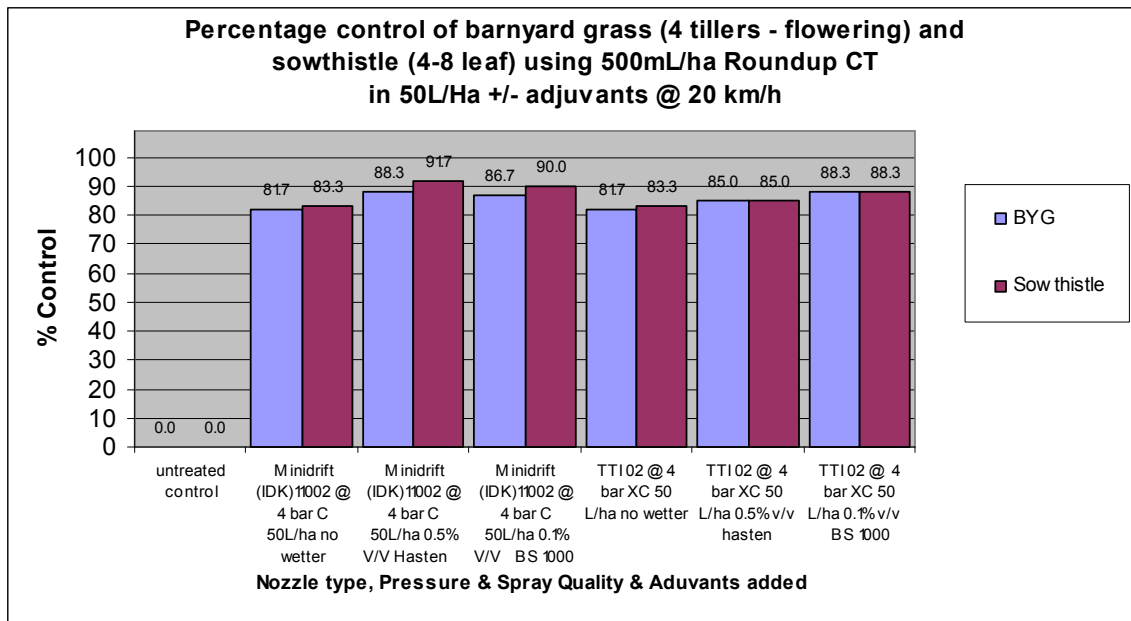
**Effect of two adjuvant types on the efficacy of sub-lethal rates of Roundup CT with two spray qualities on a older Barnyard Grass and Sow thistle (Darling Downs, 2007/8)**

**Treatments:** (7 treatments replicated 3 times)

All sprayed treatments received Roundup CT @ 500 mL/Ha with or without an additional adjuvant (hasten or BS1000) applied at a travel speed of 20 kph using a tractor mounted 12 m boom set at a height to achieve double overlap at the target. Nozzles, pressures and adjuvants added are listed on the graph below.

**Main Weeds Present:** Larger Barnyard Grass and Sow Thistle,

**Results:**



**Outcomes from this trial:**

At 50 L/Ha on the older weeds present in this trial no differences in efficacy were seen when using either a coarse (C) or extremely coarse (XC) spray quality for each product / adjuvant combination. The addition of either Hasten or BS 1000 to the low rate of Roundup CT did not significantly increase or decrease efficacy with either spray quality (C or XC).

## **Summary of all trial results to date: Implications for using coarser spray qualities for summer fallow spraying.**

When using translocated products such as Roundup CT at 50L/ha for control of the summer weeds present in the trials discussed here (particularly barnyard grass and sowthistle) there appears to be no significant impact on efficacy by moving from medium (M), to coarse (C) or even extremely coarse (XC) spray qualities.

Increasing the application volume (from 50 L/Ha) in these trials did not increase efficacy, in fact it resulted in some reductions in efficacy with XC droplets for the lower rates of Roundup CT used. Whereas an increase in volume to 70L/Ha (or more), would be appropriate for many contact products such as Sprayseed, particularly when using coarse droplets.

This series of trials has highlighted that oils and air induction nozzles don't always work well together. The use of products with 'oily' formulations or the addition of oil based adjuvants may impact the performance of some air inducted nozzles, and can result in reduced efficacy – however it is hard to predict when this will actually occur. This is why some products labels state 'do not use air induction nozzles' (also for the risk of phytotoxicity to crops with products such as some of the grass selectives).

### **Conclusion:**

#### **What are the implications for nozzle selection?**

We really should consider having at least two types of nozzles in our toolbox – typically I would choose one low pressure air induction type nozzle and at least one other nozzle (not air inducted) such as a TurboTeejet for use with oily formulations or products that require the addition of an oil based adjuvant, or situations where Medium droplets are preferred. If the two sets of nozzles are carefully chosen you should be able to cover almost every spraying situation.

For example; Most growers use two volumes ranges, a lower volume range and higher volume range, such as 50 L/Ha and 70 L/Ha. If you traveled at an average speed of 20 kph and wanted operate at pressures up to 5 – 5.5 Bar, then you could select a combination like:

Turboteejet 025 to give coarse up to 50L/Ha and Medium at 70 L/Ha, and a

TTI02 or 025 for 50-100L/ha in XC (range depends on orifice size and pressure) for night spraying, pre-emergents and higher risk situations.

Between these two sets nozzles (for this speed and volume range) virtually all spraying jobs can be done with one type or the other. It really is worth spending time on nozzle selection to get the most versatile nozzles for your situation.



How many sets of nozzles do they really need ?  
 (Broad-acre example).

Typical Application Volume	Medium Spray Quality  (lower risk areas)	Coarse / Very Coarse Spray Quality	Extremely Coarse Spray Quality  (higher risk areas)
Low range  50-70 L/ha	Older insecticides, with short residual. Translocated herbicides on medium targets,	2,4-D and tank mixes, Fully translocated products  TT 025	Fully translocated herbicides, moderate targets, very sensitive areas.  TT1 02
High range  75-100L/ha	Small targets In crop spraying, contact type products, Penetration and coverage in large broadleaf crops	Most products and Most targets. Soil Applied's Stubble and Cereal penetration Some contacts at higher volumes	Pre-em's Fully translocated herbicides, most targets, very sensitive areas