

COMPARISON OF THE SOLUBILITY OF TWO GIBBERELIC ACIDS FOR AGRICULTURAL USE

Blair Cotching¹, Ray Simms², George Kerse¹

¹*Ravensdown Fertiliser Co-operative Limited*

²*LABTEC Limited*

blair.cotching@ravensdown.co.nz

Abstract

Some formulations of gibberellic acid (GA) have been reported to be less soluble than a 400g/Kg water soluble granule formulation (ProGibb SG), when used at recommended rates. The reduced solubility caused residues to be left on spray equipment, decreasing the amount of active ingredient applied and reducing effectiveness in 7 out of 10 trials.

The degree of dissolution and solubility of Express (400g/kg water soluble granule formulation of GA) was compared with ProGibb SG. The degree of dissolution after 5 min was tested at a concentration of 20g product/50L of water, which is twice the standard recommendation for both products in order to stress potential differences. To test the solubility, the time taken to fully dissolve under agitation (stirring) was tested at the theoretical solubility of the active ingredient (5g ai/L which equates to 12.5g product/L of water).

At twice the recommended dilution rates, residues were not detected with Express (<0.001%) and negligible residues detected with ProGibb SG (0.003%). In the solubility trial it took 9 minutes for Express to completely dissolve with nil detectable residues, whereas with ProGibb SG there was a slight residue (1.2%) present after 30 minutes. From a practical perspective no significant differences were found in the solubility or dissolution between the two GA products tested.

The results confirm on-farm experience on the solubility of both products and show there should be no issue with the solubility of Express and its efficacy should not be compromised when used as directed.

Keywords: gibberellic acid, solubility, Express, ProGibb SG, residues

Introduction

Gibberellic acid (GA) has been shown to increase pasture growth during periods when low soil temperatures limit pasture growth (Bryant, 2012; Jiang, Carey, Roberts, & Kerse, 2011; Matthew, Hofman, & Osborne, 2009). Agribusiness (2010) reported that commercially available GA powder formulations are less soluble than a 400g/Kg water soluble granule formulation of GA (ProGibb SG). Insoluble residues of the less soluble formulations were found in the spraying equipment and yield responses were found to be significantly inferior in 7 out of 10 trials (AgriBusiness, 2010).

Express is a 400g/Kg water soluble granule formulation of GA. Previous work has reported that Express showed equivalent efficacy to ProGibb SG (Jiang, et al., 2011).

This study was commissioned to compare the solubility of Express (GA) with the other water soluble granular formulation of GA (ProGibb SG).

Methods

Two different tests were carried out; degree of dissolution and solubility.

The degree of dissolution and solubility of Express (400g/kg water soluble granule formulation of GA) was compared with ProGibb SG. The degree of dissolution was tested at a concentration of 20g product/50L of water, which is twice the standard recommendation for both products, in order to stress potential differences. A residue amount recording was completed after 5 minutes.

To test the solubility, the time taken to fully dissolve under agitation (stirring) was tested at the theoretical solubility of the active ingredient (5g ai/L which equates to 12.5g product/L of water). The trial was completed after 30 minutes.

Results

At twice the recommended dilution rates, residues were not detected with Express and negligible residues detected with ProGibb SG (Table 1) after 5 min.

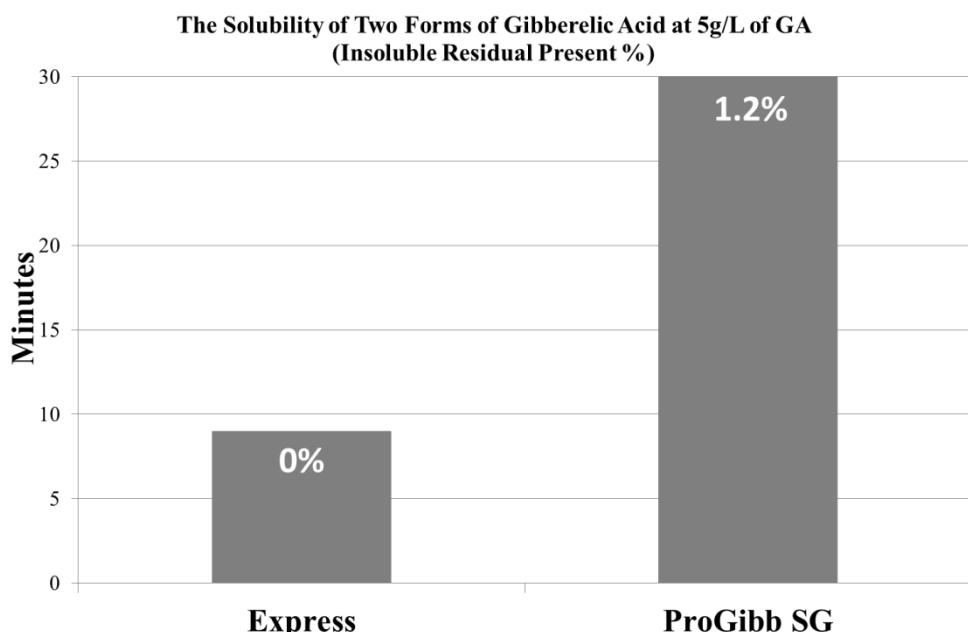
The time taken for Express to dissolve to a nil detectable result was 9 minutes, whereas with ProGibb SG there was a slight residue present after 30 minutes (Figure 1).

From a practical perspective no significant differences were found in the solubility or dissolution between the two GA products tested.

Table 1: Degree of Dissolution of Two Forms of Gibberelic Acid at 5g/L of GA

	Insoluble (after 5 minutes)	Insoluble (%)
Express	0	<0.001
ProGibb SG	0.6 mg	0.003

Figure 1: Solubility of 5g/L of GA using CIPMAC MT 179 Method (Insoluble Residual Present %)



Discussion

When compared at twice the recommended dilution rate there was no significant difference in solubility between Express and ProGibb SG (Table 1). This result confirms on-farm experience on the solubility of both of the tested products.

When compared at the theoretical solubility of the active ingredient, 5g/L GA, the solubility of both formulations was very good with no significant differences being found (Figure 1). This is consistent with those reported in Agribusiness (2010), with Express being no different in terms of GA concentration and solubility to ProGibb SG, whereas comparisons with other GA formulations suggested they had lower solubility which appears to have caused inconsistent results.

The results suggest that at the recommended dilution rates, there should be no issue with solubility of Express and the efficacy of Express will not be compromised when used as directed.

The results are only relevant to the two GA products tested in this work (Express and ProGibb SG) and at the rates tested. Further solubility testing is required for other forms of GA.

References

- AgriBusiness (Producer). (2010) New Trials Confirm ProGibb SG Advantage. AgriBusiness - January/February.
- Bryant, R. (2012). Use of gibberellins to boost pasture growth in spring, LUDF Field Day - October 2012. Christchurch: Lincoln University.
- Jiang, S., Carey, P. L., Roberts, A., & Kerse, G. (2011). Comparison of Three Plant Growth Regulators and Urea on a Canterbury Dairy Pasture. Paper presented at the Adding to the knowledge base for the nutrient manager. Retrieved from <http://flrc.massey.ac.nz/publications.html>
- Matthew, C., Hofman, W. A., & Osborne, M. A. (2009). Pasture response to gibberellins: a review and recommendations. New Zealand Journal of Agricultural Research, 52, 213-225.