

## Response of Canola and Wheat to Applied Silicate and Gypsum on Raised Beds

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### Abstract

High winter rainfall and poor soil structure in the South-west Victoria often lead to waterlogging, and has led to the use of raised beds in broad-acre cropping. This study was undertaken to ascertain if the growth of canola and wheat on raised beds in South-west Victoria could be enhanced by the application of sodium silicate (SS) and/or gypsum (G). An experiment was carried out at the Southern Farming Systems (SFS) site at Gnarwarre, from 25 May to 18 December 1999. The plots were arranged in a RCBD with four blocks. The treatments were control, SS ( $1.5 \text{ t ha}^{-1}$ ), G ( $8 \text{ t ha}^{-1}$ ) (2) and SSG (SS =  $0.75 \text{ t ha}^{-1}$  + G =  $4 \text{ t ha}^{-1}$ ). Canola var. Charlton and wheat var. Declic were each grown on narrow raised beds 1.7 m wide x 6.0 m long. The treatments had no significant effects on root length density (RLD) and the yield of canola and wheat. Compared to the control, soil conditioners led to an increase in plant height, leaf dry mass and shoot dry mass of wheat and plant height of canola at anthesis.

### Key words

Canola, wheat, sodium silicate, gypsum, raised beds.

### Introduction

During the long, cool winter growing season, high rainfall (mean annual 500+ mm), poor soil structure in the heavy clay sub-surface duplex soils in the Gnarwaree district of South-west Victoria often leads to waterlogging as a result of a perched water table. Duplex soils account for about 12% of the land area in Australia and are used mainly for pasture and some wheat and lupins which often show considerable spatial variation in growth and yield (1) as a result of restricted root growth, causing inadequate nutrient and water supply. Farmers of SFS have developed and are increasing the use of raised beds for crops such as wheat and canola as a means of overcoming crop losses due to waterlogging. Gypsum is known to improve the productivity of dispersive soils and sodium silicate has shown to maintain root activity under waterlogged conditions (3).

### RESULTS

The results of this experiment are shown in the table and figure below:

Table 1. Effect of treatments at anthesis stage and final harvest of canola.

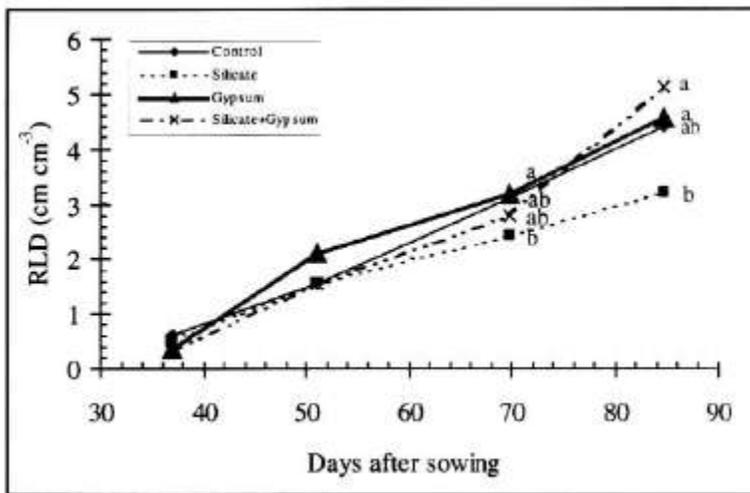
Canola	At anthesis		At final harvest	
	Treatments	Plant height (cm)	Leaf number	Harvest index
Control	51.5 a	15.3 a	0.10 a	2.35 a
SS	53.7 b	18.8 b	0.13 a	3.75 a

G	53.7 b	17.9 b	0.14 a	3.27 a
SSG	52.8 b	16.8 ab	0.13 a	3.10 a

**Table 2. Effect of treatments at anthesis stage and final harvest of wheat**

Wheat	At anthesis					At final harvest			
	Treatments	Plant Height (cm)	Leaf Number	Leaf dry Mass (g)	Stem dry Mass (g)	Plant dry mass (g)	Leaf area Index	Harvest Index	Grain dry Mass (g/plant)
Control		73.5 a	27.5 a	1.73 a	2.46 a	4.93 a	9.3 a	0.25 a	1.75 a
SS		76.5 b	31.7 b	2.53 b	2.87 ab	6.32 b	10.7 a	0.24 a	1.72 a
G		76.1 b	29.4 ab	2.78 b	2.88 ab	6.19 b	9.6 a	0.22 a	1.82 a
SSG		76.0 b	29.7 ab	2.53 b	3.19 b	6.68 b	12.8 b	0.22 a	1.78 a

Means in columns followed by the same letters are not significantly different ( $P>0.05$ ).



**Figure 1. Root length density (0-25 cm depth) in wheat. Means for the same harvest followed by different letters are significantly different ( $P>0.05$ ).**

### Discussion

Generally, the treatments had no significant effects on growth and yield of canola var. Charlton, except treatment SS or G resulted in a significantly great plant height and leaf number of at anthesis (Table 1).

However, the treatments had beneficial effects on wheat at anthesis especially in increasing plant height, and leaf and shoot dry mass, even though there were no significant effects on RLD (Figure 1) and yield at final harvest. In addition, SSG treatment improved stem dry weight and leaf area index; and SS increased leaf number of wheat (Table 2).

No waterlogging occurred during the experiment. In fact, water deficit stress condition prevailed during crop anthesis (133 days after sowing). The rainfall during the season (341 mm) was markedly less than average of 500+ mm, which may explain the low harvest index. Raised beds might also responsible for the lack of treatment effects on crop yield because in the beds appeared to be drier than otherwise.

## **Conclusion**

It can be concluded that treatments had no significant effect on root length density and yield of canola and wheat at the final harvest under the seasonal conditions. However, these soil conditioners led to an increase in plant height, leaf and shoot dry weights of wheat, and plant height of canola at anthesis phase.

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## **References**

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