

# Wheat Yield and Quality in Western Australian Sandplain Farming Systems

**Aim:** To examine the potential for crop yield in the northern sandplain systems and explore practices that will allow the potential to be approached.

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**Company:** CSIRO Plant Industry

**Farmer:** Stuart McAlpine

**Location:** Liebe Long Term Research Site, Buntine/Marchagee Rd



**Background:** The northern sandplain region of WA produces some 15% of national cropping output. Our aim is to examine the potential for crop yield in the systems of the region and identify means of overcoming the biophysical constraints to production and quality. The focus is primarily on wheat but there is also interest in examining the performance of lupins and canola given their importance in the farming system.

The soils of the region characteristically have high hydraulic conductivity. There is some concern regarding the potential rates of deep drainage and nutrient leaching in these soils. This is accentuated by the high proportion of cropping in the region. In the future, these issues may play an important role in the sustainability of the production system and marketing of the product.

## Trial Details:

Plot size and replication	Mainplots (for crop species) 40m x 10m; sub-plots (for nitrogen rates) 40m x 2.5m Randomised complete block with 4 replicates.
Soil type	Deep yellow sand
Sowing date	22 May 2003
Conditions at sowing	Good planting rains, profile not fully wet.
Machinery	Knife Point Minimum Till with press wheels (Morris Gumbo boots)
Seeding rate	Wheat = 70 kg/ha   Lupins = 100 kg/ha Canola, Lucerne, Serradella = 6 kg/ha
Fertiliser	Wheat and Canola plots were split in to subplots, each receiving either 0, 40, 80 or 120 kg/ha of N
Herbicides and Insecticides	<i>Canola:</i> Glyphosate, Trifluralin, Chlorpyrifos, Atrazine, Propaquizafop, Cypermethrin <i>Lucerne:</i> Glyphosate, Trifluralin, Chlorpyrifos, Bromoxynil & Diflufenican, Propaquizafop, Cypermethrin <i>Lupins:</i> Glyphosate, Trifluralin, Chlorpyrifos, Diflufenican & Ethametsulfuron, Propaquizafop, Cypermethrin <i>Serradella:</i> Glyphosate, Trifluralin, Chlorpyrifos, Flumetsulam, Propaquizafop, Cypermethrin <i>Wheat:</i> Glyphosate, Trifluralin, Chlorpyrifos, Clopyralid, Cypermethrin
Paddock History	2002 = Wheat, 2001 = Wheat, 2000 = Canola

**Results:**

Soil moisture content was monitored over time and the root distribution of canola and wheat was measured at three times during development. The soil profile became wet gradually over the growing season and the root systems of wheat and canola followed the wetting front downward. Both species showed evidence of restricted development in the 20-40cm layer, coinciding with a layer of high soil density detected in the soil assessment made before sowing by the Liebe Group. The restriction remained evident until the last measurement in October. In this year, there was little difference between the two species with respect to the length of root they had in each layer of the soil. The root distribution of all species was measured in October. Lupins, lucerne and serradella had a lesser root length in each layer than canola or wheat.

Canola and wheat appeared to have a pattern of leaf area development more suited to the rainfall distribution than the other species, with canopy development occurring earlier. However canola did not show the early dry matter accumulation that might be expected.

Canola and wheat responded to nitrogen across the range of treatments applied. They both produced a larger canopy which was maintained somewhat longer. However, the response was less marked in terms of dry matter and inflorescence number. In fact, canola produced no more flowering branches at 120kg than at 40kg. No yield depression was seen at high N levels although grain size of wheat decline from 44 to 37mg with increasing N across the range of treatments. Grain quality parameters are currently being assessed.

**Summary:**

- There was little difference in the root growth of wheat and canola.
- There was evidence of restricted root development in the 20-40cm soil layer.
- Wheat yield increased with increasing nitrogen but grain size was reduced slightly.
- There was no evidence of declining yield with high nitrogen in this experiment.

**Technically reviewed by:** Mick Poole