Field performance of new wheat varieties in large-scale trials on the south coast of Western Australia

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Abstract

South coast wheat growers have access to a large range of new varieties from both WA and the Eastern states. However, there is often little locally relevant information available on variety performance in the Esperance region.

Large scale field trials were conducted over six years (1999-2005) on the south coast of Western Australia in collaboration with cereal growers from the South East Premium Wheatgrowers Association (SEPWA). The aim was to evaluate the suitability of new wheat varieties to the local environment and determine appropriate management practices to improve yield and grain quality.

Climate and weather conditions greatly influenced the performance of the new wheat cultivars in terms of yield and quality (including protein, screening, staining, sprouting or low falling numbers). South Coast cereal growers should spread risk by growing a mix of wheat varieties with different maturities, disease resistance and tolerance to weather damage. Based on research and field experience across six seasons, the best variety options and agronomic management are identified for improving productivity and profitability in WA wheat based farming systems.

Key Words

Wheat agronomy, variety evaluation, grain yield, grain quality

Introduction

Field trials were conducted to match new wheat varieties to the south coast environment and determine agronomic management practices to improve yield and grain quality (Amjad et al., 2006). The aim was to evaluate the suitability of new wheat varieties and potential crossbreds both from WA and inter-state in the south coast environment.

Methods

A range of new wheat varieties and cultivars were selected and tested across various seasons in comparison to a common control variety. All trials were partially replicated with a control variety grown every third plot and two test varieties between them. Grain yield data from the test varieties were compared as percentage of the nearest control. Trials were conducted and managed using commercial equipment by the host farmers.

Trials were monitored for weeds and diseases during the growing season. Farmer experiences and field observations about crop growth, disease, lodging, head losses, harvestability and threshability of the new varieties were also collected and recorded.

Results

More than 70 trials were conducted on the three major soil types found on the South Coast. These were - Sandplain, Duplex and Mallee soils. More than 30 wheat varieties and new promising cultivars were tested.

All trials were harvested and grain quality samples were collected for assessment of delivery standards.

Grain yield and grain quality results across seasons and environments are available on the SEPWA web site (www.sepwa.org.au).

1999 results

A good start to the season in 1999, followed by mild weather in spring resulted in heavy infestation of foliar diseases that greatly affected the performance of the varieties which had the potential to pay premiums. Yield varied from 2.0 t/ha to 4.0 t/ha depending on the soil type and environment. The main diseases observed were septorias in combination with leaf rust. Stem rust was a problem only late in the season. Camm, the triple rust resistant variety, performed extremely well on all sites both for yield and quality (including protein, sprouting, staining and falling numbers). Quality issues such as grain sprouting and staining greatly downgraded some of the high yielding varieties. Brookton, Cunderdin and Westonia yielded well but were downgraded because of sprouting (low falling number) and fungal staining.

2000 results

During 2000, a dry start to the season was followed by consistently dry conditions during grain filling, generally resulted in lower yields (1.5 t/ha to 3.5 t/ha) and lower proteins. High screening was also a problem. Westonia was the highest yielding variety followed by H45, Carnamah, Yitpi and Camm.

2001 results

A dry winter in 2001, followed by above average rainfall during spring and a wet harvest, generally resulted in 30 % higher yield than expected. This was balanced by a greater number of problems with low falling numbers and fungal staining. New varieties like Camm, H45, Mitre, Stylet and Giles performed best both for yield and falling numbers (above 300) in the South Coast environment. Wyalkatchem yielded better than Camm. Wyalkatchem and Kukri gave variable falling numbers when harvested after mid December in 2001. Similarly Carnamah and Westonia yielded well but falling numbers were lower and more variable

2002 results

The 2002 was a dry year on the South Coast. All new wheat varieties yielded lower. Varieties responded differently to climatic and dry weather conditions.

2003 results

A good start to the 2003 season followed by consistently good conditions around grain filling generally resulted in higher grain yields averaging over 3.0 t/ha in the Mallee and 4.0 t/ha in the Sandplain environments. High yield potential and high grain quality attributes are the key parameters in variety selection on the coast. There appears to be a trade-off between yield, disease resistance and susceptibility to weather damage. The highest yielders were Wyalkatchem and H45. Wyalkatchem was susceptible to stem rust and looks risky for the Esperance region. H45 is susceptible to stripe rust and requires special management and attention. Based on limited testing in 2003, the GBA Sapphire showed promising results. The best tolerance to weather damage was found in Sun type (Braewood) and Cook/ Sunelg type (WAWHT25252A-EGA Eagle Rock), and the disease situation is best addressed with Janz and its derivatives such as Annuello, Mitre and Babbler.

2004 results

The 2004 season started late and the wheat was generally sown from early June, followed by a series of devastating events including disease (stripe rust), frost (in some areas), and lack of rain in October during grain filling. The conditions placed a lot of pressure on the performance of many varieties. Foliar disease resistance to leaf, stem and stripe rusts, together with Septoria and grain quality problems (including staining, sprouting, low falling numbers and mouldy grains) were of great concern in the adaptation of new wheat varieties to the Esperance port zone.

2005 results

2005 was a comparatively wet year with a very early break providing an opportunity to sow early. However, severe waterlogging impacted yields on the sandplain trial site followed by devastating frost in August and October. Across all sites, the softer finish to the season from good rainfall in spring during grain filling resulted in average to above average grain yields. On the sandplain soil type, grain yields averaged around 3.25 t/ha. On duplex soils, the average grain yield was 4.81 t/ha and on the mallee soil, the average yield was 2.67 t/ha. Grain quality was downgraded due to staining and black point caused by wet weather at harvest –particularly on the sandplain. Generally early to mid maturing varieties were badly frosted in 2005 (eg. H45/H46, EGA Tammarin Rock, Flamenco, Odiel, Rees) and resulted in lower grain yield compared to mid to long season late maturing varieties (eg. Annuello, GBA Sapphire, Braewood). Screenings and grain proteins were generally low due to the softer finish of the season. Grain staining was the major issue with most varieties due to wet weather damage at harvest.

Conclusion

Based on six years collaborative trials of variety performance for disease resistance, grain yield, grain quality and weather damage (black point, fungal staining and falling numbers), the south coast cereal growers and researchers have identified four varieties that have shown wide adaptation to soil types and environments. These varieties are:

- Annuello – (mid season) but improvement on staining and grain size compared to Janz
- GBA Sapphire – (mid to long season)
- Braewood – (longer season)
- EGA Eagle Rock (mid season to long season)

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Reference

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