

# FINAL REPORT

CFF00004

## APH Zone Evaluation

### PROJECT DETAILS

**PROJECT CODE:** CFF00004

**PROJECT TITLE:** APH ZONE EVALUATION

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**END DATE:** 29.05.2015

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### Summary

This research delivers a scientifically comprehensive and statistically robust data set for determining the possibility of growing Australia's premium wheat grade, Australian Prime Hard (APH), in regions beyond the present Queensland (QLD), northern and southern New South Wales (NSW) APH Zones. This data set comprises grain, flour and end-product quality evaluations of agronomically appropriate APH varieties grown in six regions in 2013 and 2014. To ensure linkage with the wheat classification and zoning systems data from this project, quality assessments of 2015 sites and comprehensive statistical analyses will be undertaken by Wheat Quality Australia (WQA) in project WQA00004.

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## Conclusions

This research project has completed end-product quality testing of APH varieties grown during the 2013 and 2014 seasons. A range of agronomically appropriate APH varieties have been successfully grown in six regions across Australia during the 2012, 2013, 2014 and 2015 seasons. Completion of end-product quality testing in the successor research project to this project for the 2015 field sites and comprehensive statistical evaluation of all the quality data will provide a solid data set upon which to evaluate the ability of APH varieties to be grown outside of the present three APH regions.

## Recommendations

1. Completion of the end-product quality testing of the 2015 APH field sites and analysis of these data, together with that of the 2013 and 2014 seasons, will allow for comprehensive multi-environment, multi-seasonal evaluation of the suitability of growing APH varieties outside present APH classification zones.
2. Management of the APH Zone research project and evaluation, dissemination and appropriate implementation of the findings from this research will be undertaken by WQA, the industry body charged with administering the Australian wheat classification system.

## Outcomes

### Economic Outcomes

Economic benefits include the potential expansion of Australia's APH growing zones. This will broaden the geographic APH growing base, helping reduce detrimental influences of adverse growing seasons on supply of APH grain to key overseas grain customers. Secondly, through increasing total tonnages of APH grain being grown and marketed, more grain growers will benefit from the APH price premiums.

## Achievements/Benefits

This project assessed APH varieties in a range of wheat growing regions across Australia for four seasons and evaluated the end-product quality of this grain from a subset of these sites for two of these seasons.

A range of between 25 to 36 agronomically appropriate APH varieties were grown in National Variety Trials (NVT) for the past four seasons across three zones outside of the present APH classification zones (Victoria (VIC), South Australia (SA) and

Western Australia (WA)) and three APH Zones (QLD, northern NSW, southern NSW) for a total of 24 to 26 field sites per season. Grain from two of these seasons (2013 and 2014) has been assessed for end-product quality.

Appropriate APH varieties were selected for growing in each of the regions by Dr Brian Cullis in consultation with stakeholders. The approach taken in variety selection was to have a small sub-set of varieties common to all sites with the remaining varieties selected on a site by site basis. For example, during the 2013 season, a set of eight common varieties were grown at all 24 field sites with the other varieties at each site being adjusted such that a total of 35 varieties were grown across all 24 sites during the 2013 season. This approach was taken to ensure that the most agronomically appropriate varieties were grown at each site. A total of 25 and 36 varieties were grown across all 24 sites, respectively, in the 2012 and 2014 seasons.

#### Field sites

For each season, the aim was to have four field sites in each of the six regions, however, this was varied slightly between the seasons. To better utilise the leverage available through GRDC's existing investment in the NVT, the field trials from 2013 onwards were directly negotiated and coordinated by the GRDC, with GRDC liaising directly with NVT providers.

#### The 2012 field sites were:

QLD: Biloela, Bungunya, Macalister, Meandarra; Northern NSW: Bellata, Bullarah, Coolah, Spring Ridge; Southern NSW: Gregory, Lockhart, Temora, Wagga Wagga; VIC: Manangatang, Merrinee, Quambatook, Walpeup; SA: Booleroo Centre, Minnipa, Waikerie, Wunkar; WA: Kulin, Miling, Toodyay, York.

#### The 2013 field sites were:

QLD: Bungunya, Duaringa, Dulacca, Macalister; Northern NSW: Bellata, Bullarah, Tulloona, Walgett (abandoned during growing season); Southern NSW: Condobolin, Lockhart, Merriwagga, Wagga Wagga; VIC: Manangatang, Merrinee, Quambatook, Walpeup; SA: Booleroo Centre, Minnipa, Waikerie, Wunkar; WA: Bencubbin, Kellerberrin, Kulin, Pithara.

#### The 2014 field sites were:

QLD: Dulacca, Emerald, Jambin, Macalister, Westmar; Northern NSW: Bellata, Bullarah, Gilgandra, Tulloona; Southern NSW: Condobolin, Lockhart, Merriwagga, Temora; VIC: Beulah, Manangatang, Merrinee, Quambatook, Walpeup; SA: Booleroo Centre, Minnipa, Waikerie, Wunkar; WA: Kellerberrin, Morawa, Nabawa, Pithara.

In 2014, the Jambin, Bullarah, Tulloona, Beulah and Kellerberrin field sites were all later abandoned.

Following harvesting of each site from 2012, 2013 and 2014 seasons, sub-samples of five APH checklines were sent to Agrifood Technology for grain quality assessment (protein content, test weight, falling number, screenings and thousand kernel weight). Based upon these measurements and grain yields, a sub-set of sites was selected for end-product quality assessment. The aim was to test two sites from each of the six regions.

#### The sites selected and evaluated for grain, flour and end-product testing were:

(1) 2013 season: QLD: Macalister, Dulacca; Northern NSW: Bullarah, Tulloona; Southern NSW: Condobolin, Lockhart, Wagga Wagga; SA: Booleroo Centre, Waikerie; WA: Kellerberrin, Kulin.

(2) 2014 season: QLD: Emerald, Macalister; Northern NSW: Gilgandra; Southern NSW: Lockhart, Merriwagga; VIC: Manangatang, Walpeup; SA: Minnipa, Waikerie; WA: Morawa, Pithara, Nabawa.

Following consultation, the 64 measured grain, flour and end-product traits were reduced to 11 traits to make statistical analysis more practicable. These 11 quality traits included: Test weight, screenings, grain protein, mill extraction rate, flour ash, water absorption, dough development time, extensograph 45 min Rmax and extensibility, straight dough bread volume, and yellow alkaline noodle brightness stability.

Before end-product quality evaluation of the first field sites by Agrifood Technology was begun, a trial run was undertaken using grain from the Bullarah 2012 site to familiarise Agrifood with the experimental design approach and ensure smooth running of the testing. Delays in obtaining quality testing experimental designs meant the grain for the 2012 sites was deemed to have aged too much for quality testing to be undertaken.

Test weight, 1,000 grain weight, near infra-red (NIR) grain protein, falling number, screenings, single kernel characterisation system (SKCS), oven ash, milling, NIR flour protein, farinograph, extensograph and straight dough baking were assessed in this trial. The express purpose of these trial runs was to familiarise Agrifood's laboratory staff in undertaking phased experimental

designs involving partial compositing of field plot replicates and partial replication of grain and flour at each experimental phase. The staggered nature of the different phases of the experimental designs, namely separate grain, mill, flour and end-product phases, meant that four sites could be under simultaneous evaluation, minimising the time taken to assess all the selected 2013 sites. Once the trial was completed, end-product testing of the selected 11 field sites from the 2013 season was begun. The same experimental partial compositing phased experiment design approach was used in the evaluation of the end-product testing of the selected 2014 sites.

To minimise the effects of grain ageing, the grain from the field sites selected for end-product evaluation from 2013 onwards was stored at Agrifood Technology in a specially purchased chilled shipping container prior to quality testing.

Grain, flour and end-product quality testing of the selected 2013 and 2014 field sites was completed in 2014 and 2015, respectively.

An initial statistical assessment of the 2013 and 2014 field site end-product quality testing has been completed. The 2013 statistical analyses report is attached to this Final Report. Analyses of the 2015 season and multi-site statistical analyses of all three seasons (2013 to 2015) will be undertaken in the successor project to this research project, WQA00004.

## **Additional information**

### **Attachment**

1. Report on Analysis of Farinograph Water Absorption for 2013 APH trials.