

# FINAL REPORT

SEP00010

## Enzyme brewing - The catalyst for a new export barley market

### PROJECT DETAILS

PROJECT CODE: SEP00010

PROJECT TITLE: ENZYME BREWING - THE CATALYST FOR A NEW EXPORT BARLEY MARKET

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### Summary

The South East Premium Wheat Growers Association (SEPWA) enzyme brewing project has initiated a new export market for Australian barley. Using the SEPWA trials, this project provided the majority of samples to the University of Tasmania (UTAS) for the technical evaluation of enzyme brew performance. This science was used as feedback to Asian breweries to determine grain standards and brewery adoption paths. The project also facilitated several exports of barley consignments to breweries to allow the evaluation of Australian barley as an unmalted adjunct. In the concluding stages of the project, several grain exporters were introduced to breweries which will hopefully lead to the long term adoption of Australian barley for enzyme brewing in Asia.

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## Conclusions

At the outset of this project, market prognosis from industrial biotechnology company Novozymes suggested that barley supply to breweries was a key barrier to adoption of barley-based enzyme brewing. In response to this, this project set about assessing and upskilling several supply sources of Australian barley that had the ability to service export demand by breweries.

Despite enzyme barley brewing being technically feasible and financially attractive, barley supply is only part of the overall picture in this new market.

Brewing is an industry that harbours tradition and brand presence as key aspects of the overall business strategy. Practices that capture cost efficiencies in production are not necessarily automatically adopted, as impacts on flavour and market share come first. As a result, breweries are often reluctant to radically alter beer raw materials from existing formulations.

This project has found that education among brewers about raw barley brewing needs to go hand-in-hand with barley supply. Initial small incorporations of raw barley in formulations will build familiarity of brewers with Australian supply sources and this will give them confidence to increase raw barley percentages over time.

It is highly unlikely that brewers will change to 100% raw barley-based brews. Initial trial results indicate that between 10 and 30% incorporation of raw barley in the place of malted barley and/or broken rice has overall good flavour profile for existing beer brands. Raw barley will, in some cases, steal market share from malted barley, but in other cases from adjuncts - such as broken rice depending on the individual brew formulation. This is where the market will progress in the coming five years.

This project has made significant progress in introducing supply and trialling of Australian brewing barley in Asian breweries. To date, breweries have little understanding of Australian barley supply and market dynamics between seasons - as they have been largely insulated from this by malt producers. Attention needs to be directed in this area to build confidence among breweries so that there can be benefits at the farm gate via increased demand for Australian barley for the long term.

The adoption of new varieties in this market place is unlikely to have the slow and cumbersome experience as found in the current malted barley market path. Brewing barley is a more direct supply chain and hopefully this can facilitate more immediate market demand for newly released varieties. This is good news for in-paddock adoption of improved varieties.

Overall, this market offers excellent potential for Australian barley growers, yet it is only in the very infant stages of development.

## Recommendations

The sheer scale of the Asian brewing industry, combined with solid per capital beer consumption growth, makes for a very optimistic market outlook for Australian brewing barley.

Care will need to be taken to educate brewers about raw barley supply so that the appropriate product is sourced and their initial experiences are positive. It needs to be remembered that beer formulation is brand-specific, and - to some extent - each brewery will need to develop its own skill set in using raw barley as an adjunct in its beer. It is hoped that the GRDC investment in collaboration with the Department of Agriculture and Food WA (DAFWA) via the Australian Export Grains Innovation Centre (AEGIC) will provide this technical support in the future.

The previous decade of consumption growth in Asia has been in budget beer. The next decade will see younger generations demand more premium beers for both flavour and status. The European brands (e.g. Carlsberg and Heineken) clearly taste different compared to local Asian beers, due to the malt flavour profile. This has resulted in a market perception for the flavour to be more 'premium'. Asian local brands will push towards this flavour profile as the market matures. The inclusion of raw barley offers this, without the production cost of full malt beers.

From on ground consultations with Asian breweries, it was determined that rice commonly constitutes approximately 50% of the total beer recipe formulation throughout Asia. Work should focus on changing the rice part of the formulation by pursuing the 'better flavour' results achievable with malt and barley-based formulations. This way, market growth can occur without a reduction in Australian malt inclusions.

This project has targeted several barley export suppliers and up-skilled them in the technical background of the brewing barley market requirements. From project introductions in Asia, via Novozymes, it is hoped that breweries will be able to independently source barley for their requirements in the future. It should be noted that this market path is still very young and it would be in the Australian grains industry's best interests to ensure positive experiences which are technically supported in the coming two to three years. A negative experience with Australian barley by a brewer could jeopardise the potential long term benefits for Australian grain growers.

Supplying barley to breweries is one thing, but the idea that Australian barley is the quality adjunct of choice for flavour needs far more work.

## Outcomes

This project has increased the demand for Australian barley beyond the traditional feed and malt markets. Raw barley use in enzyme brewing offers Australian grain growers another entry point for export products to the Asian brewing market.

Enzyme brewing has been shown to be an efficient and cost effective path for breweries to reduce raw material costs. This market is set to expand in the coming decade as brewers look for ways to maintain flavour profiles without the cost structure of higher malt content beers.

Having the scientific evaluation of UTAS behind this project enabled confidence in demonstrating Australian barley as a supply source. Australian barley has now been presented as a preferred product compared with competitor exporting countries.

From a grower perspective, the raw barley export path will initially only be niche volumes. However, in the long-term - as volumes grow - it will offer a more flexible path to market than the traditional malting barley market. This is good news for grain growers, particularly as traditional malting markets have often been slow in adoption of new varieties which are agronomically superior.

Looking strategically into the long term of 10 to 20 years, it is likely that more and more beer will be made using raw unmalted barley as rising water and energy costs increase malt raw material costs. Already there are two beers commercially brewed based on raw unmalted barley and, as this increases, Australian grain growers are poised to supply this market.

## Achievements/Benefits

An outline of the project's activities are as follows:

- o Communication with UTAS for supply of barley samples from across Australia for technical assessment of varietal enzyme brewing performance.
- o Collaboration with UTAS and brewing industry contacts for the required standards for 'Australian brewing barley'. This was then further tested against existing industry standards, so that this new supply chain would not cause segregation issues in

storage and handling.

- o The project officer visited a number of grain export organisations across Australia to assess supply potential and educate them about the enzyme brewing market. The project officer also facilitated a direct supply inspection from a major international brewing entity to commence Australian supply.
- o Via collaboration with UTAS, the project facilitated three commercial scale demonstration brews, which were evaluated by the public at the Taste of Tasmania festival 2012/13. Drinkers were surveyed about their taste and perception of the raw barley brew. This data was then used by Novozymes and UTAS to demonstrate the success of enzyme brewing technology.
- o The project used the demonstration brewing, export logistics knowledge and market insights to guide the UTAS economic analysis of enzyme brewing versus traditional malt-based brewing.
- o Via collaboration with Novozymes, SE Asia and China, the project officer visited a number of brewery facilities in China, Vietnam, Singapore and the Philippines to introduce the concept of raw barley supply from Australian exporters.
- o Following the initial introductions and supply assessments, the project officer facilitated a number of trial consignments of barley direct to breweries so that they could conduct test brews with raw unmalted barley.
- o The project combined all of this information in a market intelligence report which was supplied to GRDC, via Paul Meibusch, for panel evaluation.

Due to prudent financial management from SEPWA, the project was able to be extended by a further six months using the original budget and this enabled:

- o The export of two more test consignments to a brewery so that they could conduct varietal flavour profiles before they introduced barley at a commercial scale.
- o The introduction of two export grain suppliers, who had shown particular interest in developing the brewing barley market, to several prominent Asian brewing conglomerates. Since then, this project is aware of at least one commercial-scale order and another pilot-scale order now being handled by these organisations.
- o The extended time enabled the project to assist in the auditing and approval of a second export facility for barley supply to a prominent brewing multinational.
- o The presentation of industry adoption levels of raw barley brewing to the Australian Barley Technical Symposium (ABTS) in 2013.

## Other research

The enzyme brewing market for Australian barley is at a sensitive stage of development. A negative experience by brewers would be detrimental for the Australian barley industry's reputation as preferred supply source. As a result, GRDC needs to invest further in the technical fine tuning of raw barley adjunct use by Asian breweries. In particular, this attention should be in ensuring SE Asian breweries adopt raw barley successfully to ensure this becomes a demonstration example for the Chinese market.

Some breweries have expressed concern over the possible variation of flavour between different varieties of barley. Technical support would be well directed to investigate this possibility and provide confidence of 'flavour' performance of varieties. This could also be used to increase the adoption of barley varieties by brewers in the raw and malted market paths. This would then provide a demand pull-back down the supply chain to a grower level, where new barley varieties can bring yield and disease advantages.

Over the duration of this project, it has been common that many in the barley industry do not properly understand the malting and brewing process. In particular, many barley growers cannot distinguish between the malting and brewing process and - as a result - have little appreciation about the quality attributes which underpin the assessment of their grain and market access.

SEPWA has learned a great deal about wheat quality and market access via collaboration with Interflour in SE Asia. It would benefit the barley industry to up-skill growers and exporters about malting and brewing in a similar manner. Information flow along the supply chain will be critical in maintaining Australia's reputation for quality product in the market, as competition for the Asian brewing market comes from other barley exporters, such as Argentina.

## Intellectual property summary

The project has not publicly mentioned particular breweries that have commenced the commercial adoption of raw barley in



their beer brands. Brand recognition is critical for breweries and care must be taken to guard against any possible market perception other than that imparted from the brewery. For this reason, the market intelligence report has not been published in full publicly. It has been passed on to the appropriate personnel at GRDC, as well as DAFWA/AGEIC on an in-confidence basis.

## **Additional information**