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## Rapid malt - the path to faster malting barley

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# Rapidmalt- The path to faster malting barley

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**M**alt analysis provides guidance on the effectiveness of the malting process and the suitability of the malt for brewing. The brewer judges malt quality by referring to the malt analysis provided by the maltster. We have malted current varieties to the standard four day (96hr) germination period. We then abbreviated the process by 24 hours to a three day (72hr) germination time. We have identified through malt analysis (Table 1) on some standard four day germination varieties that it is possible to abbreviate the process by 24hrs and still achieve a desirable malt product (Table 2). The obvious beneficiaries of this technology are the malt houses. The outcomes will impact on the possible production output without impacting heavily on capital and operational costs. This research could reduce the malting time by 24 hours by selecting suitable varieties. Therefore a higher throughput could be achieved from malt houses that are currently at capacity. Alternatively if the same amount of grain was used for processing, a shorter malting time would cut down considerably on output costs. Less power and water could be used in the process which would cut down substantially on expenditure. Malt analysis will now be carried out on a larger set of varieties and these will be compared with microarray analysis of gene expression comparisons to endeavour to identify genes responsible for differing rates of initiation of in the malting process to help reduce this malting time even further, possibly to a two day malting.

Table 1. MBIBTC Barley rating system

Parameter	Solid Adjuncts		Liquid Adjuncts	
	Range	Point	Range	Point
Extract % db	> 83.0	3.5	> 83.0	3.5
	82.0-82.9	3.0	82.0-82.9	3.0
	81.0-81.9	2.0	81.0-81.9	2.0
	80.0-80.9	1.0	80.0-80.9	1.0
	< 80.0	0	< 80.0	0
Diastatic Power, WK	> 350	1.0	> 350	1.0
	300-350	1.5	300-350	1.5
	250-299	1.0	250-299	1.0
	< 250	0	< 250	0
Modification Kolbach index %	< 35.0	0	< 35.0	0
	35.0-37.9	0.5	35.0-37.9	0.5
	38-40.9	1.0	39-40.9	1.0
	41.0-43.9	1.5	41.0-43.9	1.5
	44-46.9	1.0	44-46.9	1.0
	47-49.9	0.5	47-49.9	0.5
Viscosity, CP	< 1.55	1.0	< 1.55	1.0
	1.56-1.59	0.75	1.56-1.59	0.75
	1.60-1.65	0.5	1.60-1.65	0.5
	> 1.65	0	> 1.65	0
Apparent Attenuation Limit (% dry basis)	> 86.0	0	> 86.0	0
	85.0-86.0	0.5	85.0-86.0	0.5
	82.0-84.9	1.5	82.0-84.9	1.5
	80.0-81.9	0.5	80.0-81.9	0.5
	< 80.0	0	< 80.0	0
Wort beta-glucan (in mg/L)	< 100	1.0	< 100	1.0
	100 to 200	1.5	100 to 200	1.5
	100 to 200	0	100 to 200	0
	> 200	0	> 200	0



Table 2. Malting results

Malting Scores	96hrs	72hrs
	Franklin	4.5
SloopVic	2.5	2.5
SloopSA	3	1.5
Baudin	4.5	4.75
Gairdner	5.75	4
Harrington	1.5	0.5
Milby	4.5	6.25
Stirling	4.25	5.5
Cowabbie	3.5	5.5
Hamelin	5	2
Gairdner	3.5	5.5
Grimmett	5.5	4
Scarlett	2	4.5
Schooner	5	3.75
Tallon	4	3
Tangtangara	5.75	4.5
Valier	3	4.5
Gairdner control	5	5
Lindwall	3.5	3

## Malting

Malting serves the purpose of converting insoluble starch to soluble starch, reducing complex proteins, generating nutrients for yeast development, and the development of enzymes. The three main steps of the malting process are steeping, germination and kilning. During malting, enzymes break down the cell structure of the endosperm, releasing nutrients necessary for yeast growth and making the starch available for enzyme degradation during mashing.

The steeping process usually takes 24 hours in which the seeds are submerged in water to achieve the desired moisture content. The germination standard in Australia at present is four days but in other countries this can be as high as 12 days.

## Conclusion

Some varieties of seed are capable of sufficient endosperm modification and of producing high quality malted seed following a germination period of not more than 72hrs.

## Malting protocol

STEEPING(17°C):  
 1<sup>st</sup> Steep 7h  
 1<sup>st</sup> Air rest 10h  
 2<sup>nd</sup> Steep 7h  
 Moisture content ex-steep of 40%

GERMINATION (17°C): 96h or 72h for shorter protocol  
 Moisture content 42% at 24h after end of steep and a peak content of 45% at 48h after end of steep.

KILNING:  
 0-15 min 17-45°C  
 15min-2h 45-55°C rising uniformly  
 2-12h 55-65°C rising uniformly  
 12-16h 65°C  
 16-20h 65-80°C rising uniformly  
 20-26h 80°C  
 Cool to 22°C  
 Final malt moisture less than 5%

