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Heritage Barley Varieties – Going Back for the Future?

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Background

Maris Otter continues to hold a special place in the maltster's and brewer's portfolio of malting barley varieties and is rapidly approaching its 50th anniversary of commercial introduction.

Maris Otter is, however, a relative youngster in comparison to other heritage varieties that we are exploring for their potential for re-introduction into modern malting and brewing. These heritage varieties connect our 21st century processes with those of the late 19th and early 20th centuries.

Our first focus is on Chevallier which was selected by the Rev. John 'Barley' Chevallier of Aspall Hall, near Debenham, Suffolk, UK. From a manuscript history of Debenham:-

"About the year 1820 John Andrews, a labourer of Mr Edward Dove, of Ulverston Hall, Debenham, had been threshing barley, and on his return home at night complained of his feet being uneasy, and on taking off his shoes he discovered in one of them part of a very fine ear of barley – it struck him as particularly so – and he was careful to have it preserved. He afterwards planted the few grains of it in his garden, and the following year, Dr [John] and Mr Charles Chevallier, coming to Andrews's cottage to inspect some repairs going on (the cottage belonged to the Doctor), saw three or four ears of the barley growing. He requested it might be kept for him when ripe. The Doctor sowed a small ridge with the produce thus obtained, and kept it by itself until he grew sufficient to plant an acre, and from this acre the produce was 11½ coombs (about the year 1825 or 1826). This was again planted, and from the increase thence arriving he began to dispose of it, and from that time it has been gradually getting into repute. It is now well known in most of the corn markets in the kingdom, and also in many parts of the Continent, America, &c., and is called the Chevallier barley"*

Chevallier was taken up rapidly and by the last decades of the 19th century it was being grown throughout Europe, California, Chile, Australia and New Zealand. In the UK, it was at peak utilisation in the late Victorian era covering some 80-90% of the barley area[1].

Stopes[2] described Chevallier in 1885 as *"probably the most widely distributed and best known barley variety, producing heavy crops of extremely friable grain, with an almost transparent husk, a high percentage of starch and great weight."*

1. Christine Clark (1998), History of the British Malting Industry since 1830. The Hambledon Press
2. Henry Stopes (1885), Malt and malting, an historical, scientific, and practical treatise. F.W. Lyon

Introduction

Chevallier was superseded in the early years of the 20th century by higher-yielding varieties bred for malting, such as Plumage Archer.

Given that it's over 100 years since Chevallier was cultivated and malted on a large scale we are re-learning the agronomic, malting and brewing characteristics of the variety. The work described here are the initial stages in this process.

Fig. 1: Chevallier barley

Methodology

Chevallier seed obtained from the Germplasm Resources Unit at John Innes Centre was propagated over successive seasons to produce a seed lot sufficient to sow a 0.5 ha trial plot at NIAB-TAB at Morley, Norfolk for harvest 2013. Normal treatments were applied including 65 kgN/ha.

Grain harvested from the 0.5 ha trial plot was provided to Crisp Malting Group where it was micromalted both with and without the addition of gibberellic acid (GA). A 500 kg batch was then malted in the No.19 floor maltings. Steeping was on 10 hr wet/12 hr dry/12 hr wet/12 dry/8 hr wet cycle. Germination was at 18C for 7 days with the addition of GA. Natural draft kilning was carried out on a typical ale malt program.

Chevallier floor malt was provided to Brewlab for preliminary pilot brewing evaluation. An IPA-style with target OG 1.058 was brewed. Grist bill included 3.3% crystal malt and 5.6% torrified wheat. Infusion mashing was carried out at 65C for 1 hour. Magnum and Amarillo hops were added to the boil. Fermentation was with Safale 04 (Fermentis).

Results

Harvesting of 0.5 ha trial plot

Fig. 2: 2013 crop Chevallier

Although lodging was evident, the crop responded well to the applied treatments resulting in a yield of 3 mt/ha after application of 65 kgN/ha. Total nitrogen was 1.80%.

Yield was approximately 45% of a modern spring malting variety grown under the same agronomic regime, but with 130 kgN/ha applied.

Micromalting of Chevallier

Parameter	GA+	GA-
Moisture (%)	4.5	4.9
IOB Extract 0.7mm (L°/kg, dry)	302	295
IOB Colour Visual (EBC)	4.3	3.6
Total Nitrogen (%, dry)	1.70	1.75
IOB Total Soluble Nitrogen (%, dry)	0.72	0.58
IOB Soluble Nitrogen Ratio	42.6	33.2
IOB FAN in Wort (mg/l)	158	107
Friability (%)	90	80
Homogeneity (%)	97	94
Partly Unmodified Grains (%)	3	6
Whole Glassy Corns (%)	1.4	2.6
Alpha Amylase (DU, dry)	72	58
Diastatic Power (°IoB, as is)	133	124
IOB Beta Glucan in Wort (mg/l)	121	226
IOB Wort Viscosity (mPa.S)	1.53	1.57

Table 1: Analysis of Chevallier micromalts

Chevallier showed a strong response to applied GA resulting in acceptable levels of protein and cell wall modification. Extract content was lower than that of modern malting varieties at equivalent nitrogen level.

Floor malting of Chevallier

Fig. 3: Chevallier green malt

The floor malt batch showed improved extract content and elevated levels of modification than the micromalts. Enzyme activity was high.

Parameter	
Moisture (%)	3.7
IOB Extract 0.7mm (L°/kg, dry)	307
IOB Colour Visual (EBC)	4.3
Total Nitrogen (%, dry)	1.81
IOB Total Soluble Nitrogen (%, dry)	0.92
IOB Soluble Nitrogen Ratio	50.8
IOB FAN in Wort (mg/l)	197
Friability (%)	95
Homogeneity (%)	99
Partly Unmodified Grains (%)	1
Whole Glassy Corns (%)	0.9
Alpha Amylase (DU, dry)	66
Diastatic Power (°IoB, as is)	107
IOB Beta Glucan in Wort (mg/l)	41
IOB Wort Viscosity (mPa.S)	1.55

Table 2: Analysis of Chevallier floor malt

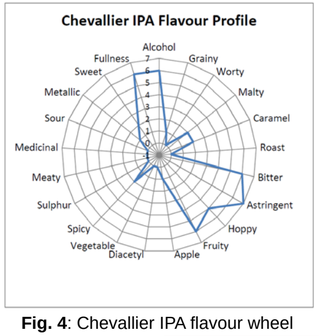

Fig. 4: Chevallier IPA flavour wheel

Brewing Asssement of Chevallier

To initially assess brewing quality, an IPA-style was brewed as this was a significant beer type of the Victorian era. Brewing and fermentation proceeded normally yielding a beer of 6.4% alcohol by volume. In terms of flavour profile, bitterness, fullness and fruitiness are typical of the beer style. Brewing trials are continuing to evaluate other beer styles and yeast strain performance.

For harvest 2014 Chevallier is being grown on a 5 ha trial site and should yield sufficient grain to produce 3 mt of malt. Commercial quantities of malt will be available from crop 2015 exclusively from Crisp Malting Group.