

COMMERCIAL BREWING TRIALS WITH ZENITH HOPS

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Commercial brewing trials with Zenith hops from the 1982 and 1983 crops have shown that these hops are suitable for producing both ales and lager beers.

Key words: *brewing, hops, new variety*

INTRODUCTION

The following report was submitted to the Hop Industry Committee on behalf of the Brewing Trials Sub-Committee, comprising: A. E. Redsell (Chairman), G. K. Buckee, A. D. Burr, D. E. Long (Secretary), R. A. Neve and M. Schofield. The brewing trials were carried out by: Allied Breweries (UK) Ltd, Greene King & Sons PLC, Scottish & Newcastle Beer Production Ltd, Watney Mann and Truman Brewers Ltd and Whitbread & Co PLC. These companies are thanked for their help and co-operation.

Zenith is a late maturing, wilt-sensitive hop cultivar which shows some resistance to both downy and powdery mildew. It was bred by the Department of Hop Research, Wye College, principally for a high yield of alpha-acid per hectare. Lead conductance values have shown that Zenith does not have quite such a high alpha-acid content as Yeoman, its wilt-tolerant 'cousin', having averaged 9.0% in 1982 and 9.8% in 1983 when grown seeded, and 10.0% in both years when seedless.⁵ However, because it is a high yielding hop, its alpha-acid yield per hectare is comparable with that of Yeoman.

Zenith has been shown to produce ales of sound flavour and quality with hop utilisation values within the expected range, both in pilot-scale trials on 1979 and 1980 crop hops¹ and in commercial-scale trials on hops from the 1982 crop.⁴ Further commercial brewing trials were undertaken to establish whether Zenith hops could be used to produce lagers, as well as ales, of sound flavour quality and whether overall hop utilisation was satisfactory when using this new cultivar.

MATERIALS AND METHODS

Zenith hops were supplied by three growers. Each collaborating brewery was asked to compare beers brewed using Zenith hops, or hop products, with a control beer brewed using the hop grist which was currently being employed. The hop rate was such as to produce the normal level of bitterness found in the control beer. For this purpose, the lead conductance value (LCV), as estimated by the Hops Marketing Board Limited, was used for cone hops, whilst the initial LCV provided by the hop processors was used for extracts and pellets. Brew Lengths varied from 240 to 550 barrels.

Participating brewing companies were asked to compare the flavour of the control beer with that brewed from Zenith hops using the triangular taste testing procedures of Bengtsson.²

RESULTS AND DISCUSSION

1982 Crop Hops

Of a total of twenty brews, carried out by seven participating companies, six were lagers and the remainder ales. Hops in the form of cones, pellets and liquid carbon dioxide extract were included in the trial. The results are summarised in Table 1. The participating breweries generally achieved a good match between beers brewed with Zenith hops and the corresponding controls, with regard to analytical bitterness. Hop utilisation with the new cultivar was generally similar to that of the controls. Collaborator IV commented that the lower utilisation values obtained with the control hops, when compared with both seeded and

TABLE I. Commercial brewing trials with Zenith hops from the 1982 Crop

Investigator	Type of Beer	No. of Brews	Form of hops		Beer Bitterness BU) (%)		Hop Utilisation		Suitability of Zenith Hops for Brewing
			Zenith	Control	Zenith	Control	Zenith	Control	
I	Cask bitter (dry hopped)	3	cones	cones	30	30	30.1	28.1	Suitable*
					30	33	30.8	28.5	
					31	33	31.1	28.3	
II	Draught bitter	3	pellets	pellets (85%) extract (15%)	35	37	38.2	37.4	Suitable
					35	38	32.3	31.1	
					34	35	34.7	30.2	
III	Cask bitter	3	pellets†	pellets	24	22	27.6	25.2	Suitable
					24	26	30.0	29.4	
					21	20	25.0	24.2	
IV	Pale ale Pale ale	1 1	cones cones (seedless)	cone‡ cone‡	25	25	27.6	19.5	Suitable
					26	26	27.7	21.9	
V	Draught bitter	3	pellets	pellets	28	29	38.5	38.9	Suitable*
					29	27	44.3	37.3	
					27	29	33.9	41.5	
					23	24	27.4	29.7	
VI	Lager§	3	pellets	pellets	21	21	24.5	23.3	Suitable
					22	23	27.9	29.2	
					20	20	44.8	42.7	
VII	Lager§	3	liquid CO ₂ extract (seedless)	methanolic extract	19	20	42.8	42.6	Suitable
					18	20	38.9	40.7	
					20	20	44.8	42.7	

*Bitterness includes a contribution from isomerised extract

†50% of Zenith hops used in the grist.

‡1981 crop hops used in the production of control hops.

§High gravity brewing employed.

TABLE II. Commercial brewing trials with Zenith hops from the 1983 crop

Investigator	Type of beer	No. of brews	Form of hops		Beer Bitterness (BU)		Hop Utilisation (%)		Suitability of Zenith hops for brewing
			Zenith	Control	Zenith	Control	Zenith	Control	
II	Lager*	1	pellets (seedless)	pellets	32	27	33.0	39.0	suitable†
IV	Lager*	1	pellets (seedless)	pellets	25	25	37.5	38.4	suitable
VI	Lager*	2	pellets	pellets	23	22	27.4	28.4	suitable
VII	Lager*	2	CO ₂ extract	methanolic extract & pellets	28	32	28.7	30.0	suitable
					34	37	32.5	34.7	suitable

*High gravity brewing employed.

†Bitterness includes a contribution from isomerised extract.

seedless Zenith hops, was possibly due to the fact that 1981 crop hops had been used in the control grist.

A total of fourteen triangle taste tests were carried out on the ales and no significant difference was found in thirteen cases. In the remaining test a one-star significant difference was found. Investigator V carried out a flavour profile study by the methods of Clapperton³ which showed no hop-related differences between trial and control beers. All participants considered Zenith a suitable hop for brewing ales.

Lager beers were produced by investigators VI and VII. Whilst both considered Zenith a suitable hop for lager production, investigator VI expressed caution about the suitability of a total replacement of the hop grist with Zenith due to a pronounced hop aroma and slightly higher perceived bitterness which resulted in a one-star significant difference being established in the triangle taste tests.

1983 Crop Hops

A total of six lager brews were carried out by four participating companies. Both seeded and seedless Zenith hops were used together with pellets and liquid CO₂ hop extract.

The results are summarised in Table 2. Overall hop utilisation values were comparable in test and control brews and only one investigator detected a significant flavour difference. Investigator VI recorded a one-star significant difference in triangle taste tests but suggested that this was

possibly due to the fact that the control beer was produced with hops from the 1982 crops.

Investigator VII reported that additional tests had shown no significant differences between test and control beers in both palate and non-biological stability over a nine-month period.

All collaborators considered that Zenith was a suitable hop for lager production.

CONCLUSIONS

Trials on Zenith hops from the 1982 and 1983 crops have established that this cultivar is suitable for brewing either ales or lager beers.

Acknowledgement

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