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TECHNOLOGICAL EVALUATION OF AROMATIC HOP VARIETIES OF UKRAINIAN SELECTION

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Abstract. *The article presents the results of technological evaluation of aromatic hop varieties of different maturity groups of Ukrainian selection. It is established that among the zoned varieties there are both high-quality varieties and those with low technological quality indicators and contribute to the saturation of the market with foreign raw materials. The presence of high-quality varieties of hops of aromatic type and adequate natural resources makes it possible to provide the brewing industry with domestic raw materials and expands the possibilities of its use in other sectors of the economy.*

Key words: *Hops, aromatic varieties, technological indicators, bitter substances, polyphenolic substances, essential oil.*

Introduction. An urgent problem of today's brewing industry of Ukraine is the provision of high-quality domestic hop raw materials, which would not be inferior in quality to foreign counterparts. The use of hop cones and products made from varieties of Ukrainian selection will contribute to the development of hop production in Ukraine as a whole, reduce the cost of beer through the use of domestic hop raw materials and strengthen Ukraine's position in the world market of hops and beer [9].

The lack of a comprehensive technological assessment of aromatic hop varieties of different maturity groups zoned in Ukraine promotes the cultivation of uncompetitive domestic varieties, which weakens the domestic market and hinders access to foreign markets. As a result, there is a problem of in-depth study of the state of the research question.

The purpose of the research is technological evaluation of aromatic hop varieties registered in Ukraine and identification of promising varieties on the domestic market.

Material and methods of research. The research methodology is based on the systematization and generalization of information materials obtained from the scientific literature, data of the State Variety Testing, research institutions and own research [1–7].

Results. Aromatic varieties have a delicate aroma, but, unlike bitter, contain much less of the main component - alpha acids, which are the main pricing indicator for the evaluation of hops and hop products and for which hops are used in brewing.

Table

Technological characteristics of aromatic varieties of hops of different maturity groups

Name of the variety	The content of bitter substances,%	The content of alpha-acids,%	The content of beta-acids,%	The content of total polyphenols,%	The content of essential oil (ml /100 g)	The content of xanthohumol,%	Breweries evaluation (ball)
1	2	3	4	5	6	7	8
Early-maturing varieties							
Violas	17.7	5.5	5.3	4.8	0.50	0.38	20.5
Fenixs	18.5	5.4	5.9	7.2	0.70	0.32	20.0
On average	18.1	5.5	5.6	6.0	0.60	0.35	20.3
Middle-grade							
Vydybor	18.5	5.6	6.1	5.0	1.10	0.37	21.0
Zhytomyrs'kyi 75	24.5	7.0	11.9	5.9	0.80	0.42	22.3
Zahrava	24.5	6.1	6.1	6.5	1.60	0.65	21.2
Zlato Polissia	19.0	5.0	5.0	6.4	0.75	0.77	22.0
Klon 18	12.5	3.1	3.4	6.6	0.40	0.45	21.2
Natsional'nyi	29.5	9.8	7.5	6.2	0.50	0.67	22.0
Oskar	24.0	6.0	6.4	6.0	1.65	0.37	22.3
Pyvovar	25.0	5.9	10.6	6.4	0.80	0.52	22.5
Polisianka	22.0	6.8	7.2	4.0	1.52	0.45	22.4
Regent	15.4	5.4	6.0	3.8	0.45	0.43	22.0
Slavianka	24.0	6.0	7.0	5.7	2.35	0.50	22.2
Starovolyns'kyi aromatychnyi	26.0	7.0	6.5	6.2	2.00	0.48	22.0
Triumf	32.5	8.0	11.0	5.8	2.50	0.40	22.5
Khmeleslav	20.7	6.2	6.5	7.5	1.50	0.27	22.5
On average	22.7	6.3	7.2	5.9	1.28	0.48	22.0
Late varieties							
Haidamats'kyi	21.7	6.5	7.8	7.4	0.65	0.32	21.6
On average	21.7	6.5	7.8	7.4	0.65	0.32	21.6
On average, the group of aromatic varieties	22.1	6.2	7.1	6.0	1.16	0.46	21.8

Studies have shown (Table) that the amount of bitter substances in aromatic varieties ranges from 12.5 to 32.5%. The content of alpha acids in these varieties is from 3.1 to 9.8%. A characteristic feature of such varieties is that in addition to the high content of bitter substances, especially in the varieties Zhytomyrs'kyi 75, Natsional'nyi, Pyvovar, Slavianka, Triumf, the share of beta-acids in the composition of bitter substances is much higher than the share of alpha-acids. In aromatic varieties of hops of Ukrainian selection, the high-quality composition of bitter substances is combined with a subtle delicate aroma typical of the best European varieties.

An important factor in the presence of hop flavor in beer is the quantitative and qualitative composition of essential oil [8]. The content of essential oil in aromatic varieties of hops of Ukrainian selection of different maturity groups ranges from 0.4–2.5 ml / 100 g (Table). Slavianka, Triumf, Starovolyns'kyi aromatychnyi have the highest oil content among the aromatic group of hop varieties.

In order to obtain high quality beer, it is necessary to take into account the quantitative and qualitative composition of polyphenolic substances. The increased content of polyphenols in hops, which is used for hop worting, contributes to their higher content in hop wort and beer [8]. According to the content of polyphenolic substances, hop varieties are zoned in Ukraine and have a high content of this component (Table). Slightly higher content of polyphenolic substances was observed in the varieties Haidamats'kyi, Khmeleslav, Fenixs.

The quantitative content of xanthohumol in hop cones depends on the selection variety and ranges from 0.27 to 0.77% (Table). Comparing the above data with the data of research by M. Bienda [10], it can be noted that in foreign varieties of hops the content of xanthohumol varies in the range of 0.2–1.0%, which is on the same level with domestic varieties. The high content of xanthohumol in domestic hop varieties expands the possibilities of their use and competition in domestic and international markets.

The final stage of assessing the quality of hop varieties is their brewing evaluation. As can be seen from the table. almost all varieties of hops of aromatic group have the highest brewing score of 22.0–25.0 points. In each group there are varieties of hops with lower and higher rates of brewing evaluation compared to average values.

Conclusions

Taking into account the technological indicators of the quality of hop varieties, we note that in general the most promising in the group of aromatic varieties among the early ripening recognized Fenixs; medium-ripe – Natsional'nyi, Slavianka, Starovolyns'kyi aromatychnyi, Zahrava, Triumf, Khmeleslav; late ripening – Haidamats'kyi. In terms of a set of features, they are not inferior to foreign varieties, and in some respects significantly exceed the world's best counterparts.

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