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SUITABILITY OF INTRODUCED APPLE VARIETIES FOR THE PRODUCTION OF JUICES AND CIDER

Kusnetsov Andryi,
researcher,
Litovchenko Oleksandr,
dr.-ing. s., professor,
Institute of horticulture of the NAASU
Voitsekhivskyi Volodymyr,
Ph.D., associate professor
Ilyashenko Andryi,
student,
National university of life and environmental sciences of Ukraine, Kiev
Bilko Marina,
dr.-ing. s., professor,
National University of Food Technologies, Kiev
Smetanska Irina,
dr.-ing. s., dr. agr. s., professor,
University of Applied Sciences Weihenstephan-Triesdorf, Germany
Muliarchuk Oksana,
Ph.D., associate professor,
Yarosh Yurii,
Ph.D., associate professor,
SSS «Oleksandra Maynova Bobrovytsya professional college of NULESU»

Annotation. *The suitability of introduced apple varieties for processing into juices and ciders was analyzed. High-quality juices are obtained from apple varieties: Jonagold, Red Topaz, Relinda and Black Prince. Technological varieties with a high juice yield of more than 50%: Jonagold, Black Prince, Luna, Sirius, Rosella, Relinda, Remo, Scythian Gold. The use of the SAF CIDER yeast race contributes to the increase qualities of cider wines.*

Key words: *variety, fruits, juice, cider, chemical composition, quality.*

Introduction.

Ukraine has favorable conditions for the effective development of winemaking from fruit and berry raw materials. At the same time, an imperfect tax policy restrains the production and introduction of new competitive fruit and berry wines and drinks and causes the market to be filled with various synthetic drinks whose safety is in doubt [1, 2, 3, 7].

Recently, Ukrainian consumers prefer low-alcohol and natural wines. Thus, in the countries of Europe and the world, natural low-alcohol fruit wines are in ever-increasing demand. Thus, the production of cider and perry in some countries amounts to million dal per year: France - 38, England - 14, Switzerland - 8, Spain - 7. Ukraine is quite capable of producing high-quality low-alcohol wines from fruit and berry raw materials, the cost price of which will be low, and benefit, safety and biological value will contribute to a positive impact on people's health. Natural juices and cider contain natural polyphenols that help activate the work of the digestive organs, expand and strengthen blood vessels, lower blood pressure, normalize blood sugar levels and improve mood [3, 7].

The formation of the quality of natural juices and ciders depends on a complex of factors, the most important of which are growing weather conditions, varietal characteristics, the use of pure wine yeast cultures, etc. Therefore, the sorting of varieties is one of the effective ways of forming the planned physico-chemical and organoleptic indicators of juices and wine materials [4, 7, 8].

Research materials and methods.

The experiments were carried out at the Institute of Horticulture of the NAASU, in the laboratory of innovative food technologies. Wine materials were prepared according to generally accepted technology. Apple must was fermented with the help of pure VIVASE and SAF CIDER wine yeast cultures. After the fermentation of sugar, the wine materials were sulfited, the containers were hermetically closed and stored at a temperature of 3-5 °C. The raw material was obtained from the experimental sites of the IH of NAASU. Chemical-technological studies were carried out according to generally accepted methods in winemaking [6].

Results and their discussion.

The analysis of the obtained results showed that the juices of the studied varieties of apples differ in biochemical composition and quality (table 1).

1. Chemical-technological parameters and quality of apple juices

Variety	Content DSS[1], %	Content sugar, %	Content TA[2], %	SAI[3]	Juice output, %	TE, points
Golden	12.0	9.6	0.23	42	55.6	8
Johnagold	11.9	9.5	0.33	29	60.0	8+
Luna	11.8	9.4	0.31	30	57.4	8
Reanda	13.0	10.4	0.87	12	48.6	8
Radogost	12.0	9.6	0.64	15	48.9	8
Revena	11.0	8.8	0.49	18	50.3	8
Red Topaz	11.7	9.1	0.48	19	56.0	8++
Rosella	13.0	10.4	0.29	36	58.0	7,9
Relinda	14.0	11.2	0.48	23	57.1	8+
Remo	12.8	10.2	1.19	9	57.6	8
Renora	12.0	9.6	1.01	10	47.0	7,9
Sirius	13.8	11.0	0.44	25	59.6	8
Skifske zoloto	12.0	9.6	0.58	17	56.4	8
Orion	12.6	10.1	0.43	23	53.8	8
Black Prince	12.2	9.8	0.29	34	56.7	8+

[1]DSS – dry soluble substances, [2]TA – titrated acids, [3]SAI - sugar acid inde, [4]TE– tasting evaluation

Among the studied samples, the highest content of DSS was noted for the following varieties: Relinda, Sirius, Rosella, Reanda (more than 13%). In terms of sugar content, the following varieties had the advantage: Sirius, Rosella, Orion, Reanda, Relinda, Remo, all of which were more than 10%.

The fruits of Remo, Renor and Reand apples were characterized by an increased content of titrated acids (more than 1%). The fruits of the Golden, Black Prince, Luna and Jonah Gold varieties were characterized by low titrated acidity - 0.23-0.33%. Juices and ciders from these varieties had an imbalance in taste.

The technological suitability of the fruits for processing was characterized by the yield of juice. On average, according to the investigated varieties, it was 55%. An increased yield of juice was characterized by the following varieties: Johna Gold - 60%, above 55% (Black Prince, Luna, Sirius, Rosella, Relinda, Remo, Scythian Gold), with a lower level of suitability below 50% - varieties: Renora, Reanda and Radogost (for these varieties, the use of additional processing of the muscle with enzyme preparations is recommended).

Analyzing the organoleptic indicators of the juices of the studied varieties, it can be stated that all samples have good quality, but the most harmonious can be considered: Jonah Gold, Red Topaz, Relinda and Black Prince.

The analysis of natural ciders (without the addition of sugar) made under the conditions of micro-winemaking using different races of yeast made it possible to establish the difference in chemical and technological indicators (table 2).

2. Chemical-technological indicators of ciders made from different varieties of apples and using different races of yeast

Variety / Races of yeast	Content					TE, point
	alcohol, % об.	sugar, %	TA[1], %	PS[2], мg/dm^3	P[3], мг/дм^3	
Remo / VIVASE	6.1	0.1	1.02	0.45	275	7.9
Remo / SAF CIDER	6.3	0.1	0.94	0.42	300	8.0
Skifske zoloto / VIVASE	5.3	0.6	0.47	0.36	220	7.8
Skifske zoloto / SAF CIDER	5.7	0.5	0.46	0.31	245	8.0
Relinda / VIVASE	6.6	0.2	0.30	0.56	240	7.9
Relinda / SAF CIDER	6.9	0.1	0.29	0.50	255	8.0
Revena / VIVASE	6.2	0.2	0.35	0.34	250	7.9
Revena / SAF CIDER	6.5	0.1	0.32	0.31	265	8.0
Renora / VIVASE	5.6	0.7	0.84	0.38	200	8.0
Renora / SAF CIDER	6.4	0.5	0.54	0.32	200	8+

[1]TA- titrated acids, [2]PS – pectin substances, [3]P – polyphenols, [4]TE– tasting evaluation

The alcohol content in all wine materials is sufficient for this type. The presence of a small amount of sugars not used by yeast was observed in wine materials from the Skifske zoloto and Renora varieties, which did not significantly affect the quality.

The content of TA during fermentation decreased by 10-20%, which for juices with a high acid content had a positive effect on the organoleptic characteristics of wine materials. Samples from the Remo and Renora varieties were rougher in taste with excess acidity. Relinda cider had low TA.

The content of polyphenols varied slightly by varieties. The increased level of natural P provided a slight astringency and complemented the flavor of the Remo and Revena varieties. The content of PS during fermentation decreases by 2-3 times. The remaining amount contributed to the stability of the samples during storage.

Remo, Skifske zoloto, Relinda and Renora varieties received the highest tasting rating (8 points). Comparing the influence of the yeast race, it should be noted that the SAF CIDER race proved to be better for these varieties, its use contributed to a more complete fermentation of sugars, an intensive reduction of TA and PS, and less loss of P.

A detailed analysis of the organoleptic parameters of the studied cider wine materials from apples of foreign selection revealed that all varieties are suitable for cider production (table 3).

3. Organoleptic characteristics of cider wines (vinified by SAF CIDER yeast race)

Variety	Color	Aroma	Taste	TE*, point
Golden	straw-golden, transparent, without shine	clean, pleasant	typical, simple	7,8
Johnagold	straw-golden, transparent	clean, pleasant	clearly apple, pleasant	7,9
Luna	straw-golden, transparent	clean, with soft compote-honey tones	simple, watery	7,7
Reanda	straw-golden, transparent	pure typical	clean, highly acidic	7,9
Radogost	straw-golden, transparent	intense, typical	clean, harmonious	8
Revena	straw-golden, transparent	clean, pleasant	pronounced apple, pleasant	8
Red Topaz	straw-golden, transparent	harmonious	clean, pleasant	8
Rosella	straw-golden, cloudy	чистий, з відтінками печених яблук	simple, slightly tart	7,9
Relinda	straw-golden, transparent	intense, typical	clean, harmonious	8
Remo	straw-golden, transparent	clean, pleasant	clean, highly acidic	8
Renora	light golden, transparent with a shine	intense, typical	clean, harmonious	8+
Sirius	straw, light opal, dull	varietal, typical, with shades of dried fruits	simple, with oily shades	7,7
Skifske zoloto	straw-golden, transparent	intense, typical	clean, harmonious	8
Orion	straw-golden, cloudy	simple, harmonious	pronounced apple, pleasant	7,9
Black Prince	straw-golden, transparent	clean, pleasant, fresh	with spicy bitters	7,9

**TE – tasting evaluation*

The color of all samples was transparent, but it should be noted that samples from the Rosella, Sirius and Orion varieties had a light opal. The tasters noted different notes in the aroma of all samples, which had a positive effect on the formation of each aromatic complex. The taste of all the samples was good, only the samples from the Luna variety had an insufficient fullness of taste, Sirius had oily shades, Black Prince had a piquant bitterness.

Conclusions.

Suitability for the production of juices and ciders of apple varieties of foreign selection has been established. The highest quality juices are obtained from apple varieties: Jonah Gold, Red Topaz, Relinda and Black Prince. Varieties with a high juice yield of more than 50% can be considered more technological: Jonah Gold, Black Prince, Luna, Sirius, Rosella, Relinda, Remo, Scythian Gold. The use of 2 races of wine yeast revealed that SAF CIDER is better. The obtained results should be taken into account in the production of high-quality natural varietal juices and cider wines in order to improve quality and competitiveness.

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