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INFLUENCE OF FERMENTATION PATTERN ON AROMA COMPOUNDS IN LEGUME SPREADS

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INTRODUCTION & AIM

While fermentation is recognized for its ability to enhance the functional, nutritional, and sensory aspects of legumes, the outcomes of various studies differ and lack consistency due to factors such as protein source, microorganisms, and applied fermentation methods. The **aim** of this study was to compare the profile of aroma compounds in spreads produced from different legume concentrates using different fermentation temperatures.

MATERIALS AND METHODS

The legume concentrates (LC) (local market, Latvia) of brown pea (AB), yellow pea (AY), and fava (AF) in 50:50 proportions with Alomix (legume concentrate mix), starter Danisco® VEGE 033 (Danisco, Denmark), were used in the research. PC was thermally treated (72±1°C, 30±5 min), cooled (37°C, 40°C, 43°C), inoculated, and fermented (until pH 4.9-4.6 was). Aroma compounds were detected in fermented spreads using Perkin Elmer Clarus 500 GC/MS and an Elite-Wax ETR column (60 m × 0.25 mm i.d.; DF – 0.25 µm).

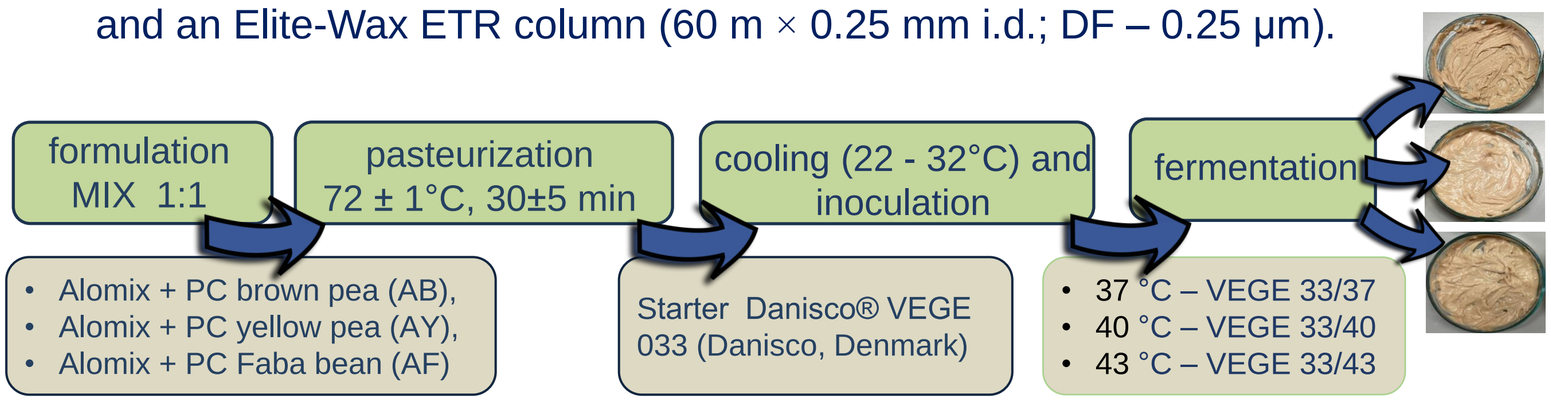

Fig. 1. *The technology of the legume spread production*

RESULTS & DISCUSSION

Table 1. Chemical composition of the legume spreads

Legume spread	Content g, 100 g^{-1}			
	protein	fat	fiber	ash
AY	8.83 ± 0.09^{b}	1.41 ± 0.03^{a}	1.64 ± 0.019^{a}	1.83 ± 0.073^{a}
AB	9.10 ± 0.21^{a}	1.37 ± 0.031^{a}	1.66 ± 0.018^{a}	1.84 ± 0.069^{a}
AF	9.56 ± 0.36^{a}	1.34 ± 0.035^{a}	1.70 ± 0.036^{a}	1.77 ± 0.083^{a}

Table 2. Volatile compounds in the legume spreads before fermentation

Retention time (min)	Volatile compounds	Content, %						Flavour
		Legume spread before pasteurization			Legume spread after pasteurization			
		YP	BP	FB	AY/70	AB/70	AF/70	
13:83	hexanal **CAS NR. 66-25-1**	83.64	78.31	71.77	90.95	73.84	67.00	grassy, hay-like, pea pod
21.57	1-hexanol **CAS NR. 111-27-3**	16.36	21.69	28.23	9.05	26.16	33.00	lemon, grass, green.

Table 3. Volatile compounds in the fermented legume spreads

Retention time (min)	Volatile compounds	Content, %									Flavour
		AY VEGE033			AB VEGE033			AF VEGE033			
		37℃	40℃	43℃	37℃	40℃	43℃	37℃	40℃	43℃	
6:04	acetone **CAS NR. 67-64-1**						8.42	23.93	28.46	41.68	pungent, sweet
10:46	2,3 butenediol **CAS NR. 431-03-8**							20.31			buttery, creamy
13:83	hexanal **CAS NR. 66-25-1**	43.06	63.68	51.57	59.16	43.36	4.77	11.14	19.42	19.32	grassy, hay-like, pea pod
17:21	β-terpinyl acetate cyclohexanol1-metil-4-(1-metiletil)-, acetate	-	-	-	-	-	33.88	-	-	-	herbs, pine
18.39	furan, 2-pentil **CAS NR. 110-00-9**	-	6.41	-	-	-	-	-	-	-	fruity, sweet
21:58	1-hexanol **CAS NR. 111-27-3**	56.94	9.46	41.04	40.84	28.26	8.50	44.62	31.78	29.89	lemon, grass, green
23:65	2-octenal **CAS NR. 2363-89-5**	-	7.86	-	-	-	-	-	-	-	fatty acids, citrus fruits
23:84	1-octen-3-ol **CAS NR. 3391-86-4**	-	5.06	-	-	-	-	-	-	-	mushrooms, soil
24:07	acetic acid **CAS NR. 64-19-7**	-	-	7.25	-	12.24	6.71	-	10.34	9.12	sour, vinegary
25:99	benzaldehyde **CAS NR. 100-52-7**	-	7.43	-	-	-	-	-	-	-	almond, sweet
27:76	butanoic acid **CAS NR.107-92-6**	-	-	-	-	-	30.99	-	-	-	rancid, cheesy
34:66	triacetin **CAS NR. 102-76-1**	-	-	-	-	16.14	6.72	-	-	-	slightly sweet smell

Aldehydes, alcohols, organic acids, and ketones have the highest relative abundance in the analysed samples. A significantly lower ($p<0.05$) hexanal concentration was detected in AF samples, regardless of the fermentation temperature, in AY samples at 37±1°C, and in AB samples at 43±1°C.

CONCLUSION

Fermentation temperature has significant influence on aroma compounds in fermented legume spreads; however, the results are not consistent and depend on the LC. The choice of LC and an appropriate fermentation temperature can positively affect the aroma of the product. The choice of LC and appropriate fermentation temperature can positively affect the taste, aroma of the final product. The fermentation temperature for AY and AF sample 37 °C, for AB 43°C was established as the most appropriate, which reduces the pea aroma in analyzed samples.

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