BIORUŽA, s. r. o.

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CERTIFICATE of ANALYSIS (COA)

COMMON NAME	Ginger
LATIN NAME	*Zingiber officinale*
COUNTRY OF ORIGIN	Sri Lanka
CULTIVATION METHOD	Certified Organic (USDA, NOP)
TYPE	Essential Oil
EXTRACTION METHOD	Steam Distilled
PLANT PART	Rhizome
USE	Aromatherapy, Natural Perfumery

SKU	4381
LOT #	18
MANUFACTURING DATE	February 2024
BEST BY DATE	February 2026

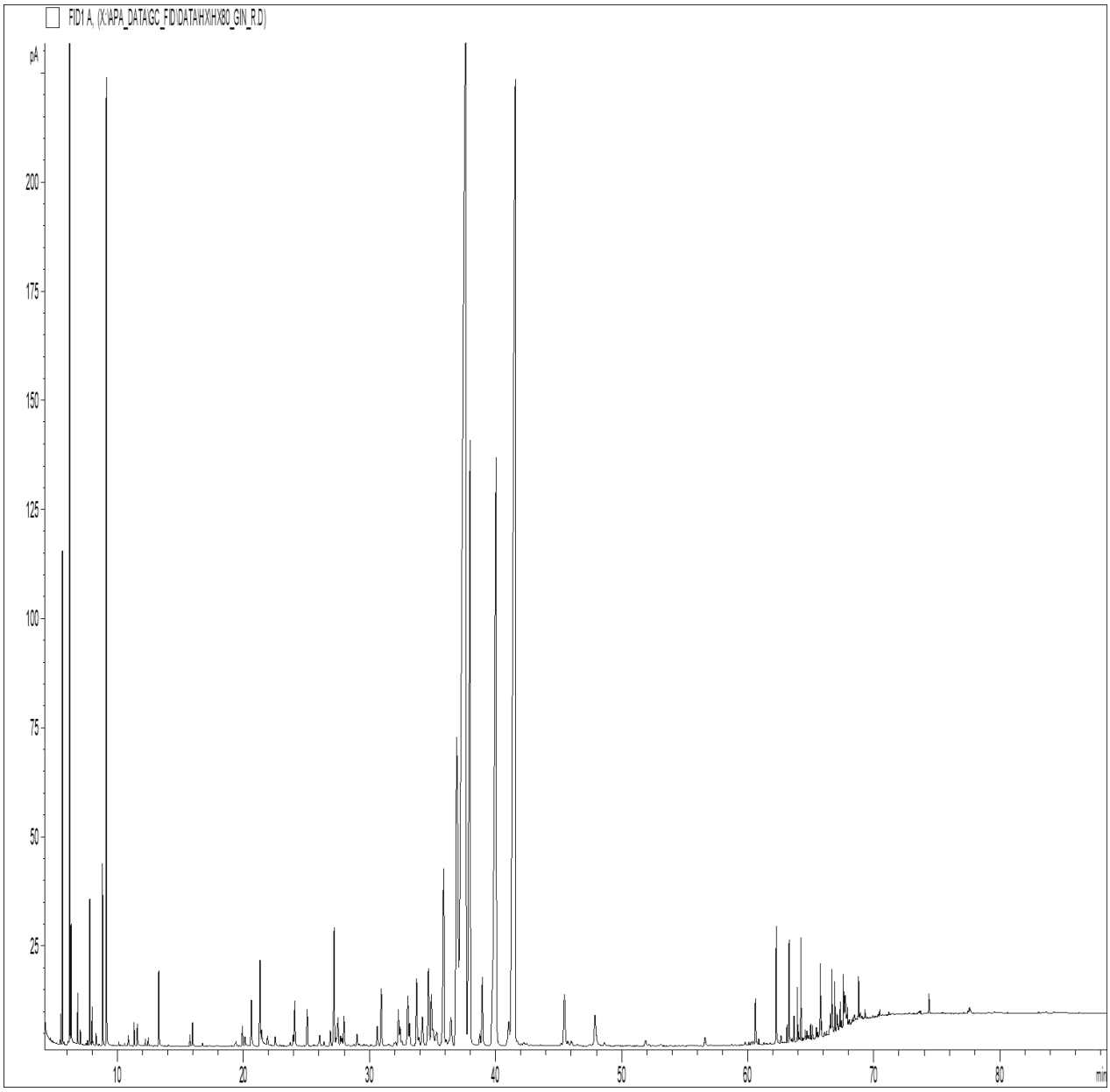
	SPECIFICATIONS (Range)	
SPECIFIC GRAVITY @25˚C	0.8600 – 0.918	0.8764
REFRACTIVE INDEX @20˚C	1.460 – 1.55	1.4928
OPTICAL ROTATION @20˚C	-26° to -42°	-37.947^{o}

PHYSICAL APPEARANCE	Transparent liquid	*Conforms*
COLOR	Light yellow to brownish	*Conforms*
ODOR	Warm, spicy, stimulating, hint of sweetness.	*Conforms*
SOLUBILITY	Soluble in alcohol and fixed oils	
SPECIAL USE INSTRUCTIONS	Dilute before use	

PRIMARY CONSTITUENTS	Alpha-Zingiberene, Ar-Curcumene.

THIRD PARTY LAB ANALYSIS (GCMS)

Chromatographic profile:



Identification results: ORGANIC GINGER - BATCH N° 380 LOT 18					
Peaks	**RT (min)**	**Compound name**	**%**	**Norm (%)**	**Allergens (%)**
1	5.50	TRICYCLENE	0.08		
2	5.64	**alpha-PINENE**	**1.25**	**0.1 - 3.0**	
3	5.79	TOLUENE	0.01		
4	6.21	**CAMPHENE**	**3.63**	**0.2 - 12.0**	
5	6.33	HEXANAL	0.37		
6	6.86	beta-PINENE	0.15		
7	7.06	SABINENE	0.05		
8	7.64	delta3-CARENE	0.02		
9	7.81	beta-MYRCENE	0.46		
10	7.99	alpha-PHELLANDRENE	0.13		
11	8.07	psi-LIMONENE	0.02		
12	8.31	2-HEPTANONE	0.05		
13	8.83	LIMONENE	0.67		0.67
14	9.13	**1,8-CINEOLE**	**3.67**		
15		**beta-PHELLANDRENE**			
16	10.12	gamma-TERPINENE	0.02		
17	10.87	p-CYMENE	0.05		
18	11.33	TERPINOLENE	0.11		
19	11.59	OCTANAL	0.11		
20	12.23	1,3,7-NONATRIENE, 4,8-DIMETHYL-	0.03		
21	12.45	2-HEPTANOL	0.04		
22	13.28	5-HEPTEN-2-ONE, 6-METHYL-	0.36		
23	15.76	2-NONANONE	0.06		
24	15.97	ROSEFURAN	0.12		
25	16.76	PERILLENE	0.01		
26	19.33	5-HEPTEN-2-OL, 6-METHYL-	0.02		
27	19.41	alpha-CUBEBENE	0.03		
28	19.92	delta-ELEMENE	0.12		
29	20.12	CITRONELLAL	0.06		
30	20.63	ISOLEDENE	0.31		
31	21.32	alpha-COPAENE	0.55		
32	21.45	DECANAL	0.25		
33	21.91	CAMPHOR	0.06		
34	22.52	2-NONANOL	0.07		
35	23.71	ALCOHOL COMPOUND	0.02		
36	23.95	beta1-CUBEBENE	0.08		
37	24.07	LINALOOL	0.30		0.30
38	25.06	alpha-cis-BERGAMOTENE	0.25		
39	25.59	SESQUITERPENE	0.01		
40	26.04	SESQUITERPENE	0.04		
41	26.05	BORNYL ACETATE	0.06		
42	26.40	SESQUITERPENE	0.03		
43	26.90	alpha-trans-BERGAMOTENE	0.12		
44	27.20	**beta-ELEMENE**	**0.90**	**< 1.0**	
45	27.37	beta-CARYOPHYLLENE	0.06		
46	27.50	2-UNDECANONE	0.27		
47	27.71	TERPINENE-4-OL	0.08		
48	27.82	COMPOUND Mw=152	0.06		
49	27.97	ROSEFURAN OXIDE	0.23		
50	28.31	ALIPHATIC ESTER	0.02		
51	28.77	SESQUITERPENE	0.02		

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Peaks	**RT (min)**	**Compound name**	**%**	**Norm (%)**	**Allergens (%)**
52	29.01	SESQUITERPENE	0.10		
53	29.18	MYRTENAL	0.03		
54	29.55	cis-p-MENTH-2-EN-1-OL	0.02		
55	29.74	CADINA-3,5-DIENE	0.01		
56	30.62	GERMACRENE A	0.17		
57	30.94	ALLO-AROMADENDRENE	0.49		
58	31.54	SESQUITERPENE	0.02		
59	31.97	ZONARENE	0.02		
60	32.08	SESQUITERPENE	0.04		
61	32.30	FARNESENE ISOMER	0.29		
62	32.42	CITRONELLYL ACETATE	0.16		
63	32.58	alpha-HUMULENE	0.05		
64	32.79	SESQUITERPENE	0.01		
65	33.04	E-beta-FARNESENE	0.43		
66	33.18	gamma-SELINENE	0.20		
67	33.74	**NERAL**	**0.59**	**0.2 - 2.0**	0.59
68	33.92	Z-beta-FARNESENE	0.08		
69	34.20	gamma-MUUROLENE	0.32		
70	34.67	BORNEOL	0.79		
71	34.91	alpha-TERPINEOL	0.47		
72	35.04	gamma-CURCUMENE	0.16		
73	35.27	SESQUITERPENE	0.08		
74	35.32	LEDENE	0.15		
75	35.88	GERMACRENE D	1.79		
76	36.08	SESQUITERPENE	0.07		
77	36.46	SESQUITERPENE	0.40		
78	36.92	**MUUROLADIENE ISOMER**	**4.85**		
79	37.65	**alpha-ZINGIBERENE**	**29.85**	**23 - 45**	
80	37.98	**beta-BISABOLENE**	**7.11**	**3 - 7**	
81		**GERANIAL**		**0.5 - 3.5**	7.11
82	38.75	SESQUITERPENE	0.09		
83	38.95	SESQUITERPENE	0.60		
84	40.04	**E,E-alpha-FARNESENE**	**7.72**		
85	40.10	delta-CADINENE	0.37		
86	40.12	GERANYL ACETATE	0.79		
87	40.14	7-epi-alpha-SELINENE	0.49		
88	41.05	CITRONELLOL	0.32		0.32
89	41.56	**beta-SESQUIPHELLANDRENE**	**10.97**	**8 - 17**	
90	41.58	**alpha-CURCUMENE**	**7.08**	**3 - 11**	
91	41.73	CADINA-1,4-DIENE	0.07		
92	42.04	SESQUITERPENE Mw=202	0.03		
93	42.24	MYRTENOL	0.04		
94	42.47	SESQUITERPENE	0.03		
95	42.80	SESQUITERPENE	0.01		
96	43.23	SESQUITERPENE Mw=202	0.01		
97	45.21	2-TRIDECANONE	0.03		
98	45.47	GERMACRENE B	0.66		
99	45.73	cis-CALAMENENE	0.06		
100	46.01	trans-CALAMENENE	0.06		
101	46.49	TERPENIC COMPOUND	0.02		
102	47.42	SESQUITERPENE Mw=202	0.02		

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Peaks	**RT (min)**	**Compound name**	**%**	**Norm (%)**	**Allergens (%)**
103	47.88	**GERANIOL**	**0.47**	**0.1 - 3.5**	0.47
104	48.63	E-GERANYL ACETONE	0.03		
105	51.90	Epi-CUBEBOL	0.08		
106	52.17	COMPOUND Mw=218	0.02		
107	53.10	alpha-CALACORENE	0.02		
108	56.61	CUBEBOL	0.10		
109	57.05	SESQUITERPENOL	0.01		
110	58.72	beta-CALACORENE	0.01		
111	59.79	AROMATIC COMPOUND	0.03		
112	60.09	CARYOPHYLLENE OXIDE	0.02		
113	60.28	AROMATIC COMPOUND	0.02		
114	60.40	IONONE ISOMER	0.03		
115	60.61	7-epi-SESQUISABINENE HYDRATE	0.15		
116	60.63	AROMATIC COMPOUND	0.15		
117	60.88	SESQUITERPENOL	0.03		
118	61.28	SESQUITERPENOL	0.01		
119	62.26	NEROLIDOL	0.48		
120	62.32	GERMACRENE D-4-OL	0.03		
121	62.64	AROMATIC COMPOUND	0.05		
122	63.11	DITERPENE	0.08		
123	63.28	ELEMOL	0.41		
124	63.36	COMPOUND Mw=218	0.03		
125	63.43	COMPOUND Mw=218	0.01		
126	63.52	SESQUITERPENIC COMPOUND Mw=220	0.03		
127	63.67	10-epi-gamma-EUDESMOL	0.12		
128	63.94	SESQUITERPENOL Mw=222	0.20		
129	64.05	SESQUITERPENOL	0.04		
130	64.13	SESQUITERPENOL	0.02		
131	64.22	beta-SESQUIPHELLANDROL	0.38		
132	64.35	SESQUITERPENOL	0.02		
133	64.46	SESQUITERPENOL	0.02		
134	64.56	SESQUITERPENOL	0.06		
135	64.71	SESQUITERPENOL	0.05		
136	64.82	SESQUITERPENOL	0.03		
137	64.99	COMPOUND Mw=218	0.06		
138	65.12	SESQUITERPENOL	0.07		
139	65.44	gamma-EUDESMOL	0.05		
140	65.46	MINT SULFIDE	0.03		
141	65.56	T-CADINOL	0.03		
142	65.72	HINESOL	0.08		
143	65.77	SESQUIPHELLANDROL ISOMER	0.29		
144	65.84	4-VINYL-GUAIACOL	0.08		
145	66.07	SESQUITERPENOL	0.02		
146	66.11	SESQUITERPENOL	0.02		
147	66.26	AROMATIC COMPOUND	0.02		
148	66.48	Epi-alpha-BISABOLOL	0.02		
149	66.52	alpha-BISABOLOL	0.03		
150	66.57	alpha-EUDESMOL	0.08		
151	66.67	beta-EUDESMOL	0.31		
152	66.76	SESQUITERPENOL	0.02		

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Peaks	**RT (min)**	**Compound name**	**%**	**Norm (%)**	**Allergens (%)**
153	66.92	SESQUITERPENIC OXIDE	0.18		
154	67.09	EUDESMA-7(11)-EN-4-OL	0.09		
155	67.15	AROMATIC COMPOUND	0.03		
156	67.29	AROMATIC COMPOUND	0.01		
157	67.34	GERANYL-alpha-TERPINENE	0.10		
158	67.45	COMPOUND Mw=220	0.05		
159	67.60	COMPOUND Mw=222	0.24		
160	67.74	AROMATIC COMPOUND	0.38		
161	67.92	GERANYL-p-CYMENE	0.07		
162	68.01	COMPOUND Mw=250	0.03		
163	68.09	COMPOUND Mw=220	0.03		
164	68.32	ISOEUGENOL	0.02		
165	68.48	COMPOUND Mw=220	0.04		0.02
166	68.74	COMPOUND Mw=220	0.01		
167	68.81	ZINGIBERENOL	0.17		
168	68.94	AROMATIC COMPOUND	0.03		
169	69.08	SESQUITERPENOL	0.02		
170	69.31	SESQUITERPENIC OXIDE	0.04		
171	69.48	COMPOUND Mw=220	0.01		
172	69.95	COMPOUND Mw=218	0.01		
173	70.48	ALCOHOL COMPOUND	0.03		
174	71.19	ALCOHOL COMPOUND	0.01		
175	73.55	SESQUITERPENIC OXIDE	0.01		
176	73.63	SESQUITERPENIC OXIDE	0.02		
177	73.72	XANTHORRHIZOL	0.01		
178	74.39	ACORENONE	0.10		
179	77.49	AROMATIC COMPOUND	0.02		
180	77.59	ZINGIBEROL	0.05		
		TOTAL	**99.91**		**9.49**