NexAvens Scientific Library

OPEN ACCESS

NL Journal of Agriculture and Biotechnology

(ISSN: 3048-9679)

Volume 1 Issue 1 October 2024

Research Article

Chemical Amount of Chamomile Populations in Albania.

Alma Imeri[1*] | Ndricim Zhuri[1]

1. Department of Agronomic Science Faculty of Agriculture and Environment Agricultural University of Tirana

Corresponding Author: Alma Imeri, Department of Agronomic Science Faculty of Agriculture and Environment Agricultural University of Tirana, Albania.

DOI: 10.71168/NAB.01.01.103

Received Date: August 04- 2024 **Publication Date:** September 12- 2024

Abstract: Matricaria chamomilla L. is one of the most important medicinal plants in Albania. It has been used for centuries and its usage recently still has great importance. Beside its traditional application forms it is also used in the homeopathy, in several cosmetics; nowadays is an increasing demand on chamomile. Beside its importance as a medicinal plant, chamomile has great economic significance as well, because the dried chamomile flowers are one of the most important exported products. In Albania there is not yet a tradition of cultivation of Matricaria chamomilla L. It is a wild plant spread and its abundance due to climate is almost found in all Albania. My survey is related to the amount of some component in essential oil of Matricaria chamomilla L, cultivated and wild growing. Based on our results giving advices for the improvement of technical knowledge which can increase the effectiveness of the selection work carried out on chamomile.

Keywords: Matricaria chamomilla I, homeopathy, morpho-phenological.

Introduction

German chamomile, Matricaria chamomilla L. (syn. Chamomilla recutita (L.) Rauschert), which belongs to the Asteraceae family, is a very important medicinal plant species [4,5]. Chamomile is a native plant of South and East Europe. However, at present it has spread over nearly all the European continent. The plants can be found in North Africa, Asia, North and South America, Australia and New Zealand [4]. The flowers of German chamomile accumulate blue essential oil from 0.2 to 1.9% [6]. As a medicinal plant, its dried flowers are an old age remedy, known in ancient Egypt, Greece and Rome [3]. Nowadays, in phytotherapy, flower anthodia are mainly used. Pharmacological properties include anti-inflammatory, antiseptic, carminative, healing, sedative and spasmolytic activity [5]. According to Yanive and Palevitch (1982) and Bernath (1986) [1], essential oil content and composition of essential oil in plants varies and is due to the genetic and Environmental factors. Well irrigated chamomile plants produced flowers with high content of essential oil [7] and flower yield [2]. Therefore, the main objective of the present study was to measure the essential oil content and composition of German chamomile based on best practice of cultivation.

The biological and therapeutical application of plants of the compositae with nearly 120 genera and more than 15,000 species in Albania is more the result of systematically conducted chemical and pharmacological research than of tradition. In addition, the compositae has attracted many chemists and biochemists and substantial research has been built up over the past four decades on the chemical constituents of individual species and genera. A study of the early herbals reveals that a surprisingly large number of plants of the compositae were used for their curative properties. Undoubtedly, the wide medicinal use of many compositae inspired the organic chemists at the turn of the century to explore the chemistry in order to identify the active constituents. Compositae in fact are exceptionally rich, both in the range of secondary compounds present and also in the number of complex structures known of any one class [8].

Many other substances elaborated by the family are toxic or show other significant physiological activity and this may be one reason why plants of the compositae are rarely used in human diets or for animal fodder. Several classes of plant compound are characteristic of this family notably the terpenoid - based sesquiterpene lactones, the fatty acid derived polyacetylenes and the polysaccharide fructans. Many structures discovered for first time in this family have served as models for the synthesis of biologically active compounds and have promoted research into the activity of analogous structures. New screening methods and isolation techniques have made it possible to elucidate the mode of action of old drugs and thereby reintroduce them into modern therapy [8]. The highest content of essential oil and azulenic substances was found in normally ripe flower heads [9]. The essential oil content of chamomile flowers was 0.24 - 1.9% [8].

For a long time, the only known active principle in the chamomile oil was azulene. The name azulene was given to the parent compound of the azulene series C10H8 [10]. Azulene from M. chamomilla L. has been named chamazulene (camazulene) in order to differentiate it from the azulenes contained in other essential oils [11]. One of the most striking properties of the azulenes is their intense blue or blue-violet colour, noticeable even at very high dilution. Azulenes are decomposed by permanganate, even at low temperature, to small fragments and therefore there is no six membered aromatic ring in azulenes [10]. Chamazulene (l,4-dimethyl-7-ethylazulene) is of intensive characteristic blue colour owing to its conjugation system of five double bonds. Chamazulene is a bicyclic hydrocarbon [12].

Chamazulene, one of the major component of the oil, has pain-relieving, wound healing, antispasmodic, antiinflammatory antimicrobial properties [13]. Antiphilogistic activity of prochamazulene has been determined and found to be at least equal to that of chamazulene [14]. Chamazulene when tested on dextran- induced rat paw oedema showed the highest antiinflammatory activity [15]. Chamazulene show only slight activity and ineffective against tetanus toxin [16]. Chamazulene is a special histamine-releasing substance. Chamazulene or the blue oil o f chamomile does not have an antiinflammatory effect, but it enhances sluggish inflammatory reaction and make them more intensive [17].

Bisabolol, another constituent of the oil, has antiinflammatory, antimicrobial and antipeptic activities [13]. Laevorotatory form which is found in chamomile has more effective antiphlogistic and spasmolytic effect then the racemate (dextrarotatory form). The chemistry of bisabolol has been fruitfully extended by the partial synthesis of bisabolol ethers and esters. Most of these synthetic compounds are more active and usually have lower toxicity than natural a-bisabolol [8]. Bisabolol exhibited varying degrees of fungistatic activity. It has significant effects at only 100 mg/ml and is fungicidal to Candida albicans following a 30 minutes' exposure of the yeast to a 1000 mg/ml concentration [18].

Material and Methods

Steam Distillation

Chamomile essential oil was isolated by steam distillation (READ 1992). Hydro-distillation lasted for 2 hours into n-hexane; sample weights were 2g of drug dry matter. Samples have been grown in wild and cultivated. They are German chamomile well studied and certified by genetic bank near department of agronomy science in Agricultural University of Tirana. Plants have been cultivated in south of Albania (Korça district) and in northern part of Albania (Lezha district).

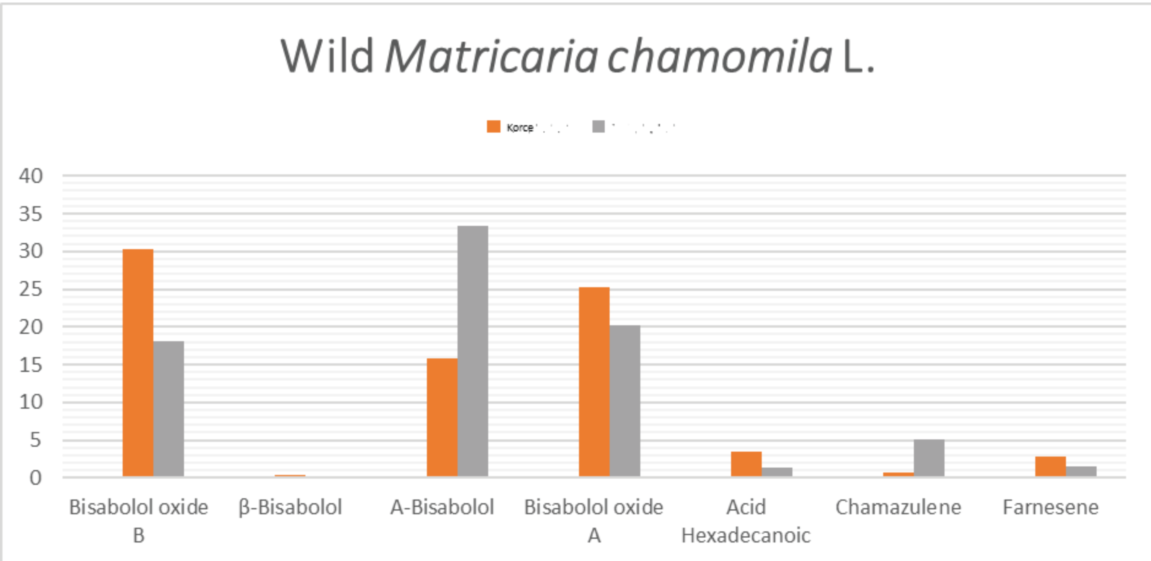
A modified distillation apparatus by Coocking & Middleton was used (HUMPHREY 1992). Gas chromatography (GC)

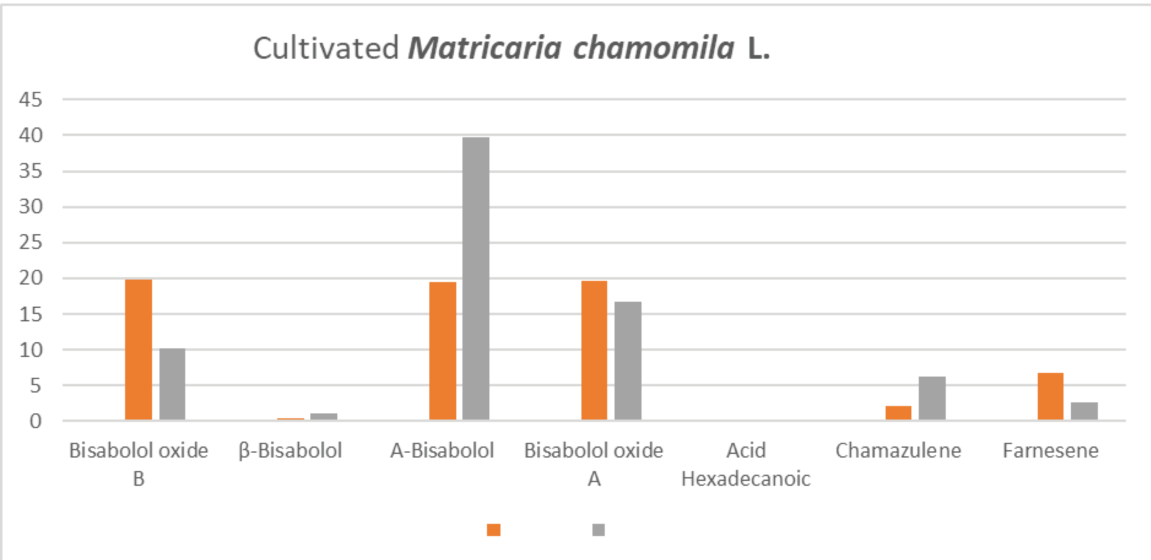
The compounds of essential oil were determined by means of Hewlett-Packard 5890 Series II system, with capillary column HP-5, FID detector, split-splitless system for injection and automatic injector HP 7673. The operating conditions were: injection temperature 150°C, detector temperature 250°C, carrier gas nitrogen. Sample sizes 1.0 μl were used and manual type of injection. The composition of chamomile essential oil was determined by capillary GC analysis: Hewlett-Packard 5890 Series II with FID and split-splitless system for injection. The column HP-5 (50 m long × 0.20 mm i. d.) was used. The following temperature program was used: 90°C (0 min), then 10oC/min to 150°C (5 min), 5°C/min to 180°C (3 min), 7°C/min to finally isothermal 280°C for 25 min; nitrogen was used as carrier gas. Detector temperature 250°C, carrier gas nitrogen (flow velocity 274 mm/s), auxiliary gases were nitrogen (30 ml/min), hydrogen (30 ml/min), air (400 ml/min). Peak areas and retention times were measured by electronic integration with a Hewlett-Packard 3396 Series II integrator.

3. Results and Discussions

There are a lot of components presents in the essential oils of Matricaria chamomilla L. The focus of this study is related to the amount of some component (used in the industry, pharmacology, home therapy), in essential oil of Matricaria chamomilla L. Using cultivated plants and wild growing, the amount of essences is different and should be discussed. Based on our results Bisabolol has high amount in cultivated plants in Lezha, so is recomented to be used and cultivated more. This cultivated plants in same place have high amount of Chamazulene well known for antifungal effect.

	Compound name	Formula	Korce Wild	Korce Cultivated	Lezhe Wild	Lezhe Cultivated
1.	Farnesene	$C_{15}H_{24}$	2.85	6.82	1.47	2.62
2.	Bisabolol oxide B	$C_{15}H_{26}O_2$	30.36	19.78	18.11	10.24
3.	Bisabolone oxide A	$C_{15}H_{24}O_2$	25.25	19.64	20.29	16.78
4.	ß-Bisabolol	$C_{15}H_{26}O$	0.36	0.48	0.17	1.01
5.	a -Bisabolol	$C_{15}H_{26}O$	15.81	19.45	33.35	39.69
6.	Chamazulene	$C_{14}H_{16}$	0.66	2.1	5.06	6.61
7.	Acid hexadecanoic	$C_{16}H_{32}O_2$	3.45		1.41	





Recommendation

As is shown to the graf 1 and garf 2 the amount of bisabolol is varied to wild cultivars and cultivated. We recommend the wild practices for this culture to be grown and collected using the best practices for short term export of this culture. In the recent past the aim of essential oils have alternately shifted from culinary use to pharmaceutical and therapeutic use. So focused on the amount of these essences is essential for the industry and science as well. Finally, composition of the essential oils could be affected by the geographical environment, geomorphological state of the plants grown, physical and chemical characteristics of soil, plant age, better oil extraction method.

SHEQERAS/KORCE: Popullate Natyrore

CHAMOMILLA RECUTITA	CHAMOMILE	BLUE	11	
COMPOUND	RT	KOVATS	AREA	%AREA
trans-2-hexanal	9.35	853	867	0.9%
tricyclene	9.55	884	1412	1.46%
α-pinene	13.23	931	943	0.97%
camphene	14.09	940	199	0.21%
sabinene	15.67	971	194	0.2%
β-pinene	16.36	983	151	0.16%
β-myrcene	16.74	987	1019	1.05%
γ-muurolene	18.74	1509	167	0.17%
α-farnesene	19.73	1511	6599	6.82%
α-muurolene	20.94	1519	285	0.29%
α-bulnesene	20.98	1523	486	0.5%
γ-cadinene	21.17	1542	360	0.37%
calamenene	22.37	1546	914	0.94%
α-acoradiene	24.26	1551	142	0.15%
cadina-1,4-diene	25.04	1557	871	0.9%
δ-cadinene	25.71	1567	345	0.36%
tremetone	26.27	1613	1165	1.2%
caryophyllene oxide	27.03	1614	216	0.22%
viridiflorene	27.56	1623	2046	2.11%
dillapiole	28.32	1641	347	0.36%
cubebol	29.57	1653	347	0.36%
β-bisabolole	29.99	1659	463	0.48%
τ-muurolol	30.84	1663	1223	1.26%
α-bisabololoxide B	31.3	1675	19140	19.78%
bulnesol	32.33	1681	3543	3.66%
α-bisabolole	33.85	1709	18816	19.45%
chamazulene	37.99	1771	2036	2.1%
α-bisabololoxide A	45.43	1780	19000	19.64%
cis-en-in-dicycloether	49.98	1923	12696	13.12%
trans-en-in-dicycloether	50.12	1958	752	0.78%
Total			96744	100

SHEQERAS/KORCE: Popullate natyrore

CHAMOMILLA RECUTITA	CHAMOMILE	BLUE	6	
COMPOUND	RT	KOVATS	AREA	%AREA
neryl acetate	26.33	1371	88	0.01%
α-copaene	26.92	1395	395	0.06%
decanone	27.31	1406	1950	0.28%
decanonic acid	28.47	1413	289	0.04%
γ-muurolene	30.04	1509	175	0.02%
α-farnesene	30.33	1514	20142	2.85%
α-muurolene	30.82	1520	1331	0.19%
α-bulnesene	31.01	1526	2278	0.32%
γ-cadinene	31.73	1540	899	0.13%
calamenene	32.77	1545	664	0.09%
α-calacorene	33.61	1568	299	0.04%
trans-nerolidol	33.81	1571	336	0.05%
epiglobulol	34.01	1585	714	0.1%
junenol	35.01	1591	1560	0.22%
spatulenol	35.65	1602	5981	0.85%
β-eudesnol	36.33	1606	5826	0.83%
globulol	36.97	1610	17411	2.47%
tremetone	37.74	1612	2422	0.34%
caryophyllene oxide	38.23	1615	693	0.1%
viridiflorene	39.08	1625	2356	0.33%
dillapiole	39.58	1642	3768	0.53%
cubebol	40.41	1655	1878	0.27%
β-bisabolole	40.89	1660	2534	0.36%
τ-muurolol	41.8	1668	9583	1.36%
α-bisabololoxide B	42.41	1678	214240	30.36%
bulnesol	43.01	1683	900	0.13%
valerianol	43.37	1687	3371	0.48%
cadalene	44.5	1705	620	0.09%
α-bisabolole	44.9	1710	111557	15.81%
chamazulene	55.81	1772	4657	0.66%
α-bisabololoxide A	57.65	1782	178174	25.25%
cis-en-in-dicycloether	59.25	1928	83188	11.79%
trans-en-in-dicycloether	59.60	1940	984	0.14%
hexadecanoic acid	60.3	1965	24340	3.45%
Total			705603	100

MAB / LEZHE: Popullate natyrore

CHAMOMILLA RECUTITA	CHAMOMILE	BLUE	13	
COMPOUND	RT	KOVATS	AREA	%AREA
trans-2-hexanal	9.19	846	3063	0.67%
α-pinene	13.59	927	927	0.2%
β-pinene	16.05	979	311	0.07%
β-myrcene	16.43	983	973	0.21%
trans-β-fernesen	18.64	1461	346	0.08%
α-farnesene	19.43	1512	6756	1.47%
α-muurolene	20.11	1523	2575	0.56%
α-bulnesene	20.73	1525	1425	0.31%
γ-cadinene	23.18	1529	155	0.03%
cadina-1,4-diene	24.79	1554	1884	0.41%
δ-cadinene	24.89	1560	676	0.15%
α-amorphen	25.37	1561	646	0.14%
α-calacorene	25.93	1564	966	0.21%
epiglobulol	26.85	1582	545	0.12%
spatulenol	27.24	1603	1297	0.28%
caryophyllene oxide	28.36	1612	1080	0.23%
cubebol	29.22	1651	959	0.21%
β-bisabolole	29.65	1659	793	0.17%
τ-muurolol	30.45	1666	8350	1.82%
α-bisabololoxide B	30.94	1672	83312	18.11%
bulnesol	31.92	1681	4534	0.99%
α-bisabolole	33.54	1718	153365	33.35%
chamazulene	43.33	1773	23276	5.06%
α-bisabololoxide A	44.89	1778	93316	20.29%
cis-en-in-dicycloether	49.54	1922	61576	13.39%
trans-en-in-dicycloether	49.68	1937	296	0.06%
hexadecanoic acid	51.23	1962	6507	1.41%
Total			459909	100

MAB / LEZHE: Popullate e kultivuar

CHAMOMILLA RECUTITA	CHAMOMILE	BLUE	5	
COMPOUND	RT	KOVATS	AREA	%AREA
trans-β-fernesen	18.56	1465	604	0.1%
α-farnesene	19.34	1517	16447	2.62%
α-bulnesene	20.45	1523	368	0.06%
γ-cadinene	20.61	1541	1396	0.22%
calamenene	20.78	1546	152	0.02%
epiglobulol	23.89	1584	972	0.15%
junenol	24.68	1596	4168	0.66%
spatulenol	25.24	1599	493	0.08%
β-eudesnol	25.83	1603	1329	0.21%
globulol	26.53	1605	695	0.11%
tremetone	27.13	1609	2133	0.34%
caryophyllene oxide	27.81	1611	403	0.06%
viridiflorene	28.2	1623	477	0.08%
dillapiole	29.06	1640	1171	0.19%
cubebol	29.48	1651	637	0.1%
β-bisabolole	30.26	1659	6331	1.01%
τ-muurolol	30.27	1664	6239	0.99%
α-bisabololoxide B	30.72	1679	64329	10.24%
valerianol	31.38	1688	327	0.05%
α-bisaboloneoxide A	31.69	1703	6811	1.08%
cadalene	32.69	1706	391	0.06%
α-bisabolole	33.32	1709	249225	39.69%
chamazulene	42.82	1770	38705	6.16%
α-bisabololoxide A	44.36	1780	105352	16.78%
(ζ,ε)-farnesyl acetate	45.91	1843	11982	1.91%
cis-en-in-dicycloether	49.12	1927	107862	17.18%
trans-en-in-dicycloether	50.12	1939	406	0.068
Total			629405	100

Conclusion

My survey is related to the amount of some component in essential oil of Matricaria chamomilla L, cultivated and wild growing. Based on our results giving advices for the improvement of technical knowledge which can increase the effectiveness of the selection work carried out on chamomile.

References

1. Bernath, J., 1986. Production Ecology of Secondary Plant Products. In: Herb Spice and Medicinal Plants Recent Advances in Botany Horticulture and Pharmacology, Craker, L.E. and J.E. Simon (Eds.). Oryx Press, Phoenix, Arizona, pp : 185-234.

2. Hornok, L., 1992. Cultivation and Processing of Medicinal Plants. Budapest, Academic, Hungary, pp: 246-254.

3. Isaac, O., 1989. Recent Progress in Chamomile Research-medicines of Plant Origin in Modern Therapy. Prague, Czecoslovakia, pp: 7.

4. Ivens, G.M., 1979. Stinking mayweed. New Zealand J. Agric., 18: 21-22.

5. Salamon, I., 1992. Chamomile: A medicinal plant. Herb Spice Med. Plant Dig., 10: 1-4.

6. Bradley, P., 1992. The British Herbal Compendium. British Herbal Medicine Association, London

7. Kerekes, J., 1962. Effect of water on flower-yield and active substance of chamomile Matricaria chamomilla L. Herba Hungarica, 1: 55-55.

8. Heywood, V. H., Harbome, J. B., and Turner B. L., (1977), The Biology and Chemistry of the Compositae, volume one, Academic press, London. 412-413

9. Akacic, B., and Kustrak, D., (1960), Evaluation of flos chamomillae, Farm. Glasnik, 16, 419-423; through Chem. Abstr., 55, 16909, (1961).

10. Maxwell, Gordon, (1952), The azulene, Chem. Rev., 50, 127-200.

11. Guenther, E., (1952), The Essential Oil, Individual Essential Oils o f the Plant Families, D. Van Nostrand and Company, Inc. London. Volume five, 438 - 445.

12. Heeger, E. f., Bauer, K. H., and Poethke W., (1946), Matricaria chamomilla L.,true chamomile, pharmazie 1, 210-18: through Chem. Abstr. 41, 6021, (1947).

13. Leung, A. Y., (1980). Encyclopedia of Common Natural Ingredients used in Food, Drugs and Cosmetics, Wiley - interscience, John Wiley and Sons, New York, 100 -112.

14. Cekan, C., Herout, V. and Sorm, F., (1954), Chamazulene precursor from chamomile, Chemistry and industry, 604-5; through Chem. Abstr. 49, 497C (1955).

15. Verzar Petri; Gizella; Szegi, Jozsef; Marczal Gabriella, (1979), Pharmacological effect of certain chamomile compounds. Acta. Pharm. Hung. 49 (1), 13-20; through Chem. Abstr,90 115339t; (1979)

16. Mose, J. R., and Luka, G., (1957), Antibacterial action o f some ethereal oils and their components Arzneimitted torsch 7, 687-692; through Chem. Abstr. 52, 5544, (1958).

17. Vane, J. R., Ferreira, S. H., (1979), Anti-inflammatory Drugs, Handbook of Experimental Pharmacology, Sprunger-Verlag Berhn Heidelberg New York, 50/11, 726-729,

18. Szalontai Marianne; V erzur-Petri Gizella; Florian, Ede; (1977), Study o f the anti mycotic effects of biologically active components ofMatricaria chamomilla L., Parfum, Kosmet. 58 (5), 121-127; through Chem. Abstr. 87, 96715, (1977).