International J. Seed Spices 5(2), July 2015:86-88

Assessment of variability in leaf essential oil of three coriander (*Coriandrum sativum* L.*)* genotypes

S. S. Rathore*, L.K.Sharma, D. Agarwal, B. Singh and S. N. Saxena

ICAR-National Research Centre on Seed Spices, Tabiji, Ajmer

Abstract

Leaf essential oil and its constituents of three coriander genotypes namely ACr-1, Cor-50 and exotic cultivar were examined. Maximum essential oil in leaves was observed in Cor-50 (0.029%) followed by ACr 1(0.025 %) and exotic cultivar (0.023 %). Major constituents present in three genotypes were trepine-4-ol, carvone and geraniol, while minor constituents were - pinene**,** beta pinene, myrcene, gama terpinene, cymol, limonene, fenchon, linalool, camphor, anethole, eugenol, and geranyl acetate. In ACr 1, major constituent was geraniol (21.36 %) while in Cor-50 geraniol was only 10.14% and it was absent in exotic cultivar. In exotic genotype carvone was the major constituent (17.79%).

Key words: Coriander, (*Coriandrum sativum* L.), essential oil, geraniol, volatiles

Coriander (*Coriandrum sativum* L.), an annual herb of the *Apiaceae* family, is native to the Mediterranean region and is extensively grown in India, Bangladesh, Russia, Central Europe and Morocco (Small, 10). The plant is grown widely all over the world for seed, as a spice, or for essential oil production. At one time, coriander was among the world's leading essential oil plants (Lawrence, 5). The odour and flavour of mature seed and fresh leaves are completely different. While aliphatic aldehydes (mainly C10-C16 aldehydes) with fetid-like aroma are predominant in the fresh herb oil (Potter, 7), major components in the oil isolated from coriander fruit include linalool and some other oxygenated monoterpenes and monoterpene hydrocarbons (Bandoni *et al.,* 2). The entire plant when young is used in preparing chutneys, sauces, in flavouring curries and soups.

It is widely used as folk medicine as carminative, spasmolytic, digestive and galactagogue; seed extract antimicrobial; used in lotions and shampoos; with castor oil useful in rheumatism (Rathore *et al*., 9). The composition of the essential oil of coriander fruits has been studied and found different from each other (Pino *et al.,* 6). Composition of the herb oil completely differs from the seed oil (Guenther, 4). Rastogi and Mehrotra (8) reported detection of α -pinene, limonene, β - phellandrene, eucalyptol, linalool, borneol, β - caryophyllene, citronellol, geraniol, thymol, linalyl acetate, geranyl acetate, caryophyllene oxide, elemol and methyl heptenol in seed oil using TLC. Telci *et al.,* (11) and Ghani (3) reported that in the ripe fruits the oil consists mainly of linalool (50 to 60%) and about 20% terpenes (pinenes, γ -terpinene, myrcene, camphene, phellandrenes, α -terpinene, limonene, cymene). Asolkar *et al.* (1) reported a type from Mysore contained high geranyl acetate. Oil of coriander is a valuable ingredient in perfumes. Its soft, pleasant, slightly spicy note blends into scents of oriental character. In present communication essential oil analysis from leaves of three distinct genotypes of coriander has been made to find out the main constituent of essential oil responsible for pleasant aroma of young leaves.

four hundred gram leaves of three genotypes viz., ACr 1, COr-50 and exotic cultivar were collected at pre flowering growth stage (40 days-old plants) from the farm of ICAR-NRCSS, Tabji, Ajmer in year 2012-13.

Freshly harvested leaves (400g) were subjected to hydro-distillation using a Clevenger-type glass apparatus for 6 hours. Extracted oil was separated and stored at 0°C in airtight containers after drying them over anhydrous sodium.

Extracted essential oils were analyzed by GC-MS (Agilent, USA; GC -7820 A, MS-5975) equipped with an HP5MS (Universal column) (100 m 9 0.25 mm, 0.25 lm; Supelco, Bellafonte, PA, USA) with an auto sampler. A sample of 1 µL was used in split mode (20:1) with an auto injectector. Helium was used as the carrier gas at a flow rate of 1.0 ml/min. The column temperature was programmed from 50 °C to 310 °C with equilibrium time of 3 minutes, held for 30 min, then further programmed to 210 °C at 3 °C /min. Initial and final temperatures were held for 5 and 30 min, respectively. Detector and injector temperatures were set at 250°C. The fatty acids were identified by a comparison of their retention indices and

*Corresponding author e-mail: drssrathore@yahoo.co.in

their identification was confirmed by computer matching of their mass spectral fragmentation patterns of compounds in the NIST-MS library and published mass spectra with the help of Chemstation software (Agilent Technologies, Mississauga, Canada).

Table 1 showed essential oil (%) in fresh leaf of coriander genotypes and its constituents. Maximum essential oil in leaves was observed in genotype Cor-50 (0.029%) followed by ACr 1(0.025 %) and exotic cultivar (0.021 %). The leaf oil contains 15 compounds mostly of terpenes, their oxigeneted compounds and hydrocarbons. The major compounds are Carvone (17.79%, 7.36% and 12.07%) followed by Terpine-4-ol (14.75, 7.00 and 4.02 %) %) in exotic cultivar, Cor-50 and ACr 1 respectively (Fig. 1). Geraniol was another major component of leaf volatile oil, which was present only in Cor-50 (10.14%) and ACr 1 (21.36%). It is the major component of ACr 1 leaf essential oil. Geraniol was absent in exotic genotype. Apart from these compounds α -pinene, β -pinene, myrcene, gama terpinene, cymol, limonene, fenchon, linalool, camphor, carvone, anethole, eugenol, geranyl acetate, tridecanal and carveol were identified in all three genotypes. The variations in essential oil content and its constituents may be due to geographic divergence and ecological conditions as well as due to different chemotype. Presence of aliphatic oxygenated compounds of terpene i.e. alcohols and aldehydes (Terpine-4-ol, carvone and geraniol) and geranyl acetate are responsible of fetid-like aroma which is predominant in the fresh herb oil (Potter, 7), while lesser amount of linalool and some other oxygenated monoterpenes and monoterpene hydrocarbons is make differ the leaf volatile oil from seed volatile oil (Bandoni *et al.,* 2). It is revealed from the study that growth environment plays key role in production of volatile compounds in coriander leaves.

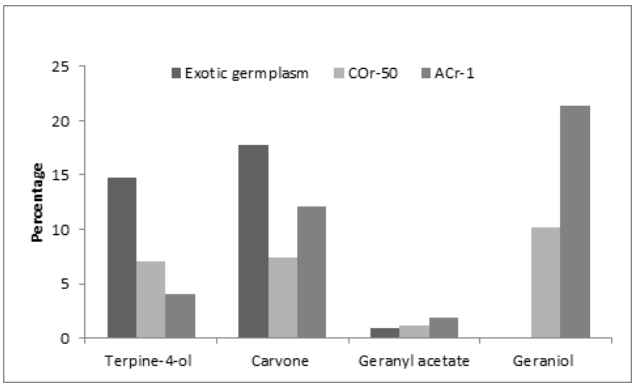

Fig 1. Major constituents leaf essential oil of three coriander genotypes.

Table 1: Essential oil (%) and its contituents in fresh leaf of three coriander genotypes

Compound	Exotic germplasm	A Cr 50	ACr 1
Volatile oil	0.023± 0.002	0.029 ±0.002	0.025±0.002
α- pinene	0.013± 0.002	0.004± 0.001	0.013±0.002
β- pinene	0.036± 0.001	0.083± 0.008	0.064±0.003
Myrcene	0.623±.01	0.024±0.001	0.01±0.002
δ- terpinene	0.187± 0.011	0.758± 0.684	0.012±0.001
Cymol	0.024± 0.009	-	0.68±0.012
Limonene	0.004±.001	0.028±0.005	-
Fenchon	0.029± 0.003	0.012±0.002	0.087±0.005
Linalool	0.111 ±0.001	0.042 ±0.008	0.087 ±0.005
Camphor	0.009± 0.002	0.003±0.001	0.008±0.001
Terpine -4-ol	14.755± 0.001	7.005±0.002	4.025±0.152
Carvone	17.793 ±0.001	7.366±.04	12.075±1.21
Anethole	0.065± 0.635	0.198±.024	-
Eugenol	0.04±.001	0.254±0.005	0.048±0.003
Geranyl acetate	0.895 ±0.903	1.2 ±.152	1.923 ±0.005
Geraniol	-	10.149 ±.011	21.366 ±1.253
Tridecanal	0.045	-	0.431
Carveol	-	-	1.326

References

1. Asolkar, L. V., Kakkar, K. K., Chakre, O. J. 1992.Glossary of Indian medicinal plants with active principles. Part I. New Delhi, India, P & I Directorate, CSIR, pp 232-33.
2. Bandoni, A. l., Mizrahi, I., Juarez, M. A. 1998.Composition and quality of essential oil of coriander (*Coriandrum sativum* L.) from Argentina. *J Essent Oil Res*. 10: 581-84.
3. Ghani, A. 2003. Medicinal plants of Bangladesh: Chemical constituents and uses. 2nd ed. Dhaka, Asiatic Society of Bangladesh, p 183.
4. Guenther, E. 1950. The essential oil. Vol. IV. Florida, USA, REK Publishing Company, pp 602-15.
5. Lawrence, B. M. 1993. A planning scheme to evaluate new aromatic plants for the flavor and fragrance industries. *In: New crops*. Janick J, Simon JE (eds). New York, Wiley, 1993, pp 620-27.
6. Pino, J. A., Rosado, A., Fuentes, V. 1996. Chemical composition of the seed oil of *Coriandrum sativum* L. from Cuba. *J Essentl Oil Res.* 8: 97-98.
7. Potter, T. L.1996. Essential oil composition of cilantro. *J Agric Food Chem*. 44: 1824-26. doi:10.1021/jf950814c
8. Rastogi, R. P., Mehrotra, B. N. 1993. Compendium of Indian medicinal Plants. Vol. II. Lucknow, CDRI, p 212.
9. Rathore, S. S., Saxena, S. N., Singh, B. 2013. Potential health benefits of major seed spices. *Int. J. Seed Spices*, 3(2):1-12
10. Small, E.1997. Culinary herbs. Ottawa, NRC Research Press, , pp 219-25.
11. Telci, I., Gul, T. O., Sahbaz, N. 2006. Yield, essential oil content and composition of *Coriandrum sativum* varieties (var. *Vulgare* Alef and var. *microcarpum* DC.) grown in two different locations. *J Essentl Oil Res.* 18: 189-93.

Received : January 2015; Revised : April 2015;
Accepted : June 2015.