COMPARATIVE STUDY OF COMPOSITION OF ESSENTIAL OIL FROM STIGMAS AND OF EXTRACT FROM CORMS OF *Crocus sativus*

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Crocus sativus L. (Iridaceae), commonly known as saffron (the plant dried stigma) with the Chinese name "Fan-Hong-Hua", is used in folk medicine for various purposes such as an aphrodisiac, antispasmodic, and expectorant [1]. Saffron, the main medicinal part of *C. sativus*, contains many kinds of crocins and also contains 0.4–1.3% essential oil. The composition of saffron essential oil is shown in Table 1. Saffronal (81.82%) was reported as the major biologically active component in *C. sativus*. Our results were generally in accordance with those previously reported, except for the undetected acetic acid [2].

As a traditional medicinal crude drug, the production of saffron from *C. sativus* is very low. It takes 150000–200000 flowers and over 400 h of hand labor to produce 1 kg saffron [3]. The aim of the present study was to find another part of *C. sativus* to replace the saffron of *C. sativus* and to exploit the new utilization resource from the *C. sativus* plant.

As far as our literature survey could ascertain, as the organ of vegetation, the corm of *C. sativus* has not been previously investigated. The essential oil composition of the corm of *C. sativus* was characterized for the first time. The volatile composition of the corm of *C. sativus* is reported in Table 2. The yield of volatile compositions was 1.0% based on the dry weight of corm. Twelve compounds were identified, representing 90.91% of the total substances. Hexadecanoic acid and octadecadienoic acid were found to be the major group of constituents accounting for 33.32% and 27.55% of the total substances, respectively.

TABLE 1. Chemical Composition of Essential Oil from Dried Stigma of *Crocus sativus* L.

Component	MW	Content, %	Component	MW	Content, %
β-Isophorone	138	1.32	2,6,6-Trimethyl-1,3-cyclohexadiene-1-carboxaldehyde(safranal)	150	81.82
β-Linalool	154	0.27			
2-Isopropylidene-3-methylhexa-3,5-dienal	150	4.45	Eucarvone	150	0.31
			6-(2-Butenylidene)-1,5,5-trimethyl-(*E*,*E*)-cyclohexene	176	0.21
α-Isophorone	138	5.57	6-(2-Butenylidene)-1,5,5-trimethyl-(*Z*,*E*)-cyclohexene	176	0.26
2-Hydroxy-3,5,5-trimethyl-2-cyclohexen-1-one	154	1.90	α,β-Dihydro-β-ionone	194	1.19
			Palmitic acid methyl ester	270	0.13
3,4,5,6-Tetramethyl-2H-pyran-2-one	152	1.14			

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TABLE 2. Chemical Composition of Volatile Compounds of Extract from Corm of *Crocus sativus* L.

Compound	MW	Content, %	Compound	MW	Content, %
n-Tridecane	184	1.31	*n*-Octadecane	254	1.13
n-Tetradecane	198	6.17	Hexadecanoic acid	256	33.32
n-Pentadecane	212	1.74	Palmitic acid ethyl ester	284	11.21
Diethyltoluamide	191	1.32	*n*-Eicosane	282	0.97
n-Catane	226	1.39	Octadecadienoic acid	280	27.55
n-Heptadecane	240	2.02	1,3,5-Tribenzoylbenzene	390	2.78

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REFERENCES

1. J. L. Rios, M. C. Recio, R. M. Giner, and S. Manez, *Phytother. Res.*, **10**, 189 (1996).
2. Manuel Carmona, Javier Martinez, Amaya Zalacain, Ma Luz Rodriguez-Mendez, Jose Antonio de Saja, and Gonzalo Luis Alonso, *Eur. Food Res. Technol*., **223**, 96 (2006).
3. O. Plessner, M. Negbim, M. Ziv, and D. Basker, *Israel J. Bot.,* **38**, 1 (1989).