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308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

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A Comparison of Important Physical and Chemical Characteristics of Six *Lallemantia iberica* (Bieb.) Fisch. and Mey. Varieties

Soheila Samadi, Masoud Khaiyamiand and Abdollah Hasanzadeh Goorut Tappe
Department of Biology, College of Science, Uremia University, Uremia, Iran

Abstract: *Lallemantia iberica* seed contains up to 30% of a drying oil. *Lallemantia iberica* seed has traditional uses as reconstitute, stimulant, diuretic and expectorant. The aim of this study is to determine suitable varieties in term of oil content and oil quality. The *Lallemantia iberica* varieties investigated are Shahindej, Sanandaj, Shazand, Ahar, Dezphul and Myandoab. We were sure about seed's freshness, because ourselves had been sowing and in researching field of Agricultural and Natural Sources Research Center of west Azerbaijan in Iran. Important characteristic of this varieties including: 1000-seed weight, oil content and fatty acid components were selected and measured. Weight measurements performed by balance with 0.0001 g sensitivity. The overall mean for 1000-seed weight was 4.87 g. Oil content based on dry seed was measured using extraction with Ether method and the grand mean was 28.05%. The mean amount of 1000-seed weight and specific fatty acids are meaningful at 1% level. Analysis of variance revealed the existence of significant variation for oil content at 1% level of significance. The mean amount of the five fatty acids namely Palmitic, stearic, oleic, linoleic and linolenic were 8.07, 2.48, 17.24, 17.33 and 51.22%, respectively, which were detected and measured by gas chromatography. According the results that obtained from our study it is clear that the variety of Shahindej has high (35.04%) oil content, is an appropriate variety for oil extraction, and the variety of Ahar contents high level of Linolenic acid (56.37%).

Key word: Fatty acid, oil content, *Lallemantia iberica*

Introduction

Lallemantia iberica is a member of Labiatae family and Labiatae family is well represented in Iran by 46 genera and 410 species and subspecies (Naghibi, 2005). The *Lallemantia* genus is one member of the Labiatae family that has 5 different species, which are distributed in different places of Iran (North, East North, East South, Alborz and other areas) (Gahram, 1994).

Lallemantia iberica originated from Caucasian region. That has been found in Asia (Syria, Israel, Iran, and Iraq) but it now the crop also appears in central and southern Europe. Unsuccessful attempts were made to introduction the plant species in Germany, Austria and Canada, seed production, were found to be low and unstable, possibly due to relatively wet climate condition (Van Soest *et al*., 1987). *Lallemantia iberica* with vernacular name Balangu shahri and with other synonyms *Lallemantia sulphurea*, *Dracocephalum ibericum* (Bieb.), with edible uses of leaves, oil, seed (Hedrick, 1972) and traditional uses as reconstiuent, stimulant, diuretic and expectorant (Naghibi, 2005; Aynechi, 1986).

Lallemantia iberica cultivated for its seeds from which and oil is extracted, the seed contains up to 30% of a drying oil (Usher, 1994). Very interesting is the isolated oil of the oilseed crop of *Lallemantia iberica*, better known as Iberian dragonhead, showing a very high content of linolenic acid (67-74%) (Hondelmann and Radatz, 1984; Van Soest *et al*., 1987; Handelmann and Dambroth, 1990) exceeding that of linseed oil (55%), and showed high theoretical iodine values of 23g/ha. Unsaturation in the oils were used to introduce eopxides by epoxidation with in situ generated peroxy acetic acid. The epoxidized oil show in high percentage of oxiran oxygen (10.7%), was applied as crosslinkers in powder-coating formulation (Overeem, 1999).

In the above investigation, the range of fatty acid content of *L. iberica* seed oil has been reported to be Palmitic 6.5%, Stearic 1.8%, Oleic 10.3%, Linoleic 10.8% and Linolenic 68.0% (Overeem, 1999).

Materials and Methods

This study was performed in Biology department of Urmia University in 2005. Seed samples of *Lallemantia iberica* varieties including: Shahindej, Sanandaj, Shazand, Ahar, Dezphul, and Myandoab. The 1000-seed weight was measured with a digital balance in three replications (Raney and Diederichsen, 2002). All seed samples were powdered and placed in 72°C oven for 24 h to be dried (Dini and Carapetiant, 2006). The extraction with Ether method was used for measure of total oil content (Leiboritz *et al*., 1987). One gram of each samples were transferred in test tubes and 10mL ether were added them, twice. Each time tubes were placed in 40°C oven for 12 h and above solutions were transferred in balanced tubes. Tubes were placed in 40°C oven for 4 h so that its ether was evaporation. Weight difference of tubes before and after experience was used for oil content.

Fatty acids were determination by gas chromatograph after the preparation of their methyl esters. This section of project was performed in Artemia researches center of Urmia University. Esterification was accomplished by addition of 3 mL n-heptan in a test tube. The tubes were vortexed for five min until the glycerol a supernatant. The amount of 0.2 µL from each sample was used for analysis. The gas chromatograph (Dany, Italy) model GC-1000 equipped with a flame ionization detector and interface DS-1000 integrator attached to a column for the separation of methyl esters was 30 m long with 0/33 mm inner diameter. The column temperature was set from 100 to 220°C with an increment of 30°C/min for 3 min and following an 8 min stop at 180°C, it was again raised at rate of 10°C/min until the final temperature was reached. The injector and detector temperatures were set at 220°C.

Results

Using the EXCEL and SPSS computer software, the obtained results from all parameters were subjected to analysis of variance. Means were compared with the Duncan's multiple range test and correlation coefficients were calculated.

The overall average for 1000-seed weight was 4/87 g and the varieties Shahindej and Ahar with an average of 5.01 and 4.50 g had the highest and the lowest values (Table 1).

The analysis of variance for seed oil (Table 3) indicates the existence of significant differences between the varieties at 1% level significance. The range of variation for seed oil was from 35/40% (Shahindej) to 17/56% (Myandoab) (Table 1) with an overall average of 28/05%. The mean amount of 1000-seed weight and specific fatty acids are meaningful at%1 level.

The reported seed oil 33% percent in *Lallemantia iberica* (Hondelmann and Radatz, 1984) which is within the range of our observed results.

The average amounts of the five fatty acids of palmitic, stearic, oleic, linoleic and linolenic in this study (Fig. 1-7) were found to be 8.07, 2.48, 17.24, 17.33 and 51.22 percent, respectively, and their variation between the varieties is depicted in Table 2.

Table1: Comparison of 1000-seed weight and oil seed samples of 6 Lallemantia iberica varieties

(%) oil		11000-seed weight (gr)		
Group	Mean±SE	Group	Mean±SE	Entry No.
A	35.40±0.559	A	5.01±0.014	1
B	31.41±0.433	A	4.96±0.041	2
B	30.21±0.614	A	4. 95±0.030	3
C	27.59±0.351	B	4.76±0.054	4
C	26.15±0.375	C	4.56±0.017	5
D	17.56±0.433	C	4.50±0.054	6

Dissimilar letters indicate significantly different at 5% level, Entry No. for 1000-seed weight: 1. Shahin dej 2. Sanandaj 3. Myandoab 4. Dezphul 5. Shazand 6. Ahar Entry No. for oil: 1. Shahin dej 2. Dezphul 3.Ahar 4. Sanandaj 5. Shazand 6. Myandoab

Table 2: Comparison of mean amount of the five fatty acid in 6 *Lallemantia iberica* varieties

Lallemantia iberica	Linolenic (%)	Linoleic (%)	Stearic (%)	Oleic (%)	Palmitic (%)
Shahin dej	48.85	18.35	2.68	18.86	8.51
Sanandaj	47.87	18.51	2.49	18.33	8.62
Shazand	49.35	17.81	2.56	18.39	7.84
Dezphul	51.16	17.47	2.30	16.80	7.79
Myandoab	56.37	15.02	2.37	14.83	7.91
Ahar	52.43	16.81	2.47	16.21	7.78

*, **, ns significant at 5 and 1% levels and non- significant, respectively

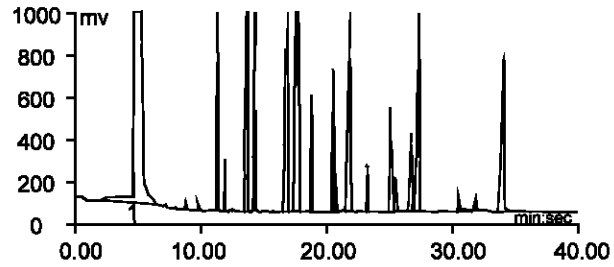

Fig. 1: Chromatographical of standard

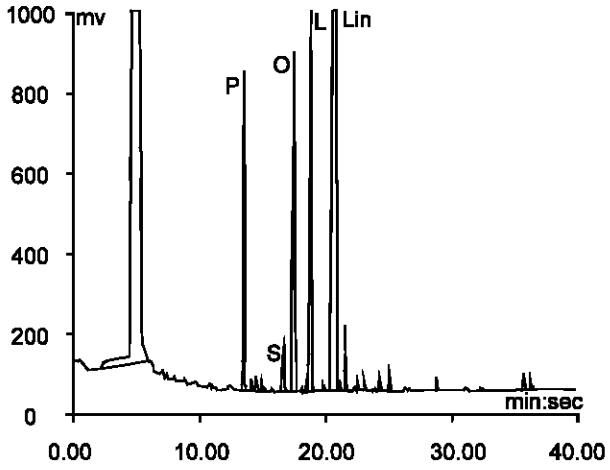

Fig. 2: Chromatigraphical of Ahar

The mean square of Table 3 indicates the existence of significant variation at the 5% level in the amount of palmitic, stearic fatty acids and at the 1% level in the amount of oleic linoleic, linolenic fatty acids the varieties under study. In a study (Overeem, 1999) of *Lallemantia iberica* the range of fatty acids measured were palmitic 6.5%, stearic 1.8%, oleic 10.3%, linoleic 10.8 and linolenic 68.0%.

Discussion

In conclusion a minimal difference in chemical composition of *Lallemantia iberica* seed as compared with other reports. The observed differences are partly

Table 3: Analysis of variance for parameters in 6 Lallemantia iberica varieties

		Mean squares					
Source of variation	d.f.	Oil	Palmitic	Stearic	Oleic	Linoleic	linolenic
Between group	5	110.34**	0.440*	0.053*	7.306**	4.980**	36.142**
Within Group	12	0.665	0.105	0.014	0.113	0.196	6.092
C.V		0.204	0.055	0.065	0.086	0.073	0.075

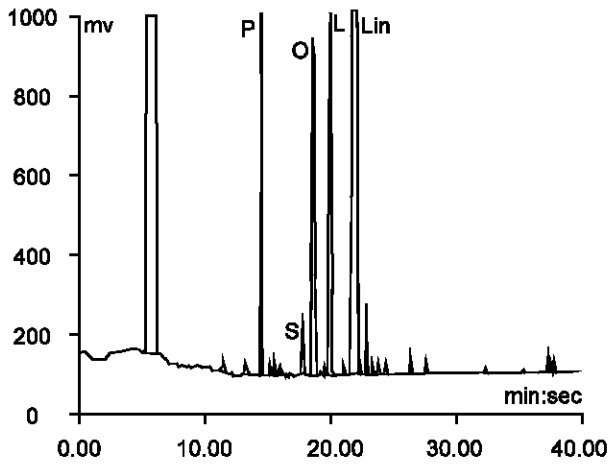

Fig. 3: Chromatographical of Dezphul

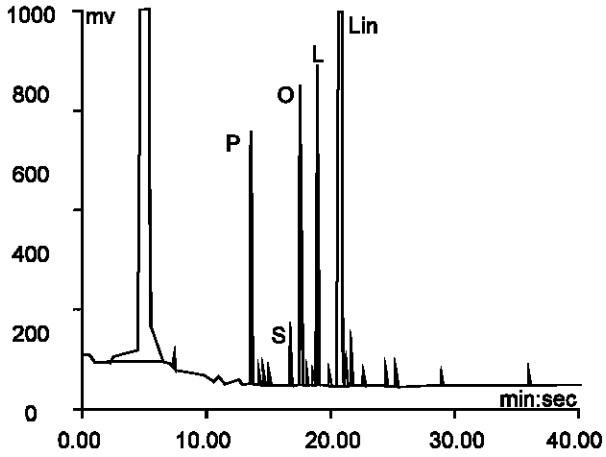

Fig. 5: Chromatographical of Myandoab

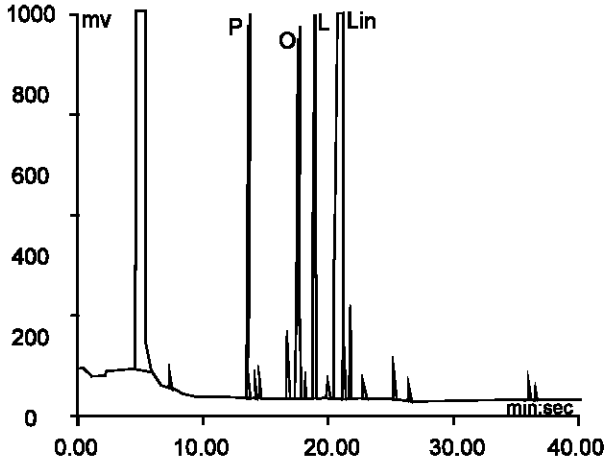

Fig. 4: Chromatographical of Shazand

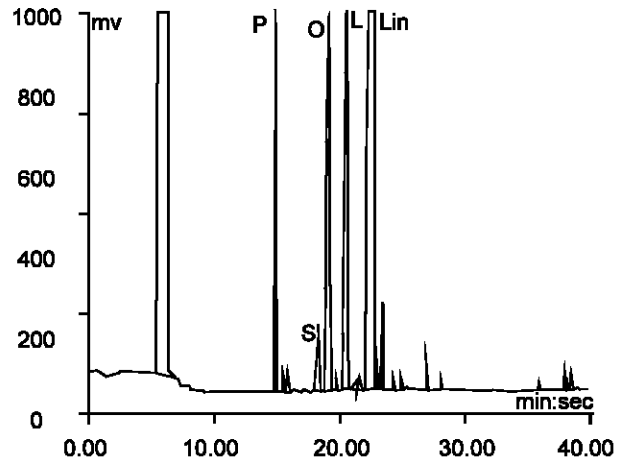

Fig. 6: Chromatographical of Shahin dej

due to environmental variation which exists even in a single region (Weiss, 1983). This observation showed that a significant negative relationship between linolenic acid and palmitic acid contents (r = -0.827*), between linolenic acid and oleic acid content (r = -0.985**), and between linolenic acid and linoleic contents (r = 0.986**) in the varieties under study. Apparently there is a competition between the amount of linolenic acid and palmitic, oleic, linoleic fatty acids to occupy the limited space in the seed. However, this competition is controlled by both genetic and environmental conditions (Burton and Brim, 1981). The results obtained from our study indicates that variety of Shahin dej has high oil content, which is placed in a separate group (A) based on the statistical analysis (Table 1) that is recommended for oil extraction. This oil is used as oil-foods and used for lightening, varnish, as painting oil and as a lubricant (Uphof, 1959). The oil variety of Myandoab (Table 2) recommend for use in the manufactures of linoleum because has high linolenic

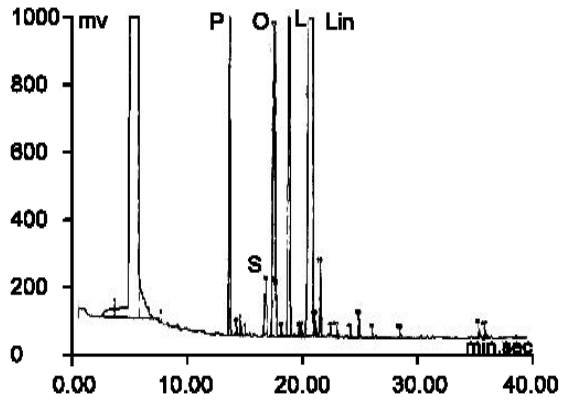

Fig. 7: Chromatographical of Sanandaj

acid content. Also are recommended for the expansion of their culture in order to increase the *Lallemantia iberica* oil production and linolenic acid (w: 3) for improving the food oil.

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References

Aynechi, Y., 1986. Pharmacogynosy and Medicinal Plants of Iran. Publication, Tehran.

Burton, J.W. and C. Brim, 1981. Recurrent selection in soybean. Selection for increased oil percent. Crop Sci., 21: 31-34.

Dini, M.R. and J. Carapetiant, 2006. Investigation of Physical Characteristics and Major Chemical Components of Seed in Ten Sesame (*Sesasmum indicum L.*) Varieties. Pak. J. Nutr., pp: 1-6.

Gahram, A., 1994. Kormophyts of Iran, pp: 272.

Handelmann, W. and M. Dambroth, 1990. Identification and evaluation of oilseed-bearing wild species of forbs as potential cropes for the extracton of industrial raw materials. Plant Develop., 31: 38-49.

Hedrick, U.P., 1972. Sturtevant's Edible Plants of the World. Dover publications ISBN 0-986-204596.

Hondelmann, W. and W. Radatz, 1984. Zur evaluierunge Ölsamenragender wildarten. Landbau forschung VÖlkenrode, 34: 145-154.

Leiboritz, H.D., A. Bengrson, P.D. Mougle and K.L. simponson, 1987. Effect of Artemia lipid fraction on growth and survival of Larval in Land Liver sides, In: Artemia Research and its application, P. Sorgeloss, D.A. Begtson, W. Deeiier and E. Japers (Eds.), 1st. Edn. (Universa, Wetteven. Belgium), pp: 469-479.

Naghibi, F., 2005. Labiatae family in folk medicine in Iran.

Overeem, A., 1999. Seed oil rich in linolenic acid as renewable feed stock for environment-friendly crosslinkers in powder coating. Industrial Crops and Products 11, pp: 157-165.

Raney, J.P. and A. Diederichsen, 2002. Oil Content and Composition of the Flax Germplasm Collection held by Plant Gen Resources of Canada. Agriculture and Agri-Food Canada Research Branch.

Uphof, J.C. Th., 1959. Dictionary of Economic plants. Weinheim.

Usher, G., 1974. A Dictionary of Plants Used by Man. Constable ISBN 0094579202.

Van Soest, L.J.M., M. Doorgeest and E. Ensink, 1987. Introdutie-demonstratie tun potentiële nieuwe gewassen 1987 (in-formatie, knelpunten en potentie). Center for genetic resources, Wageningen, pp: 29-31.

Weiss, E.A., 1983. Sesam. In: oil seed crop. Longman, pp: 284-340.