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COMPARISON OF BIOCHEMICAL CHARACTERIZATION IN *CUMINUM CYMINUM* AND *CUMINUM SETIFOLIUM* SEEDS

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ABSTRACT
The genus of *Cuminum* is one of the most important of medicinal plant which is used in pharmaceutical and food industries. *Cuminum cyminum* with local name of green cumin and *Cuminum setifolium* with local name of white cumin are annual herb and member of the Apiaceae family. In this research, some important biochemical characters such as total lipids, carbohydrate content, Ca, Na, K, Fe, Mg, Mn contents of *Cuminum cyminum* and *Cuminum setifolium* seeds were studied. Total lipid using soxhlet method, carbohydrate content using Lane - Eynons method, P element content with calerimeter method, Ca, Na, K elements contents with flam emission spectrophotometer, Fe,Ca,Mg,Mn elements content with atom absorbtion, N element content with Kjeldahl and Cl element content with chloride meter were determined. The percentages of oil were 28.15 and 20.57 in *Cuminum cyminum* and *Cuminum setifolium,* respectively. As well as sugar solution concentration in *Cuminum cyminum* was more than *Cuminum setifolium*. Mn (0.48) , Fe (229) ppm and P (0.49),Ca (0.96), Na (0.27) percentage in dry material elements content in *Cuminum cyminum* was more than *Cuminum setifolium* .

KEY WORD: Medicinal plant, *Cuminum cyminum*, *Cuminum setifolium*, oil, Carbohydrat, Macro and Micro elements.

INTRODUCTION

The Apiaceae is one of the best-known families of flowering plants, contains about 300 genera and 2500 to 3000 species(9). Cumin (*Cuminum cyminum* L.) is a member of Apiaceae and annual plant which originated in the Egypt, Turkistan and East Mediterranean. But, it is widely cultivated in Iran, China, India, Morocco, South Russia, Japan and Turkey (7,11,15). *Cuminum setifolium* plant is an annual herb, 10-30 cm alta, fruit 4-5 mm long, oblong, densely longly villose, a member of the Apiaceae family (7,9,11). Essential oil has used for bring smell to some medicine, to equip of product antiseptic associated with mouth, to sterilization of surgical operation fibre, to product of some veterinary and agricultural medicine, to industry perfumery, coloring, soap, detergent and plastic (12,18). Essential oil of cumin is used for importing flavour liquors and cordials. They are used as an essential ingredient in mixed soups, sausages, pickles, cheese, meat dishes, for seasoning breads, cakes and candies (2,12). The study was carried out to determine the effects of different phosphorus levels (0, 20, 40 and 60 kg ha^{-1}) on the yield and quality components of the cumin plant (*Cuminum cyminum* L.) in Van- Gevas,Turkey. According to result of this research; the highest seed yield (399 kg ha^{-1}), essential oil content (% 2.67) and essential oil yield (10.6 kg ha^{-1}) were obtained from the 40 kg ha^{-1} P_2O_5 application(16). A greenhouse experiment was conducted to assess the effect of 25, 50, 75 and 100 mM NaCl on growth, ion accumulation, seed yield and seed oil content in 6-7-d-old plants of *Foeniculum vulgare* Mill. There was a progressive decrease in seed oil content with increasing salt level, and the maximum reduction in oil was found at 100 mM of NaCl(1). The soxhlet method is an usual method for extracting and extract of oil, wax and colour substance from particles of plant(10, 13). Cumin oil is obtained by steam distillation. Distillation is performed right after grinding the seeds in order to prevent oil loss, decomposition and in order to rupture as many of the cell walls as possible(1,3). In steam distillation there are certain parameters that greatly influence the recovery of the oil. The main parameters such as particle size, batch size and distillation rate should be considered before commerical scale production(3). 49 compounds were identified by gas chromatography-mass spectrometry (GC-MS) (3,17). Among the 49 compounds identified, there were 16 hydrocarbons and 32 oxygenated compounds. The main components were cuminal and safranal accounting for 32.26% and 24.46% respectively in the components identified. The other nine compounds with contents all over 1%, were monoterpenes, sesquiterpenes, aromatic aldehydes and aromatic oxides etc. The other components with relatively small amounts were chiefly terpenes, terpenols, terpenals, terpenones, terpene esters and aromatic compounds (17). The seeds in terms of fresh weight are containing much amount of mineral elements. The seeds are place for oligo-elements storage in the plants (5, 6, 8, 14).

MATERIALS AND METHODS

Studing of carbohydrate in *Cuminum cyminum* and *Cuminum setifolium*

5g of *Cuminum setifolium* (Fig. 1) and *Cuminum cyminum* (Fig. 2) seeds separately were heated also 50ml distilled water, after filtrating, for determine of carbohydrate content in *Cuminum setifolium* obtained extract transported to flask 100ml but in *Cuminum cyminum* 25ml

of extract was transported to flask 50ml. For titration is used 10ml of Fehling A, B. Under way titration, solution was heated on Hot plate. 3-5 drop of methylen blue reagent was added, titration practice was finished with forming of reddish sediment. In this research carbohydrate content determined using Lane–Eynons table. In Lane–Eynons table concentration of sugared solution was showed according to use 10 or 25 cm^3 from Fehling solution(10).

FIGURE1: *Cuminum setifolium* seeds

FIGURE 2: *Cuminum cyminum* seeds

Studing of oil in the *Cuminum setifolium* and *Cuminum cyminum* seeds

For the extraction of oil from seed, the dried seeds were ground to a uniform powder and oil was extracted in n-hexane. A weighed quantity (3g) of the seed powder was placed in an extraction thimble and extraction was carried out for 8h in a Soxhlet extractor. The oil was heated in an oven at 60^0C to remove last traces of the solvent. Oil content calculated with below formula:

$(W_2 – W_1)/S$
W_1(g) = weight of empty flask
W_2(g) = weight of flask and extracted oil
S = weight of sample
The percentage of oil calculated with below formula :
$(F \times 100)/P$
F = oil content
P(g) = sample weight

Studying of macro and micro elements content in *Cuminum setifolium* and *Cuminum cyminum*

The digestion using dry ashing method and composition with HCl

Obtained extract by dry ashing method is used for measurementing Ca, Mg, Na, K, Cu, Mn, Fe, Al and Mo elements. 2g of dried plant sample for studing macro and micro elements 2, 4h were placed in the forge and heating to 570^0C. After cooling of ashes, was added 10cc of HCl 2mol L^{-1}. For measurementing of P element content was used from calerimeter in wave length of 470 nm. For measurementing of Na element content 1cc of extract was diluted with 50cc of CsCl + $AlCl_3$ solution. Then Na element content was measurementd using flame emission spectrometer in wave length 589 nm. K element content was measurementd using flame emission spectrometer in wave length 766.5nm. Nitrogen element content was measurementd using Kjeldahl method, 0.3g of plant powder added to 3g sulfata mixed and was poured in tube of digestion apparatus, then 6cc of sulfuric acid and 3cc of H_2O_2 added and was staied for 24h. Then placed on digestion apparatus with 370–400 tempreature for 45 minute, after cooling,was added 15 ml distilled water and was measurementd nitrogen content with apparatus. Fe, Ca, Mg, Fe, Zn, Cu and Mn elements content with atom absorption were determined. Absorption content of Ca, Mg, Fe, Zn, Cu and Mn were measurementd in wave length 422.7, 285.2, 248.3, 213.9, 324.7 and 279.5 nm respectively. Cl element content was measurementd with chloride meter. 0.5g of the plant powder is diluted with 50cc of water and it is seted for half an hour on shaker, after filtrating, the amount of extract mixed with 15cc acid buffer and drop 10 of gum arabic. Cl content in the extract was determined with a chloride meter.

RESULTS AND DISCUSSION

The result showed that sugared solution of *Cuminum setifolium* was less colour than *Cuminum cyminum* that it is showing *Cuminum setifolium* carbohydrate content was fewer than *Cuminum cyminum*, by using 21–24 cm^3 from sugared solution of *Cuminum setifolium* to be finished titration practice and to be formed reddish sediment (Table 1). Sugared solution of *Cuminum cyminum* was more colour than *Cuminum setifolium* that it is showing *Cuminum cyminum* carbohydrate content was more than *Cuminum setifolium*, by using 15–16 cm^3 from sugared solution of *Cuminum cyminum* to be finished titration practice and to be formed reddish sediment (Table 1).

TABLE 1. Percentage content of carbohydrate in *Cuminum setifolium* and *Cuminum cyminum* seeds

		Cocentration of sugared solution (equivalent of 10ml from Fehling solution)			
Species	Used content from sugared solution(cm^3)	Invert Sugar	Decstrose	Lactose	Maltose
Cuminum setifolium	24	213.3	207.4	282.9	330.0
	21	242.9	235.8	323.8	384.3
	23	222.2	216.1	295.4	350.0
Cuminum cyminum	15	336.0	317.0	455.0	542.0
	16	316.0	307.0	426.0	507.0
	15	336.0	317.0	455.0	542.0

For determining sucrose content, Invert sugar content is multiplied by 0.95 coefficient(10), sucrose content in sugared solution of *Cuminum setifolium* and *Cuminum cyminum* is in table 2.

TABLE 2. Sucrose content in sugared solution of *Cuminum setifolium* and *Cuminum cyminum*

Species	Sucrose content (mg/l)	Invert Sugar content (mg/l)
Cuminum setifolium	202.635	213.3
	230.755	242.9
	211.09	222.2
Cuminum cyminum	319.2	336.0
	300.2	316.0
	319.2	336.0

Oil of *Cuminum cyminum* (1) and *Cuminum setifolium* is a pale yellow to brownish yellow liquid, it occasionally displays a greenish tint. Percentage of oil of *Cuminum cyminum* was more than *Cuminum setifolium* (Table 3,4).

TABLE 3: Oil content and percentage in *Cuminum setifolium* and *Cuminum cyminum* seed

Species	Repeat numbers	Sample weight(g)	Oil percentage	Oil content(g)
Cuminum setifolium	1	3	23.2	0.696
	2	3	19.19	0.5757
	3	3	19.33	0.58
Cuminum cyminum	1	3	32.03	0.961
	2	3	22.13	0.6641
	3	3	30.30	0.9091

TABLE 4. Comparison of oil content and percentage in *Cuminum setifolium* and *Cuminum cyminum*

Species	Sample weight (g)	Oil percentage	Oil content (g)
Cuminum setifolium	3	20.573±2.27	0.617±0.068
Cuminum cyminum	3	28.153±5.28	0.844±0.15

In addition to the elements content have differ in the different species of plants, it change in the one plant species on the basis of tissue age and nutrition conditions(5, 6, 8, 14). The content of Mn, P, Ca, Na and Fe elements in the *Cuminum cyminum* was more than *Cuminum setifolium* and the content of Cu, N, Zn, Mg and Cl in *Cuminum setifolium* was more than *Cuminum cyminum* (Table 5). The content of K element was similar in the *Cuminum setifolium* and *Cuminum cyminum* (Table 5).

TABLE 5. Comparison of macro and micro elements content (ppm) in the *Cuminum setifolium* and *Cuminum cyminum*

Species	Zn	Mn	Cu	Fe	Cl	Na	Mg	Ca	K	P	N
Cuminum setifolium	49	21	30	109	0.88	0.15	0.55	0.32	1.81	0.34	3.35
Cuminum cyminum	33	35	21	229	0.51	0.27	0.48	0.96	1.81	0.49	3.27

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