

Phytochemical Studies on Elements of The Flora of Saudi Arabia. 1. Chemical and Morphological Studies on Seeds of *Cucumis prophetarum* Growing Naturally in The Deserts of Riyadh Area

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Besides morphological study of the seeds of *Cucumis prophetarum*, phytochemical studies were made for investigating the chemical characteristics and composition of seed oil of that plant. The elucidation of fatty acid composition was made by T.L.C. and gas-liquid chromatographic analysis. These indicated the presence of palmitic acid (11%), stearic acid (1%), oleic acid (8.0%), linoleic acid (53%) and linolenic acid (27.0%).

The seed oils from many species of the family Cucurbitaceae were examined (Dimitror 1971, Mary Chisholm and Hopkins 1964; and Eckey 1954). The composition of oil from the seeds of *Cucumis prophetarum* growing in Pakistan was studied by Aslam *et al.* (1965). The separated oil had sp.gr. 0.917, n_D^{25} 1.471, acid value, 11.600, iodine value 133.000, saponification value 186.800, unsaponifiable matter 1.4%, peroxide value 20.900, diene value 0.630. The meal was 71.6% by wt. of seeds, and contained 25.6% protein, and 6.5% ash. The oil had 17.6% solid acid fraction, trans acids being 7.0% and saturated acids 10.6%.

The review of literature showed no work done on the oil of the species under the conditions prevailing in Saudi Arabian deserts.

Material

The ripe yellow fruits of *Cucumis prophetarum* were collected from wadi El-Haa, about 30km from Riyadh, in March 1978, dried at room temperature till the yellowish seeds

separated from the dried pulp. Part of the seeds was used in the morphological study and the rest were grinded into fine powder before being subjected to extraction.

Experimental

The morphology of the seed and anatomy of the seed-coat of *Cucumis prophetarum* (Esau 1977) were studied. Detailed phytochemical studies on the oil, and proximate seed analysis, namely, estimation of moisture, ash, total nitrogen, total carbohydrates (Schaffer & Hartmann 1921) and oil contents were also made.

The fundamental chemical characteristics, namely, acid and saponification values, unsaponifiable matter, iodine value, and refractive index of the oil were determined.

The composition of the oil after being extracted with pet. ether (40–60°C) was investigated by thin layer chromatography using plates covered with kieselguhr (Shalaby & Steinegger 1964) and the individual acids were determined by using gas-liquid chromatographic analysis. The oil was saponified and the liberated fatty acids were converted to methyl esters (David 1963), to 20mg of the fatty acids 6ml of 0.5N NaOCH₃ were added and heated at 60–80°C. The methyl ester solution was extracted with petroleum ether (40–60°C). Then the solvent was distilled and the sample was subjected to Pye Unicam Chromatograph Series 104.

The operating conditions are as follows; Length of column, 2 meters with internal diameter of 0.5cm; column package, 10% polyethylene glycol adipate on chromoson W (80–100 mesh); column and injection temperatures 210°C; detection temperature 250°C. N₂ flow rate 20/26 sec.; O₂ flow rate 400 ml/min; H₂ flow rate 20ml/ 26 sec.; and chart speed 5mm/min.

Results

The seeds of *Cucumis prophetarum*, which represent 8% of the weight of fresh fruit, are flattened, ovate to elliptical, slightly pointed at one end, about 4.7 to 5.9mm long and 2.4 to 2.6mm in maximal width; yellowish with scurfy whitish material at the attachment point. Cotyledons contain proteins but starch is not detected. Seed coat is characterised by the presence of collapsed epidermal cells; several layers of hypodermis having aerenchymatous cells at the two ends; one layer of sclerenchymatous cells with lignified wall (Fig. 1).

The percentage of moisture, ash, total nitrogen and total carbohydrates of the seeds of *Cucumis prophetarum* were: 4.13%, 11.04%, 6.06% and 408mg, respectively.

The analytical characteristics of the light yellow coloured oil obtained by solvent extraction are set out in Table 1. The amount of the oil was 23.9%. It has somewhat high acidity of 2.48, saponification value of 179.02, iodine value of 169.33, unsaponifiable matter of 1.15%, refractive index of 1.4775, total acids of 90.42% and specific gravity of 0.923.

Table 1. Characteristics of the oil separated from the seeds of *Cucumis prophetarum*.

Oil Characteristics	Values
Oil content	23.9 %
Acid value	2.48
Saponification value	179.02
Iodine value	169.33 %
Unsaponifiable matter	1.15 %
Refractive index	1.4775 %
Specific gravity	0.923
Total acids	90.42

The gas – liquid chromatographic analysis, as shown in Fig. 2, indicates that the mixed fatty acids are separated into palmitic acid 11%, stearic acid 1%, oleic acid 8.0%, linoleic acid 53%, and linolenic acid 27% (Table 2).

The high percentage of linoleic acid and the high iodine value will aid in classifying the oil among the drying oils.

Table 2. Component fatty acids of *Cucumis prophetarum* oil as determined by gas-liquid chromatography.

Saturated		Unsaturated		
Palmitic	Stearic	Oleic	Lenoleic	Linolenic
11.0	1.0	8.0	53.0	27.0

The remaining meal after extraction of the oil represented 71.97% by wt. of the seeds and contained 51.29% protein and 4.67% ash.

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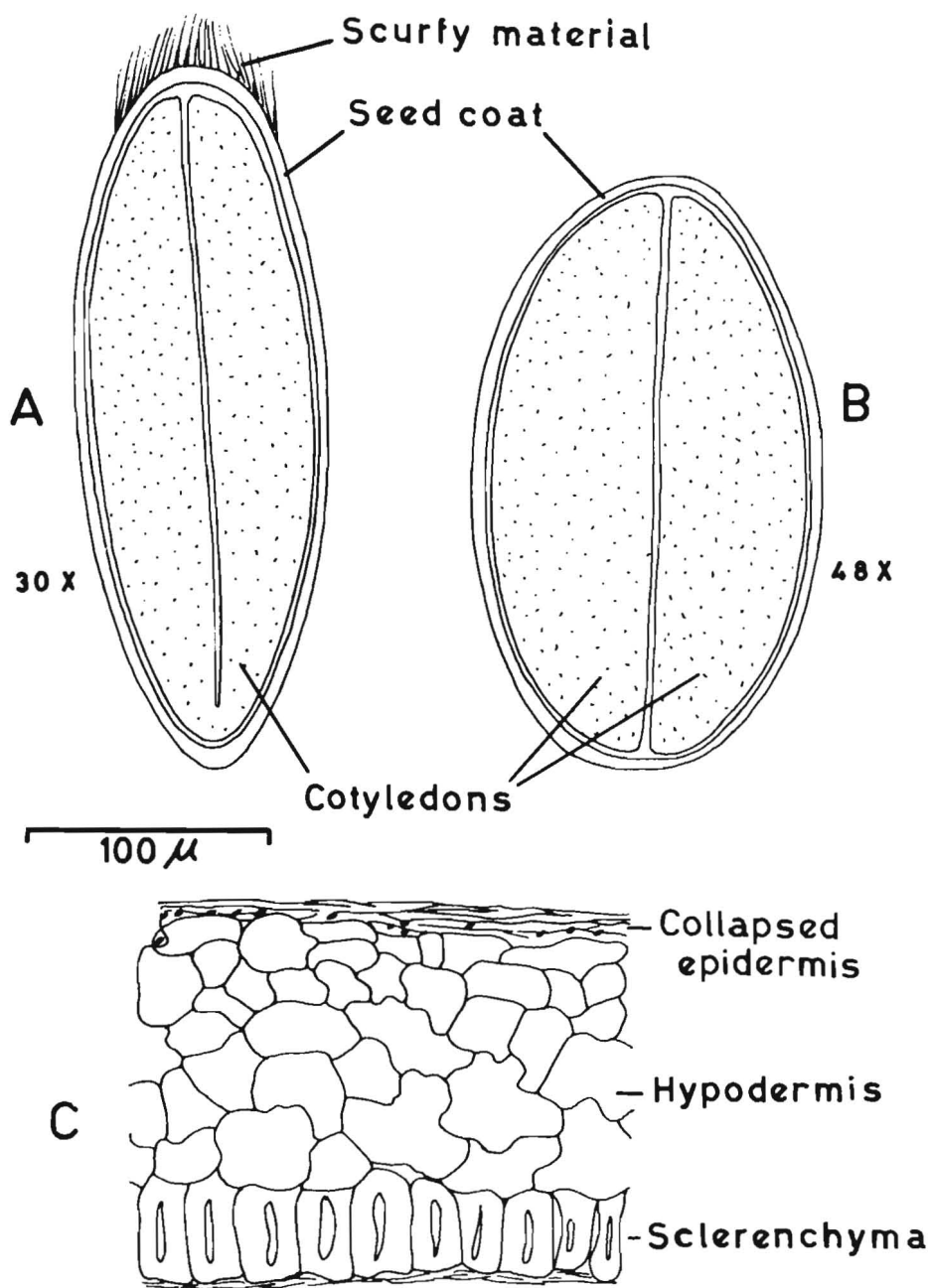


Fig. 1. *Cucumis prophetarum* seed A - L.S.; B - T.S.; and C - T.S. of seed coat.

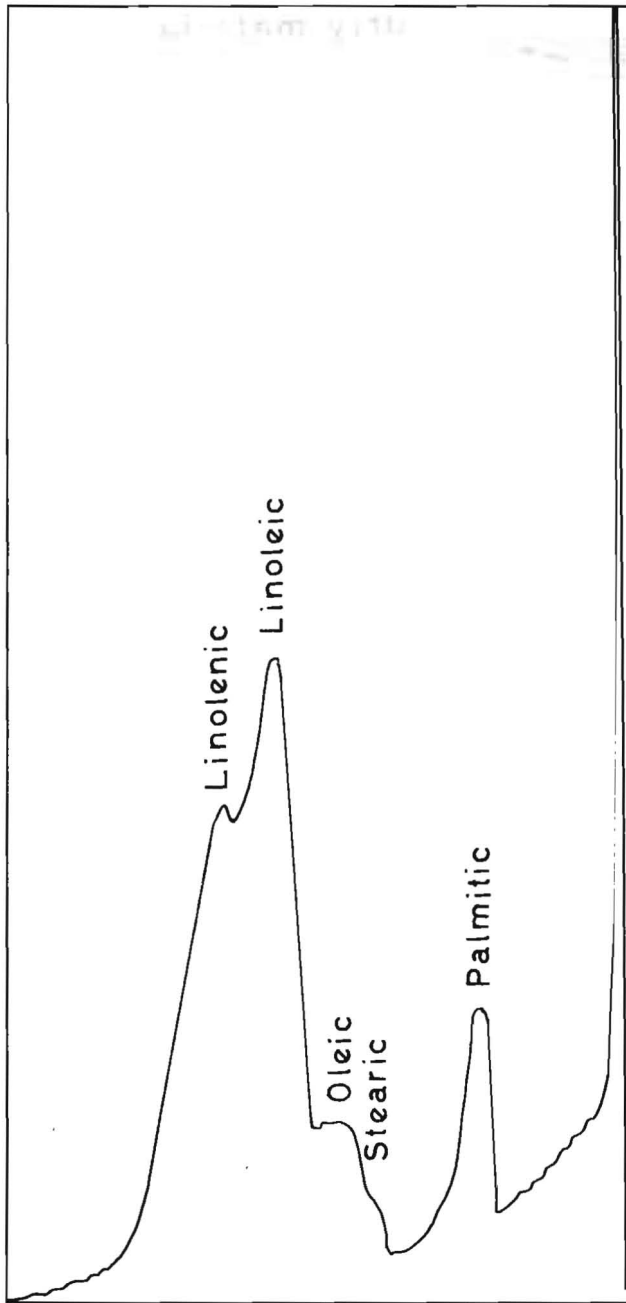


Fig. 2. Gas – liquid chromatogram of *Cucumis prophetarum* oil.

دراسات كيميائية ومورفولوجية على بذور نبات شري الذئب المنتشر في الصحاري القريبة من الرياض

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تمت دراسة الصفات المورفولوجية والتشريحية لبذور ثمار شري الذئب ، وتمت أيضا دراسة الصفات الطبيعية والكيميائية للزيوت النباتية في البذور بعد استخلاصها .
وأمكن التعرف على خمسة أحماض دهنية بواسطة كروماتوجرافيا الطبقة الرقيقة وكروماتوجرافيا الغاز حيث أمكن التعرف على ثلاثة أحماض دهنية غير مشبعة وهي : اوليك بنسبة ٨,٠٪ ، ولينوليك بنسبة ٥٣,٠٪ ولينولنيك بنسبة ٢٧,٠٪ . هذا بالإضافة إلى الحمضين المشبعين استياريك والميتيك بنسبة قدرها ١,٠٪ ، ١١,٠٪ على التوالي .