Chemical studies on date seeds

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Three varieties of date seeds were investigated to studythe chemical structure of their biochemical constituents andto illustrate its potential use in animal feeding, especiallylarge amounts of these seeds are neglected annually &8 byproductsin food factories.The obtained data deals mainly with the following points:I. Date seed carbohydrates:a) Reducing, nonreducing and total sugars in date seedswere determined. Baiani variety contained the highest percentageof total sugars. Total sugars of Haianl, Samani. andZagloul were; 4.25. 2.50 and 2.l8~, respectively.b) Three fractions of polysaccharide were obtained in apercentages of 1.0, 4.8 and 0.6 by using 7, 14~ sodium hydroxideand distilled water. Their specific optical rotation in alkaliwere[0<1 D _ 38.10, -31.36 and -38.10. The infrared analysisshowed that25the linkage between the units of B-type. Hydrolysisof the polysaccharides indicated that fraction A consists oftwo monosaccharides, D~anno8e and D-Xylose, while the othertwo polysaccharides (B and a) contained D~annose only.periodate oxidation of the polysaccharide fractions Band a, revealed similarity in results. from the obtainedresults, it could be concluded that the polymer probablYconsists of 39 unhydromannose units linked by B (1 - 4).c) The amount of date seed soda lignin was 9.5. 11.1and 10.~ for Zagloul, Samani, and Haiani. respectively.spectroscopic analysis was carried out for the three varieties.The ultra violet spectra showed the maximum absorption bandat 270-280 nm. The infrared spectra showed that the extractedlignin consists of guaiacyl and syringyl types.II. Date seed proteins:Crude protein was 7.56, 6.12 and 6.69 ~ for Zagloul,Samani and Haian! t respectively. The different protein fractionswere extracted from date seeds according to their 8olubillty. The results showed that I!1lbuminand globulin (solubleproteins) were the major fractions'(39.02~) in Zagloul while,prolamin and glutelin were the major fractions (30.21 and45.15~) in Seman! and Haiani varieties. Prolamin presentedabout 15~ of total crude protein.Electrophoretic identification was carried out byseparating aquoUS solution of NaCl 0.1 K on polyacrylamide gelelectrophoresis using glycin-tris buffer as electrolyte. Threeelectrophoretic bands were identified. Slight differencesbetween the three varieties could be seen. A ~or band wasidentified in Haiani variety.Free amino acids were qualitatively determined by paperchromatographic analysis. The results showed the presenceof 17 amino acids.The protein was hydrolyzed and quantitatively determinedby using amino acid analyzer. Glutamic acid was the mostaboundant amino acid, it comprises 11.8, 9.7, and 11.3 mg/gdry sample. Tyrosine, isoleucine, methionine and histidinwere detected in minute quantities.III. Date seed lipids:a) Crude fate content was 7.58, 11.)0, and 6.71~ in thethree varieties. The refractive indices were 1.4655, 1.4665and 1.4665, the specific gravities were 0.8933, 0.8940, and0.89)5, the acid values were 0.78, 2.14 and 2.18, the saponificationnumbers were 309.19, 306.77 and 325.09 and the iodinevalues were 50.19, 5).7) and 52.77 for Zagloul, Samani andBaiani, respectively.The results of unsaponifiable matter indicate thatZagloul and Haiani have nearly values (1.23 and 1.43, respectively)while, Samani has the lowest unsaponifiable matter(0.68").b) The GLe analysis showed the presence of five saturatedacids between 010:0-018:0 in the three 011s i.e. capric, lauric,myristic, palmitic and stearic. Two compounds were foundbetween 018-020 and were identified a8 oleic and linoleic acids.Lauric acid has the highest amounts of saturated fatty acids(2).65, 22.07, and 31.04% ~in-the three varieties), while,oleic acid, the predominant, has the highest amount(42.09, 37.58 and J8.96~) ~s unsaturated fatty acid. Theratio of saturated to unsaturated fatty acid was (1.06:1,1.19:1 and 1.14:1). Therefore, date seed 011 can be classifiedas semi dry oil.c) The unsaponifiable matter was identified and determinedby GLC analysis. The analysis showed the presence of15 fractions of

hydrocarbons and sterols. The hydrocarboncontent of the samples was 50.67, 33.95 and J9.76~ for zagloul,Samani and Haian1, respectively. sterol content was the majorfraction 1n saman1 and Baiani varieties (66.07 and 61.23 ~)wbile. Zaglou1 has lower sterol content (48.93%). B_a1tosteroloccured in the three samples and was the most abundant sterol(24.57, 34.36 and 32.75~).