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Extraction and valuation of the hemicelluloses of the cell wall of Retama *monosperma* (l.) boiss in the pharmaceutical domain

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Abstract

The kind Retama belonging to the family of Fabaceae is endemic of the Mediterranean Basin. It characterizes the coastal ecosystems and the desert. In Algeria, three species of the *Retama* are indicated: *Retama monosperma* Boiss. *Retama raetam* Webb and *Retama sphaerocarpa* L. (Quézel and Santa, 1962).*Retama monosperma*, object of our study, develops particularly on the littoral dunes of Algeria and presents several interests. To know better this vegetable with the aim of a better valuation adds us a biochemical study of the hémicelluloses. Hémicelluloses has an economic interest mattering in the food and pharmaceutical domain notamment xylose which enters the preparation of alcohols such as the Butanol, the manufacturing of candies without sugars. The extraction of hémicellulos by the protocols gives a yield 14, 33 % of hémicellulose.The qualitative analysis by CCM in shown that hémicelluloses is established by some glucose and by xylose (glucoxylane).The pres ence of xyloses in the construction of hémicelluloses incites us to look for protocols of purification of this sugar which gives the xylitol (C5H12O5) it is the polyol which possesses interesting properties what makes its high value for the pharmaceutical and food industries. It is about one compose which has a similar sweetening power in saccharose , not - cariogene who is already exploit in food industry as ingredient in the chewing gum and the toothpaste . Furthermore he can be use by the obeses persons or the diabetics (Knuuttila *and al*., 2000).

Keywords: *Retama monosperma*,valuation,extraction, hemicellulos ,xylose

Introduction

Retama monosperma (Boiss), object of our study, develops on the littoral dunes of Algeria in particular, it is a shrub of the family of Fabacées, the from 2 to 4 meters in height, (BENISTON, 1985) *Retama monosperma* is an arbustive legume growing in the littoral dunes, thanks to her system of adaptation has the drought and has the salinity, these long roots to allow as well the absorption of waters deep as the mobile stabilization of dunes (HATIMI,1995)

This plant can be also valued in the pharmaceutical domain because the works EL-SHAZLY and al. (1996) allowed to identify 27 alkaloids from his stalks and his fruits as well as the presence of flavonoids in seeds

The theme of the «Vegetable Walls " recovers multiple facets interesting various fields of application, in particular, the food(supply) and the human health, the animal nutrition, the biomaterials, the health of plants, food-processing industries as well as biofuels. The development of the knowledge in these various applications requires multidisciplinary fundamental and applied works.

Materials And Methods

Biological material

The samples which were the object of this study are pods of Retama Monosperma taken from feet growing in the natural conditions (Ain Türk, Oran).

Determination of the moisture content

The taken pods are access weighed to determine the weight of fraiche material, cut then spread over a metallic plate and dried in a steam room in a temperature of 50 °C during 72 hours then weighed to determine the weight of dry material subject . Several made weighings every 24 hours allowed to verify that the PMS is stabilized after 72 hours of drying.

Preparation of the vegetable powder

The dry material is reduced powder by grinding by using a crusher with type RETCH's knives, provided with a filter with stitches

Preparation of parietal residue

The vegetable wall is obtained by the use of the organic solvents which allow the elimination of lipids and tannins. The used protocol is the one of Harche *and al*. (1991).

Delignification some parietal residue

In theory the procedure of the délignification should eliminate totally lignines without modification of polysaccharides. However, no method is totally satisfactory.

For the délignification of the wall, the pods of *Retama monosperma*, we chose the method of Gabrielli *and al*. (2000) which uses the soda diluted in the ethanol

Extraction of the hémicelluloses

There are several protocols of extraction using each a known extractant. In our case, we used the protocol of Chanda *and al*. (1950).

The partial acid hydrolysis allows the hydrolysis of the polysaccharides of the matrix, the case of hémicelluloses. The used method is the one of Reis (1975).

Qualitative analysis by ccm

The qualitative analysis by CCM is used to determine the osidique composition of the parietal polysaccharides

Results

Hémicelluloses has a structural role in the flexibility and the plasticity of the cellular walls. Their concentrations vary 15 to 40 % of the dry material to grasses and 8 to 15 % to legumes.The average rate of the hémicelluloses of the pods of *Retama monosperma* is 14,33 %. This rate is upper to that estimated in the pods of Locust tree arabica of Adrar and Tamanrasset (13, 9 % and 10,78 %) (Tissouras,, 2004).

More lowcontents were noted at leaves and stalks of Arundo donax L. with 4,74 % rates and 3,5 % respectively (Kellal, 2011).

The soda is the base most frequently used for the treatment of the ligno-cellulosic products. She increases the absorption capacity of water, causes the inflation of the cellulosic fibers. This justifies the choice of the protocol of extraction adopted in our experiment.

CCM revealed an important spot of which the RF corresponds to the glucose; another less significant spot corresponding to the xylose, This suggests that the hémicelluloses of the pods of Retama monosperma is of type(chap) xyloglucane whose main chaine is established(constituted) by glucose with connections of xylose.

Conclusion

Hémicelluloses has an economic interest importing in the food and pharmaceutical domain in particular the xylose which enters the preparation of alcohols such as the butanol, the manufacturing of candies without sugars

Indeed, the works of Uhari and al. (1996), Amaechi and al. (1999), Alanen and al. (2000) brought the scientific proof of the preventive effect of the xylitol against the tooth decay thanks to its inhibitive action (share) towards the germs of oral laflore in particular against Streptococci.

References

Alanen P., Isokangas P., Gutmann K., 2000 - Xylitol candies in caries prevention: results of a field study in Estonian children. Community Dent Oral Epidemiol, 28: 218-224.

Amaechi BT., Higham SM., Edgar WM., 1999 – Caries inhibiting and remineralizing effect of xylitol in vitro. J. Oral. Sci., 41: 71-76.

Beniston N.T.W.S., 1985.- Fleurs d'Algérie. Entreprise. Nat. du Livre, Alger, 359 p.

Chanda S.k., Hirst E.L., Jones J.K.N. et PERCIVAL E.G.V., 1950. In : CHAA L., 2008. Caractérisation et valorisation des hémicelluloses des tissus foliaires d'*Aristida pungens* (Poacées). Thèse de Doctorat d'Etat univ d'ARTOIS., France, 113p.

Gabrielli L.,Gatenholm P.,Glasser W.G.,Jain R.K and Kenne L.,2000 Separation,characterization and hydrogel-formation of hemicelluloses from aspen wood.Carbohydr.Polym.,43:367-374

Harche M.,Tollier M.T.,Monties B.et Catesson A.M.,1991. Caractérisation comparée des constituants(polyosides,lignines et Acides phénoliques)des parois cellulaires des trois graminées subdésertiques prérennes :Stipa tenacissima L.,Lygeum spartum L.et Aristida pungens L.Cellulose chem-technol.,25 :11-17.

Hatimi A .,1995 Symbiotes racinaires de trois légumineuses arborescentes des dunes littorales de Souss-mssa.Ed.I.N.R.A.53P.

Kellal H. ,2011.Caractérisation anatomique,histologique et structurale des fibres du roseau *Arundo donax* L.Thése de Magister en Biothechnologie Végetale.USTO.Oran,134P

Knuuttila ML., Kuoksa TH., Svanberg MJ., Mattila PT., Karjalainen KM., Kolehmainen E.,2000 - Effects of dietary xylitol on collagen content and glycosylation in healthy and diabetic rats. Life Sci., 67: 283-290.

Quezel P., Santa S., 1962 – Nouvelle flore de l'Algérie. Tome I. CNRS, Paris, 565p.

Reis D.,1975. études préliminaire des polysaccharides des parois cellulaire . dans l' hypocotyle en croissance du phaseolus aureus .c .racad.sci., paris,ser.d ,218 :123-126.

Tissouras F. ,2004. Caractérisation biométrique des gousses et des graines ;extraction et identification des polysaccharides pariétaux et des huiles de deux légumineuses ligneuses « Acacia arabica et Acacia raddiana » des zones arides Algeriennes.Thése de Magister en Biothechnologie Végetale.USTO.Oran,82-84P

Uhari M., Kontiokari T., Koskela M., Marjo Niemela., 1996 - Xylitol chewing gum in prevention of acute otitis media: double blind randomised trial. Pediatrics., 313: 1180-1183.