IOSR Journal Of Environmental Science, Toxicology And Food Technology (IOSR-JESTFT)
e-ISSN: 2319-2402,p- ISSN: 2319-2399. Volume 7, Issue 2 (Nov. - Dec. 2013), PP 01-04
www.iosrjournals.org

Effect of Cassava Starch Flour Seeding On Functional Properties of Cissus Gum Stem and Root (Cissum Populnea)

OGORI A. F., GANA J.

School of vocational studies federal college of education kontagora. dept. of Home Economics P.M.B 39. Niger State, Nigeria.
Department of food science and technology federal university of agriculture Makurdi Benue State P.M.B 2374 Nigeria.
School of vocational studies, department of agricultural science federal college of education kontagora PMB 39 Niger state Nigeria

Abstract: *Effect of cassava starch seeding on the functional characteristics of cissum gum root and stem (cissu populnea) wars researched. The result revealed that hot water extraction and seeding of the gum with processed cassava starch flour reduced water absorption capacity (10-1.40) for gum stem (10-1.90) for root gum, oil absorption capacity (0.58-0.6v/g) for stem gum (0.55-0.60v/g) for root gum. Emulsifying properties showed reduced trend for both stem and root at increased percentage seeding. Bulk density was (0.84-0.64g/g) on seeding, pH was (5.6-6.1) for gum stem on flour starch seeding and (5.94-6.01) for gum root seeding. Similar trend were observed for hygroscopicity. It was observed at these decrease functionality at flour starch seedings,that the observed properties such as water absorption capacity bulk density pH and hyproscopicity could be used as binder, for certain food processing, pharmaceutical pocket for drug preparation and as well as microbial subtract culture stocks.*

Key words: *CISSU root, CISSU stems, Food functionality, cassava starch flour, seeding.*

I. Introduction

Cissu gum is an edible gum that has long found place in the traditional menu of the idoma. Tivs and the Igalas in middle belt area of Nigeria, West Africa (Iwe et al 2004). It is commonly called Okoho among the Idoma and Igala Agee among the Tivs. The leaves stem and root are mucilaginous and are utililized as raw material in soup, thickeners and binders even in non food material, such as mudhousing ceilings and architectural mud buildings.

Cissu gum has potential application in food product (Iwe et al, 2004). For food systems stability (Holme et al, 1985). The young tender leaves are used for soup and the mucilage contributes to foam stability in making Akara ball from bean paste. Because of the viscous nature of the mucilage it has been reported as good adulterant in honey and stimulate milk production in cow (Ibrahim, 1991) Morhosseini et at, 2012 ,Rana et al 2011, Laoman 2011, and Williams 2000. for pharmacenti bounder and care for vineral diseases (Iwe et al, 1993).

Cissu root and stem mucilages as sticky substances also called gum and are broadly divided into water-soluble and water insolubles (Blackman, 1982). The resin and hydrocolloids derivatives of the gum are ionizable in water generating edible substances of polymeric nature mostly carbohydrate and mineral ions (Onojal, 2011). They are characterised by their ability to give viscous solution at low concentration lhekoronye and Ngoddy,(1985). Starch like hydro colloids are polysaccharide to an extent ,and food starch posses many similar functional and rheological properties likened to gums, their secondary aim outside nutrition are stabilizer, sensory consistency and defines food texture they can also aids in drying of gums (Iwe et al, 2004), and (Alakali, 2009) .food hydro colloids plays important roles in controlling one of the primary quality attributes of food texture, manipulating the texture and to improves the quality of food and food product because of their stability to retard flow, gelling characteristics and also preserve emulsion (Glickman, 1978). Thickening and gelling hydro colloids have binding, cloudening, coasting, stabilizing characteristics and these properties brings about or aids in food processing failure or success (Lawrence, 1976). The research work seeks to establish hot water extraction of cissum popula gum mucilages from cissu plant stem and root and also determine the effect of cassava starch seeding on cissu gum functionalities.

II. Materials And Method

Cissu plant scientifieacy called cissu populnea stem and root were obtained form wild at Niger State in Kontagora forest areas, while cassava tubers were obtained from the departmental farm of the Agricultural science department federal college of education Kontagora in Niger State.

PROCESSING

The plant stems and roots from cissu populnea were scraped with large knife to remove ashy scales and then washed in water and then cut its sizes of 20cm long at 45g of the cut pieces were threaded and dippened into 55cm water at (75^o – 80^{o}c) and allowed to soak. Thereafter the stripe were squeeze to remove the mucilagenous exudates these were filtered through a meshy sieve and dried after cassava flour starch seeding for respective percentage seedings. These were dried at 55-60^{o}c and then milled into powder using laboratory motar and pestle and finally sieved as flour through 40nm mesh sieve size.

Gissu Stem/Root
↓
Scraping
↓
Threading
↓
Steeping (70-80oc) for(5-10minutes)
↓
Hand squeezing
↓
Filtering cooling/sediment
↓
Starch seeding at
25%, 50%, 100%
↓
Drying
↓
Cool
↓
Milling
↓
Sieving
↓
Cissu gum starch powder

Fg. (1)

Cassava tuber
↓
Peeling
↓
Washing
↓
Grading
↓
Slurring
↓
Filtering
↓
Selling
↓
Dewatering
↓
Pre-gelatinize (45-60°)°c
↓
Drying
↓
Milling
↓
Starch flour

Fg. (2)

CASSAVA STARCH PROCESSING

Fresh cassava were peeled, washed, and graded and made into slurry and allowed to stand for hours. As shown in figure (2) above, befor dewatering. The slurry were pre-gelatinized at 40-60^{o}c and then dried using oven model T12H at 60^{o}c. The dried power were cooled and then milled using laboratory motar and then packaged in poly ettne material.

FUNCTIONAL ANALYSIS

The following functional analysis were carried out, water binding capacity, and oil absorption capacity by (Lin et al 1974) emulsifying activating and emulsifying stability were by (Yatsu matu et al, 1972). The hygroscopicity was by (Iwe and altah, 1993). Bulk density by (Lin et al, 1974) and pH was determined according to (AOAC, 2000).

III. Results

Table 1: Absorption capacity and emulsifying activity of cissu gum stem and root

Sample	Starch	WAC Seeding	OAC	EMA	EMS	
Cassava starch/stem		0	10.00±0.00^{a}	0.58±0.23^{d}	1.23±012^{a}	0.97±0.35^{a}
		25	2.60±0.03^{c}	0.90±001^{a}	1.23±0.11^{b}	0.26±0.14^{b}
		50	1.40±004^{d}	0.70±0.05^{b}	0.7±6.24^{c}	0.20±0.13^{c}
		100	3.40±0.24^{b}	0.60±0.26^{c}	- - - -	- - - -
Cassava stem/root		0	10.00±000^{a}	055±038^{d}	1.20±0.12^{a}	0.87±0.20^{a}
		25	2.0±0.034^{c}	0.80±0.07^{a}	1.06±0.06^{b}	0.36±0.06^{b}
		50	1.20±0.11^{d}	0.70±0.074^{b}	0.50±0.01^{c}	0.21±0.01^{c}
		100	3.40±0.24^{b}	0.60±0.26^{c}	- - - -	- - - -

Mean on the same row bearing different super script are significantly different at (to= 0.05) probability

Table 2: Bulk density pH and hygroscopicity of cissu root/stem gum

	Level of Seeding	Bulk density	pH	Hygroscopicity
Cassava starch/stem	0	0.84±6.15^{a}	6.69±0.02^{d}	0.9±0.022^{a}
	25	0.65±0.21^{b}	6.29±011^{b}	0.6±0.06^{b}
	50	0.61±0.26^{d}	6.32±0.34^{a}	0.1±0.05^{c}
	100	0.64±0.09^{c}	6.09±0.02^{c}	- - - -
Cassava stem/root	0	0.84±030^{a}	5.94±024	0.80±0.11^{a}
	25	0.66±0.18^{b}	6.01±0.07	0.6±0.13^{b}
	50	0.62±0.11^{d}	6.05±0.016	0.1±0.00^{c}
	100	0.64±0.01^{c}	6.09±0.20^{c}	- - - -

Mean on the same row bearing different super script are significantly different at (to= 0.05) probability.

IV. Discussion

Table one above showed the water absorption capacity, and emulsifying capacity of cissu gum root and stem. The water absorption capacity decreases as seeding of starch flour increases. The decrease was consistent and finally sloped at 100 percent seeding of starch flour; however absorption increased considerably but were below the control sample. This indicates cissu gum from it stem had some degree of hydro colloid crystallinity and fortells its wide range of ligands which could have occupy starch moieties because of entrapped water (Baharad and Hamid, 2012). Similar trend were observed from root gum mucilage. These attributes could make cissu gums at chosen seeding to produce desired gells and can be applied during vaporization or freezing control rate in food processing (Baharal and Hamid, 2012). This indicates resistance of the bond an shearing rate (alakalis, 2009). According to Iwe et al, 2004, the low water absorption capacity is due to porosity and particle size of the gums attributes.

The oil absorption capacity decreased at 25% seeding and dovetailed after stable formation at 50% of seeding of cassava starch flour. The higher oil absorption capacity at 50% seeding before dovetailiny and at 100% seeding indicates more hydrophilic site bonding than the stem, which may be due to higher porosity of the granular molecules and may also be because the stem could serve as a storage organ in cissu popolena plant. This phenomenon agreed with purified gum property (Baham and Hamid, 2012). The oil absorption stability at sparesly fair degree of 50% seeding for stem and root cissu gum may be due to equal binding site being experienced inducing plasticity, lubricating and melting sensation (Rincon, et al 2009) and (Gallas et al, 2012).

Emulsify ability of the gum reduced as seeding percentage of cassava starch flour increased .At 25% seeding emulsify ability was observed to be stable depicting that cissu gum colloidal properties could still be maintained with starch seeding at 25% ,enabling syneresis, foam stability and aggregation of disperse particle (Philips, 1990). According to Dikison (2003) cissu gum losses it association emulsion ability on seeding hence the emulsifying ability of cissu gum decrease on seeding because of weak bond creation.

The emulsify stability of cissu gum with starch on the root and stem mucilages decreased as seeding gradually increased and completely disappears at 100% seeding. This may be due to hydrophilic site of the gum gradually being eroded by starch which may have large molecules or hydrophobic sites that must have disrupted the emulsify ability to the gums root and stem. The surface load in the gum stem and root by starch are conversely unequal therefore, causing coalescence of oil droplet at steric distabilization on the gum seeded starch.

Table two above showed bulk density, pH and hygroscopicipy of seeded starch flour on gum stem and root.

The bulk density showed gradual decrease as seeding percentage increases. At 15% seeding and 100% seeding, the samples had significant bulk density values. This predicts the pseudo plasticity of the gum for both stem and root gum mucilages. Hence, a good binder and could be applied to stabilize dough Glickman (1983).

The pH showned a reversed trand as seeding increases the pH value, hence increases the hydroxyl ion precipitation. This confers that seeded gum from cissu populnea can be used for pharmaceutical binder or as pharmaceutical pocket for active carrier and also for microbial media stocks substrate.

The hygroscopicity for both stems and root followed a decreased order as seeding increased showing low solubility of the gum. According to Bahareh and Hamid (2012) presence of impurity and insoluble matters bring about the low hygroscopicity of the gum seeded powder hence low hydration power (28).

V. Conclusion

The present work revealed that seeding of cissu gum for stem and roots with cassava starch flour reduces its functionality like water absorption capacing, oil absorption capacity emulsifying property, bulk density pH and hydro scopicity, which may be beneficial in other food processing and pharmaceutical industries as binder, colloidal surfactant, substrate stock for microbial culture and rheological enhancing quality in food processing.

References

[1]. A.O.A.C (2000), official method of analysis 15th edition, assou of official analytical chemist Washington D.C.
[2]. Alakali .J.(2009). Rheological characteristic of food gum (Cissu populnea) African journal of food science vol. (3):9 p237-242.
[3]. Baharah and Hamid (2012) Effect of different purification technique on the characteristic of heteropolysacchard-protein bio Polymer from durian (Durio Zbelhinng) seed. Molecules (17) p 10875-10892.
[4]. Dickson E. (2003) hydrocolloids as interface and the influence on the properties of dispersed system .food hydrocolloids vol. 17, No. 1 pp. 25-39.
[5]. Glickman M(1982) functional properting of hydrocolloids in food hydrocolloids vol. ed budama M. (PP 42 ag CRC pressure Roca raton florida.
[6]. Glickman M. (1983), Gum arabic in food hydrocorlods vol pd colideman Pp. 8 29.
[7]. Holmen A. W, Marins W.M and Bayar M.m (1985). Hydro colliods and processed food. In gums and stabilizer for the food industry. 3rd proceeding of the 3rd int. cenf held at wrexhan dywowalas pp. 2005-253.
[8]. Iwe M.O. and Attah M. D. (1993). Functional property of the cissu gum cissu populnea . J of agric. Sc and tech. vol 3. pp 68-71.
[9]. Iwe M.O Obaji P. O and Aknanuman M. A (2004) physico chemical property of cissu gum powder extracted with the aid of edible starch. journal of plant food for human nutrition vol 59: p 161-168.
[10]. Ibrahim H. (1991) Pharmaconostic and evaluative studies of the stem back of cissus populnea guill and perri. A thesis submitted for the award of master of pharmacency pp 7, 8. ABU.ZAIRA
[11]. Ihekoronye A.I and Ngoddy P. O (1985), Integrated food science and technology for the tropics Pp. 50,139-148, 190 Mac Ltd London.
[12]. Lawrence A. A. (1976) Edible gums and related substance food technology review No. 9 Noya late corporation london.
[13]. Linchan E, Nakai S. and Wood D. F. (1984). Hydrophobicity and solubility of meat protein and their relationship to emulsify property J of food Sc. Pp 345.
[14]. Yasmatu K. Sawada K, Moritaka S, Misaki M, Toda J, Nada T and Ishi K. (1972) whipping and emulsifying properties of Soyabean products Agric. Bio chem. 36:716-722.
[15]. William D. A. Sayars C. Viebke C. Senan C., Maoyer J. and Boulerguer P., (2005) Elucidation of the emulsify property of sugar beet pectin. Journal of Agric Food Chemistry Vol. 53 No. 9, pp 3592-3597.
[16]. Philips C. O. Wedlocks D. J. and William P. A. (1990): Ed. Application of microcrystalline cellulose In: Gums and stabilizer for the food industry vol 5 IRL Press Oxford Uk.
[17]. Morhossein H. Tabataba A.B.A (2012). Reviews study on chemical composite of molecular structured of newly plant gum exudates of seed gums. Food Res. Int 46, 387-398.
[18]. Rana V, Rani P, Tiway A. K. Singh R.S Kennedy T.F and knill l.J (2011) modified gum approach and application in drying delivery. Carbohydrate polymer 83, 1031-1047.
[19]. Glickman M. (1982) functional properties of hydro colloids: In food hydrocolloids CRC Press Bxa Raton Fl. U.SA pp 47-99.
[20]. Rincon F. Munoz J. Depinto G.L Affuro M.C Calero N. (2009) Rheolgical properties of cèdra odorate gum exudate aqeouoes disparsion .Food hydrocolloid 23, 1031-103
[21]. Iwe M. O and Attah M.A (1993) functional properties of the active gradient of cussi pupulnea grill and Perri apeudacea J. of Agric Sci and Tech 3. Vol. 1 Pp 18:71.
[22]. Onojah J. I (2011) chemical and mineral composition of ciss gum .Journal of food sci & IT management volume 2, p, 28-3