IOSR Journal Of Pharmacy
(e)-ISSN: 2250-3013, (p)-ISSN: 2319-4219
Www.Iosrphr.Org Volume 3, Issue 6 (July 2013), Pp 66-72

Technical Sheet of Some Wild Yam (*Dioscorea*) Species Starch Functional Properties

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ABSTRACT*: The starches extracted from the tuber of some wild yam species (D, praehensilis, D hirtiflora. D.bulbifera (bulbil and tuber) D. multifera, D burkilliana, D. dumetorum and D. togoensis) picked in the Ivory Coast forest zone, have been studied according to their functional properties which included: iodine absorption spectrum, viscosity, swelling and solubility, syneresis and clarity. These studies showed a wide variety of starches from one species to another at the morphological level.*

KEYWORDS: *wild yam species, starches, functional properties, morphological, morphological*

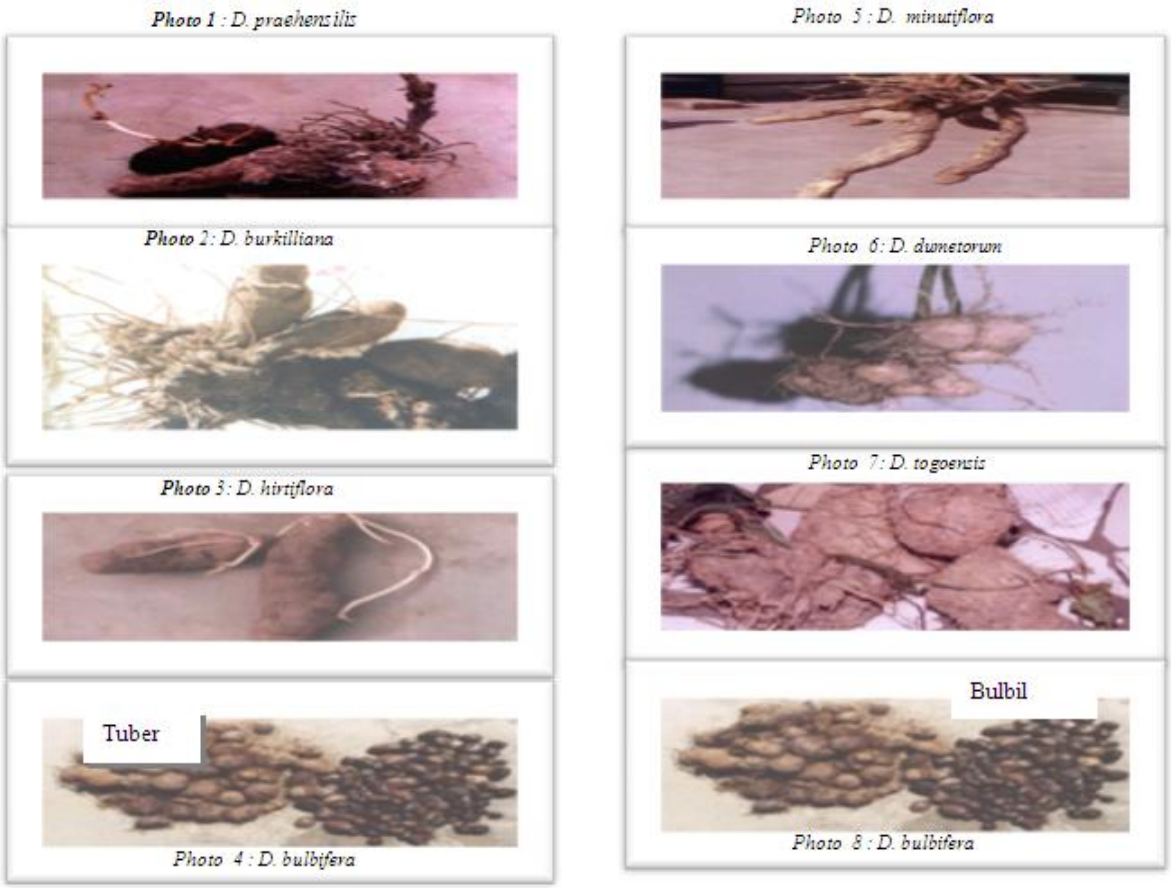
I. INTRODUCTION

Many researchers have studied the physicochemical properties of yam. Particular, the properties of yam starches which constituted with yam flour the major transformation products of yam ([1] [2] [3] [4] [5] [6] [7] [8] [9] [10]) These use of yam that showed its social, economic and scientific interest justified the study of some species of wild yam. This study was also a source of information on the properties of tuber and starches of these little known yams. Their Properties could be used for potential applications in industry.

In terms specific the species of yam spontaneous *Dioscorea praehensilis, D. hirtiflora, D. bulbifera* (bulbil and tuber), *D. burkilliana, D. togoensis, D. dumetorum, D. mangenotiana* and *D. minutiflora*, commonly found in the forest in Ivory Coast, are examined in relation to their functional characteristics starches, to consider their use

II. MATERIAL AND METHODS

Starch was extracted from tuber of wild yam (*Dioscorea)* species *Dioscorea praehensilis, D. hirtiflora*, *D. bulbifera* (tuber; bulbil), *D. burkilliana, D. togoensis, D. dumetorum, D. mangenotiana* and *D. minutiflora* according to the method of Delpeuch *et al* [11].The morphology of starch granule was observed under a scanning. Electron Microscope (Cambridge Instrument Stereoscan 120 - England).The swelling test and of solubility was carried out according to the Method of Leach *et al* [12]. The state of the starch during cooking was characterized by its spectrum with iodine according to the method of Robin [13]. The viscosity of the starch was measured according to method of Mazur *et al* [14] with Brabender viscoamylographe (Model No. 8025 - Brabender OHG, Duisburg, Germany). The preparation of the gels was made with 9 % m.s of suspension aqueous of starch the suspension was warmed during approximately 20 - 25 min under a low excitement by means of a heating magnetic agitator. The Measurement of the gels syneresis by the method described by Eliason and Kim [15] and Zheng Sosulski [16] was used. The process of Graig *et al* [17] and Zheng *et al* [18] was used for determining the clarity of starch gels studied



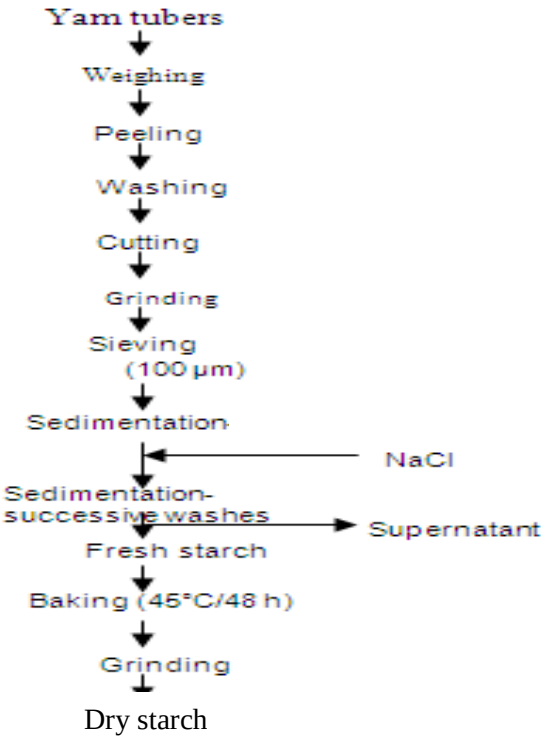


Figure 1: Diagramm of strach extraction [11]

III. RESULTS & DISCUSSION

Photo 9 : Ovo triangular Starch granule of *D.praehensilis*
Φ=34µm

Photo 10 : Ovo triangular Starch granule of *D.burkilliana*
Φ=44µm

Photo 11 : Ovo triangular Starch granule of *D.hirtiflora*
Φ=25µm

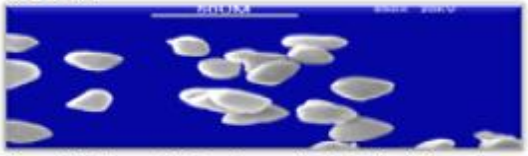


Photo 12: Triangular Starch granule of *D. bulbifera* tuber
Φ=32µm

Photo 13 : ellipsoïdale Starch granule of *D. minutiflora*
Φ=40µm

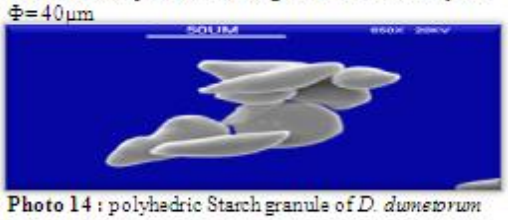


Photo 14 : polyhedric Starch granule of *D. dumetorum*
Φ=3µm

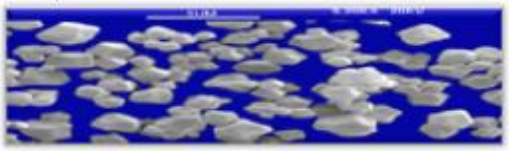
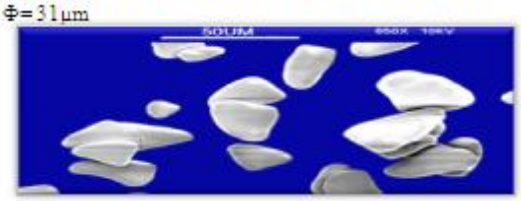


Photo 15 : Ovo triangular Starch granule of *D. togoensis*
Φ =38µm

Photo 16 : Triangular Starch granule of *D. bulbifera* bulbil
Φ=31µm



Swelling reflecting the hydration capacity of the water-insoluble starch fraction .It is expressed in grams of water absorbed per gram of water-insoluble starch (g / g). Swelling of starches studied ranged from 5 g / g to16 g / g at 95 ° C.

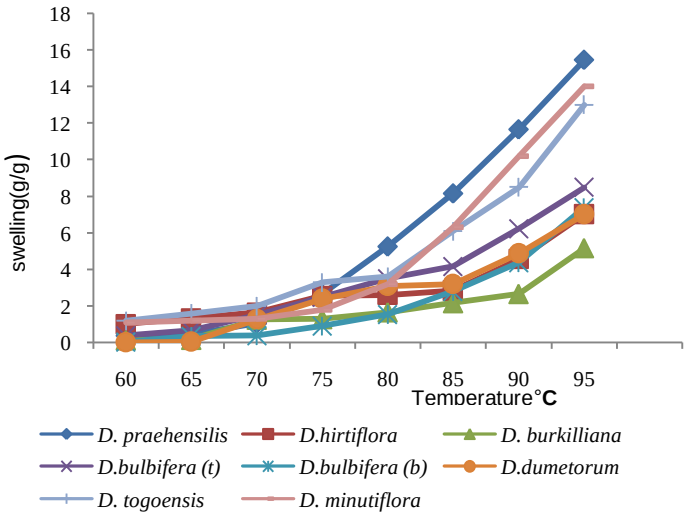


Figure 2: Starch granule swelling curves

The solubility is the percentage of starch dissolved. The solubility of starch studied is between 9.4% and 16.60% at 95 ° C.

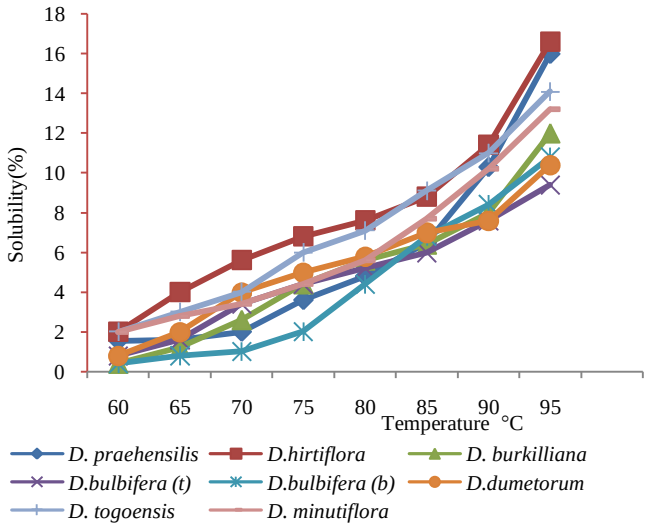


Figure 3 : Starch granule solubility curves

The ratio of the optical density at 630 nm (wavelength of amylose) on the Optical density at 540 nm (wavelength of amylopectin), which characterizes the proportions of amylose and amylopectin in the aqueous suspensions of starch is between 1.12 (*D. dumetorum*) and 1, 29 (*D. hirtiflora*)

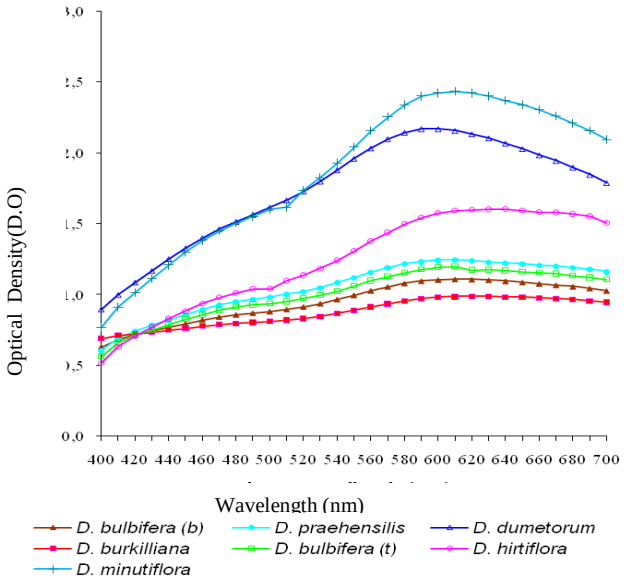


Figure 4 : Wild yam species starch suspensions absorption Spectra in the iodine (400 to 700 nm at 95 °C

The starches extracted from *D. praehensilis, D. togoensis* and *D. dumetorum* have respectively falls of viscosity equal to 13.70; 6.70; 9.30 UB/min, indices of instability equal to -3.80; -2.90; -1.50 and the indices of gelation equal to: - 0.42; - 0.70; - 0.30. The starches extracted from *D. hirtiflora*, *D. burkilliana* and *D. bulbifera* have respectively falls of viscosity equal to: - 0.70; - 8.6; - 5.30 UB/min, of the indices of instability equal to: 0.25; 0.90; 0.78: 0.73 and of the indices of gelation equal to: 0.19; 0.63; 0.20 and 0.55

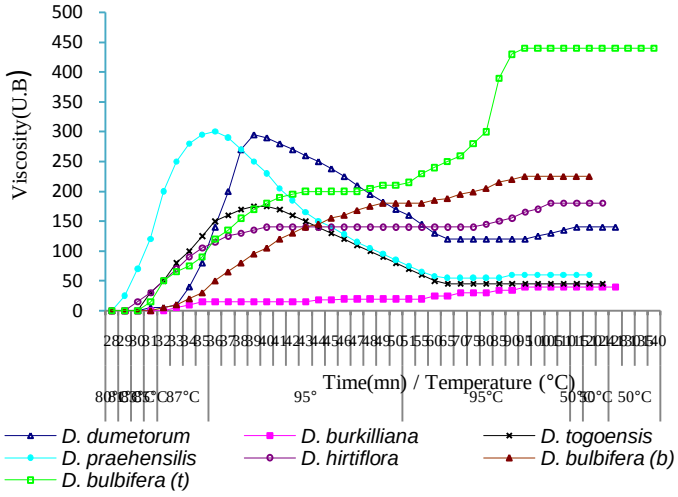


Figure 5: Viscoamylogrammes of wild yam starch
(9 % p/v)

The syneresis sharply over one week and stabilized from the second week. The average of syneresis of each starch from zero at four weeks was respectively: 30% *(D.dumetorum);* 30.4% (*D.praehensilis*); 41.0% (*D. hirtiflora)*; 43.3% (*D. bulbifera* bulbil); 46.0 % (*D. burkilliana*); 48.5% (*D. togoensis*); 54.2% (*D. bulbifera* tuber). It varies from 30% (*D. dumetorum*) to 54.2% (*D. bulbifera* tuber).

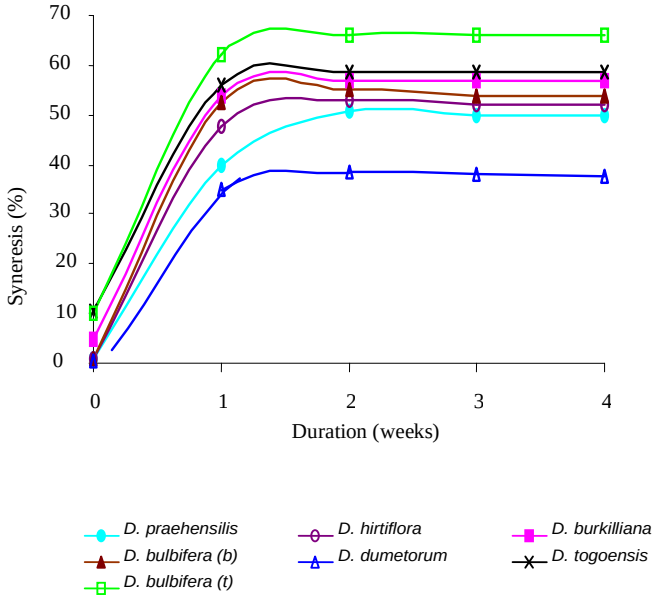


Figure 6: Evolution of the syneresis of wild yam starch
gel kept during 4 weeks in the freezer at 6°C

The clarity ranged from 25% transmittance (*D. bulbifera* bulbil) to 39.60% Transmittance (*D. togoensis*). It evolved in following order: *D. bulbifera* bulbil <*D. bulbifera* tuber <*D. hirtiflora* <*D. dumetorum* <*D. praehensilis* <*D. burkilliana* <*D. togoensis*

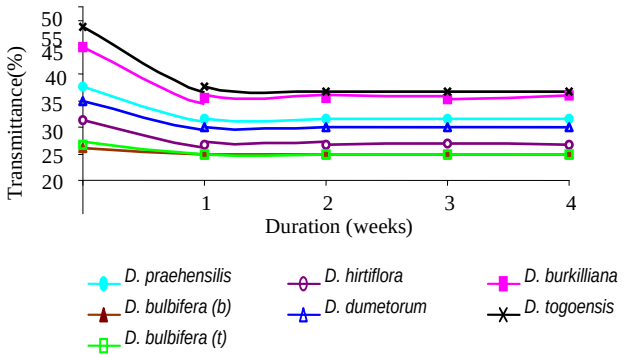


Figure 7: Evolution of the clearness of wild yam starch gel kept during 4 weeks in the freezer at 6°C

IV. CONCLUSION

Starches extracted from wild yam species studied were thermoresistant; provided lower viscosity and opaque gels. Their aqueous suspensions contained more or less amylose at high temperature and showed a tendency to retrogradation. Such properties could be positive factors for potential use of these little known yam species with the temperatures of empesage raised these starches would predispose as a good agent of texture of the high-temperature manufactured goods, as stabilisants of the highly sterilized products. The properties of these starches would determine their specific applications in the industry and would so favor their production and their use

REFERENCES

[1] Emiola L., Delarosa L., 1980. Characteristics of *Dioscorea Rotundata* of polyphenolisidase Journal of Applied Biochemistry 2; 100 – 110

[2] Gramshaw J. W., Osinowo F. A. O., 1982.Volatile Components of cooked tubers of the water yam (Dioscorea alata). J. Sci. Fd. Agric. 33; 71 – 80

[3] Ozo O. N., Caygiel J.C., Coursey D.G., 1984. Phenolics of five yams (*Dioscorea*) species Phytochemistry 23: 329 – 331.

[4] Bradbury J.H., 1988. The Chemical Composition of Tropical Root Crops SEAN Food Journal Vol. 4, N°1, 13 p

[5] Kamenan A., Benchat L. R., Schinnan M. S., Heaton E. K., 1987 Composition and physicochemical properties of Yam (Dioscorea species) Flour prepared using different Processes Journal of Food processing and preservation, 11: 299 – 308.

[6] Kouassi B., Diopoh J., Leroy Y., Fournet B., 1988. Total Amino acid and fatty acids composition of yam (Dioscorea) Tubers and the evolution during storage Journal of Food, Science and Agriculture. 42; 273 – 285.

[7] Trèche S. 1989. Potentialités nutritionnelles des ignames (Dioscorea spp) cultivées au Cameroun Eds ORSTOM. Collection études et thèses, Paris, 214p

[8] Faboya O. O. P., Asagbra A. A., 1990. The physical Chemical properties of starches from some Nigerian cultivars of white yam (Dioscorea rotundata).Trop.Sci.30, 51– 57

[9] Amani N.G. 2002. Propriétés physico-chimiques et Moléculaires des amidons d'igname (Dioscorea spp) Cultivées en Côte d'Ivoire. Relation avec la stabilité des gels Aux traitements technologiques. Thèse de Doctorat. Univ. Abobo-Adjamé, Abidjan.145 p

[10] Brunnschweller J., Luethi D., Handschen S., Farah Z., Escher F., Conde Petit B., 2005. Isolation, Physicohemical characterization and application of yam (Dioscorea spp) Starch as Thickening and Geling Agent. Starch 57, 107-117

[11] Delpeuch F., Favier J.C., Charbonnière R, 1978. Caractéristiques des amidons des plantes.Ann. Technol. Agric. 27,(4). 809-826

[12] Leach H.W.H., Mc Cowen D., Scotch T.J. 1959. Structur of the starch granule I. Swelling and solubility patterns of various starches. Cereal

[13] Robin J.P. 1976. Comportement du grain d'amidon à L'hydrolyse acide ménagé. Etude physico-chimique et Enzymatique de la fraction insoluble, contribution à la Connaissance de la structure de l'amylopectine Thèse de Doctorat d'Etat .Université Pierre et Marie Curie – Paris

[14] Mazurs E.G., Schotch T.J., Kite F.E., 1957.Grapjhical Analysis of the Brabender viscosity Curves of various Starches Cereal chim.Vol. 34, (3), 141152

[15] Eliason A.C., Kim H.R. 1992. Changes in rheological properties of hydroxypropyl potato starch pastes during freeze-thaw treatments I. A rheological approach for Evaluation of freeze- thaw stability Journal of texture Studies, 23, 279-295

[16] Zheng G.H., Sosulski F.W., 1998. Determination of water Separation form cooled starch and flour pastes after refrigeration and freeze thaw. Journal of food sciences, 63, 134-139

[17] Graig S.A.S., Maningat C.C., Seib P.A., Hoseney R.C., 1989. Starch Clarity. Cereal chim. 66,173-182.

[18] Zheng G.H., Han H.L., Bhatty R.S. 1998. Physicochemical properties of zero amylose Hull-less Barley starch. Cereal chem, 75, 520-524