JOURNAL OF INTERNATIONAL ACADEMIC RESEARCH FOR MULTIDISCIPLINARY
Impact Factor 1.393, ISSN: 2320-5083, Volume 2, Issue 5, June 2014

EFFECT OF AGRO-CLIMATIC INFLUENCE ON PROCESSING AND PREPARATION OF TAMARIND KERNEL POWDER AND SEED GUM

LOKESH .S. L*
DR.A. BALASUBRAMANIAN**
DR.P. DURAIRASU***

*Research Scholar, Forest Ecology and Environment, Forest College and Research Institute, Mettupalayam, Tamil Nadu, India
**Professor & Head, Forest Ecology and Environment, Forest College and Research Institute, Mettupalayam, Tamil Nadu, India
***Dean, Forest College and Research Institute, Forest College and Research Institute, Mettupalayam, Tamil Nadu, India

ABSTRACT

Tamarind kernel powder is an important by-product of Tamarind pulp industry and seed gum is a polysaccharide present in tamarind kernel powder. Owing to the ever increasing demand of tamarind seed gum in recent years due to its potentialities in industrial applications and its viz pharmaceuticals, textile. In the present study, an investigation was made to assess the effect of agro-climatic influence on processing of tamarind kernel powder and preparation of tamarind seed gum. The results revealed that 100 seed weight, Seed recovery and Tamarind kernel powder were maximum in seeds collected from Southern Agro climatic zone of Tamil Nadu. However, with respect to Tamarind kernel powder processing, Roasting and Dehulling methods were found to be more significant than wet processing. On the other hand, for preparing tamarind seed gum from Tamarind kernel powder wherein different combination of chemical compounds were used, the results reported that Sodium carbonate followed by sodium hydroxide were best chemicals for preparing tamarind seed gum wherein different properties viz., Texture (Smooth), Colour (Creamy), PH range between 5.6-6.4 and gum (Sticky) were found to be significant compare to other treatments. On the other hand, control revealed that with less PH and gum was found to be less sticky. Hence the present investigation indicates there is effect of seed source collected from different Agro-climatic zones on seed recovery and methods followed for Tamarind Kernel powder. The tamarind kernel powder obtained from different processes for preparation of tamarind seed gum which also indicates the quality, properties and feasibility of the prepared gum.

KEYWORDS: Tamarind seed, seed gum, Tamarind kernel powder, Roasting, Dehulling

INTRODUCTION

Tamarindus indica L. (Tamarind) is a tropical tree species widely managed for fruit and other exported products in countries like India and Thailand. It belongs to the dicotyledonous sub-family Caesalpinioideae (Leguminosae). It grows in more than 50 countries of the World. The major areas of production are in Asian countries like India, Bangladesh, Sri Lanka,

Thailand, and Indonesia, and in the African and the American continent. The tamarind tree is a long-lived, large evergreen or semi-green tree, grows wild, though cultivated to a limited extent. A mature tree may attain a maximum height of 30 m. The tamarind tree has the ability to grow in poor soils because of their nitrogen fixing capability and withstanding long periods of drought makes them ideal low input, high yielding trees (Klahal et al, 2013).

Besides this, Tamarind seeds or kernel is a by product of Tamarind pulp industry is a valuable raw material containing 30% of testa and 70% of kernel. Tamarind gum is obtained from endosperm of seeds of the tamarind tree, which is a seed gum with potential industrial applications. Recent year's research has been initiated on the use of tamarind gum in pharmaceutical and cosmetic applications. Tamarind kernel powder disperses and hydrates quickly in cold water but does not reach maximum viscosity unless it is heated for 20-30 min. Polysaccharide present in tamarind kernel powder is called as tamarind seed polysaccharide. Owing to these wide array of utility, the present investigation was carried out to study the effect of Agro-Climatic influence on processing and preparation of Tamarind Kernel powder and preparation of Seed Gum.

Material and Methods

Selection of raw material

Tamarind fruits and seeds required for the study were collected from different Agro-Climatic Zones of Tamil Nadu. After collection seeds were separated from the fruit pulp. The seeds cleaned and washed in water to remove all the foreign materials. The moisture content of the seed was adjusted to 12 to 14 per cent by drying under shade for about a week. Occasional stirring and turning were given to prevent mould infestation and these were then stored in plastic containers till use.

Shelling of testa of tamarind seeds:

Removal of testa from the seed is a difficult process the testa are tenaciously held to the endosperms and hence cannot be removed easily. The peeling of testa from the seeds is done through Wet Process, Roasting Process and De-hulling process

Wet Process

The good quality seeds are soaked in water for 36-48 hrs. Because of its hydrophilic character the seeds absorb water and the outer coat of testa become loose. The jelly like formation

along with the testa is removed and the pure kernels are taken and dried under the sun to remove water absorbed during soaking. The dried seeds are used for the production of Tamarind Kernel Powder.

Roasting Process

In this process the seeds are roasted along with the sand in a pan using sand as the medium for transmission of heat. Sand is used to increase the intensity of heat supplied and also to retain the heat for long time. Generally the seeds are heated to render the testa brittle and friable.

Dehulling Process

The seeds were subjected to dehulling. The testa from the seeds were then removed by simultaneous decortications of seeds pulverization of endosperm with the help of dehull mill by suitably adjusting the gap between plates. Due to different degrees of pulverizability of the testa and endosperms the finely divided testa was blown off by the air steam while the uncrushed endosperms fall out or remain undischarged. The weight of the crushed endosperms were measured and it was found to be 62 per cent of the total weight of the seeds

Grinding of dehulled kernel

The roasted kernels were subjected to grinding in a hammer mill. The half crushed kernels were again fed in this mill after changing. The screen at the bottom which had smaller size. This process was repeated till the Tamarind Kernel Powder of desired particle was obtained.

Preparation of Tamarind seed gum

50 g of Tamarind Kernel Powder in each particle size was dissolved in 250 ml of water. To this solution measured quantity of glucose was added and thoroughly mixed by vigorous stirring. Then measured quantity of chemical was dissolved in 50 ml of water in a separate beaker and boiler for 5 minutes and it was kept aside. The mixture of Tamarind Kernel Powder and glucose was then boiled and the boiled chemical solution was slowly added to that mixture. The whole mixture was stirred vigorously and the boiling was continued for atleast 15 minutes. The solution was then allowed to cool and 2 ml of Formalin (29 %) was added and a thorough stirring was packed in a small polythene bag for the use of experiments

Table-1 Preparation of gum from Tamarind Kernel Powder by using different chemicals

Results and discussion

Sl.No	Particulars	Quantity (g)
1.	Tamarind Kernel Powder (Common for all chemicals)	50 g
2.	Glucose (Common for all chemicals)	6g
3.	**Chemicals used for different combinations**	
	A. Sodium carbonate	5g
	B. Sodium Hydroxide	5g
	C. Borax	5g
	D. Potassium Hydroxide	5g
	E. Control	Nil

It is evident from the Table-2 (100 seed weight) in Tamarindus indica was recorded maximum (168.31 g) in Southern Agro- Climatic Zone of Tamil Nadu followed by North Western Zone (167.70 g) and minimum (102.72 g) with respect to Cauvery Delta Zone. These findings are in conformity with Pongamia pinnata wherein 100 seed weight has been reported in different Agro- Climatic zones of Southern Karnataka (Santhosh,2007). On the other hand, removal of testa from Tamarind seed were subjected three different methods viz., Wet process, Roasting process and Dehulling process. Out of the different methods tried, the maximum seed recovery (%) after removal of seed testa was reported in dehulling process of Southern Zone (88.33 %) and minimum (63.26 %) in Cauvery Delta Zone. Similarly, seed recovery (%) is least in wet process method. Wherein maximum (83.60%) seed recovery was reported in Southern Zone and minimum (60%) in Cauvery Delta Zone. Parameshwari and Srimathi (2009) has reported influence of seed source on recovery percentage in Tamarind of different Agro-Climatic zones of Tamil Nadu. However, after removal of testa from different methods seeds were subjected to grinding to obtain Tamarind Kernel Powder. After Grinding of the seeds the Tamarind Kernel Powder (%) is assessed in different methods. It was found to be that Roasted processed seeds have recorded maximum (80.35%) in Southern Zone and minimum (52.40 %) in Cauvery Delta Zone Similarly, the least TKP (%) was found to be in wet processed seeds, wherein maximum TKP (%) was recorded in Southern Zone (72.60%) and minimum in Cauvery Delta Zone (43.37%). Similar findings were reported by Klahal (2013) percentage of Tamarind Kernel Powder from different places Uthaithni (79.97 %), Ang Thong (78.82 %), Nkhon Sawhon (78.63 %) and India (81.62%).

Table-2 Effect of different Agro- Climatic Zones on 100 seed weight, seed recovery (%) and processing of Tamarind kernel powder

Sl.No	**Agroclimatic zones**	**Sources**	**100 seed weight (g)**	**Seed recovery/Kg(%)**			**Tamarind kernel powder/kg (%)**		
				Wet process	Roasting	Dehulling	Wet process	Roasting	Dehulling
1	North Eastern zone	Jagampettai,kovilur,saniyaskuppam Vedapulidiyur,kadaladi,kariyansanikkum,anathur,thiruvanpatti.	159.39	68.33	73.36	76.67	48.75	58.60	61.60
2	North Western zone	Rajpet,krishnagiri,muthugonakottai,gurvampatty,sedjavur,harur'1 Harur'2,hognekkal,mallapuram,batlagndlu,kannivadi,pennagaram, venathampatti	167.70	80.00	81.66	85.00	60.66	66.30	70.00
3	Western zone	Paliyalu,sankari,saniyasipatti,avinashi,perinaickanpalayem,kumarkundru, Pasur,kannimadi,	114.39	61.66	63.25	68.37	48.30	52.45	67.45
4	Southern zone	Oddachtaram,karmadi1,karmadi2,periyakulam,theni,Natham1,Natham'2 Natham-3,sanarapatti,Dharapuram,Valiampatti,Parali,Kariampatti	**168.31**	**83.60**	**85.00**	**88.33**	**72.60**	**75.40**	**80.35**
5	Cauvery delta zone	Nallur,Sooriyur,ponnampatti,manappari,thogaimali,Alangali,Neelimanagl am	102.72	60.00	65.00	63.26	43.37	48.33	52.40
SEm±			4.26	3.14	2.65	3.04	2.37	2.26	2.78
CD@1%			10.58	9.43	NS	9.72	7.15	7.04	8.37

Table-3 Effect of chemical compounds on different processes and properties of Tamarind seed gum extraction

Chemical Compounds/ Treatments	Wet process Tamarind seed gum				Roasting Process Tamarind seed gum				Dehulling process Tamarind seed gum			
	Texture	Color	PH (W/V)	Gum	Texture	Color	PH (W/V)	Gum	Texture	Color	PH (W/V)	Gum
Sodium Carbonate	Smooth	Creamy	6.2	Sticky	Coarse	Dark Brownish	6.4	Sticky	Smooth	Creamy	6.3	Sticky
Sodium Hydroxide	Smooth	Creamy	5.7	Sticky	Smooth	Brownish	5.6	Sticky	Smooth	Creamy	5.8	Sticky
Borax	Highly Coarse	Brownish	5.2	Elastic	Highly Coarse	Brownish	5.0	Elastic	Highly coarse	Brownish	5.3	Elastic
Potassium Hydroxide	Smooth	Creamy	5.5	Elastic	Coarse	Brownish	5.3	Sticky	Coarse	Creamy	5.7	Sticky
Control	Smooth	Light Cream	5.0	Non-sticky	Smooth	Light Brownish	4.8	Non-sticky	Smooth	Creamy	4.6	Non-sticky

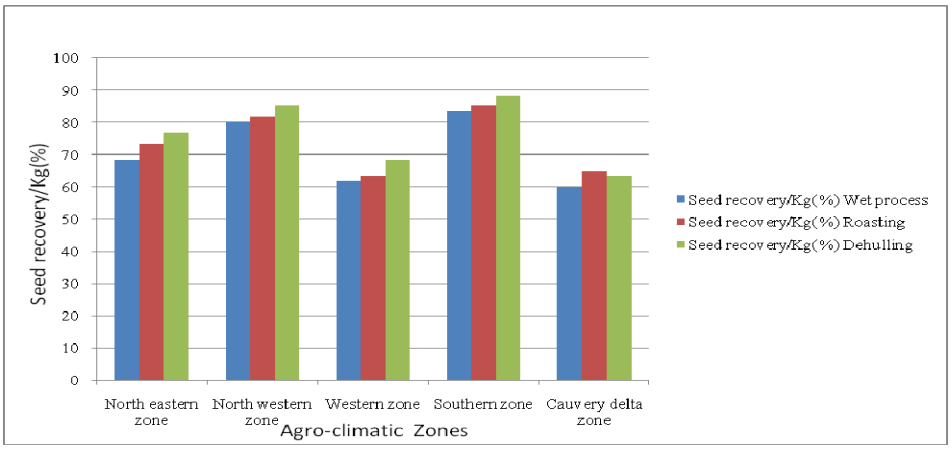

Fig.1 Depicts the effect of Agro- climatic influence on Seed recovery/Kg (%) through different processes

In all the three methods assessed, Wet processed seeds has least seed recovery (%) and Tamarind Kernel Powder (%) this may be due to in wet method, the seeds absorbs maximum moisture content and even after Sun-drying the seeds retain some amount of moisture which in-turn leads grinded seeds to form a gellating like substance and results in less percentage of Tamarind Kernel Powder. In the mean time, it is evident from the (Table-3) different chemical compounds viz., Sodium carbonate, Sodium Hydroxide, Borax, Potassium Hydroxide and Control were used to prepare Tamarind Seed gum and to evaluate physical properties such as texture, Color, PH and Nature of Gum under different processes namely Wet process, Roasting and Dehulling process of Tamarind Kernel Powder and Seed gum

were obtained. The results from (Table-3) revealed that by using Sodium carbonate following properties were characterized in Tamarind seed gum under wet and dehulling process viz., Texture (Smooth), Colour (Creamy), Gum nature (Sticky) and PH (6.2, 6.3) respectively. But, in case of roasting process the Texture was found to be (Coarse), Colour (Dark Brownish), PH (6.4) and Gum (Sticky). On the other hand, in Borax treatment revealed that in all three processes Texture, Colour and Nature of Gum in Tamarind Seed Gum was found to be Highly Coarse, Brownish and Elastic. Meanwhile, Control resulted in Smooth Texture, Colour (Light Cream) and nature of Gum (Non-Sticky) and with low PH (5.0, 4.8 and 4.6) respectively when compared to other treatments. This may be due to to exclusion of chemicals and boiling of Tamarind Kernel Powder alone with distilled water does not possess gum to be sticky in nature. Similar findings were reported by Kumar and Bhattacharaya (2008) in Tamarind seed gum properties for PH, Ash value. Shosha *et al.,(*2008) in Gum Karaya wherein different properties were characterized for textile printing.

Conclusion

In conclusion owing to the wide demand for Tamarind kernel powder and their value addition, present study suggests different methods followed for preparation of Tamarind kernel powder have effect on 100 seed weight, seed recovery in different Agro-climatic zones of Tamil Nadu. However, this inturn reflects the kind of different processing methods used for preparation of Tamarind Kernel powder and also to prepare the tamarind seed gum

Acknowledgement

This is a part of the PhD. (Forestry) thesis submitted by Lokesh, S.L to the Department of Forest Ecology and Environment, Tamil Nadu Agricultural University, Coimbatore. I kindly acknowledge Professor and Head, Department of Forest Ecology and Environment, Forest College and Research Institute, Mettupalayam for providing the facilities to carry out my research work.

References

1. Abo-Shosha, M.H, Ibrahim, N.A, Allam, E.A. and El-Zairy, E.M .2008. Preparation and characterization of polyacrylic acid/ karaya gum and polyacrylic acid/ tamarind seed gum and utilization in textile printing, Carbohyd. Polym 2: 241-249.
2. Kittiya Klahal, Janya Pikul, Wancheng Sittikijoythin, Rattanphol Mongkholrattansit.2013. Thickening agent based on Tamarind seed gum for disperse printing of polyester: International Textile Conference, Bangkok, Thailand
3. Kumar, C.S, Bhattacharya, S.2008. Tamarind seed: properties, Processing and Utilization Critical Reviews. Journal of Food Science & Nutrition 1: 1-20
4. Parameshwari, K and Srimathi, P.2009. Influence of seed source variation on size grades of Tamarind (Tamarindus indica Linn) . International Journal of legume Reserach 4 :240-244
5. Santhosh Kumar, M.S. 2007. Provenance studies in Pongamia pinnata in different Agro- climatic zones of Southern Karnataka. M.Sc (Forestry) Thesis submitted to University of Agricultural Sciences, Dharwad. :45-47