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Influence of Age-Class on Seed Characterisation and Tamarind Kernel Powder Yield in Tamarind (*Tamarindus indica* L.)

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A B S T R A C T

An experiment was conducted to study the seed coat to kernel ratio, seed coat tannin and tamarind kernel powder (TKP) outturn in different age-classes *viz*., age class of 10-20 years, age class of 20-30 years, age class of 30-40 years, age class of 40-50 years and age class of 50-60 years at Paiyur, Kaveripattinam taluk, Krishnagiri district of Tamil Nadu, India. Among the five age-classes, the kernel (Endosperm) content was maximum (77.89 %) in age class of 40-50 years and minimum (68.34 %) in age class of 50-60 years and vice versa in seed coat content. In seed coat tannin, the age class of 10-20 years was exhibited maximum with 285.13 mg g^{-1} and minimum in age class of 20-30 years (259.66 mg g^{-1}). The kernel was pulverised and it was subjected for tamarind kernel powder outturn (TKP). The tamarind kernel powder (TKP) outturn was exhibited highest in age class of 40-50 years (80.96 %) and lowest in age class of 50-60 years (75.78 %). On concluding the study, the age class of 40-50 years bestow maximum in kernel content in seed and tamarind kernel powder outturn, so hence it can be recommended for tamarind kernel powder yield in seed raised plantation.

Introduction

In the recent years, there has been a steady increase in the potentials of the world's plant resources and many investigations are screening towards new applications in science and industry. Among these plant resources and wealth, tamarind has been well known in India, since ancient times for uses. Tamarind, *Tamarindus indica* L. is a multipurpose tropical fruit tree used primarily for its fruits and seeds processed for non-food uses. Tamarind is a long-lived, large, evergreen or semi-evergreen tree, 20-30 m tall with a thick trunk up to 1.5-2 m across and up to 8 m in circumference. Tamarind thrives under a maximum annual temperature ranging from 33-37°C to a minimum of 9.5-20°C and grows well in loamy, deep and well drained alluvial soil.

Especially, the tamarind seed based products are gaining more importance in textiles and pharmaceuticals industries due to its binding and sizing properties. The tamarind seed is used for preparation of tamarind kernel powder. It is prepared by decorticating the seed and pulverising the creamy white

kernels. The decorticated seed is ground by machines to the required mesh size for obtaining a yield of 55-60 per cent. The powder tends to deteriorate during storage under humid conditions; hence storage in a dry place under moisture proof containers is important. Mixing with 0.5 per cent of sodium bisulphite before packing will prevent enzymatic deterioration (Reddy *et al.*, 2013). The characteristic of a good tamarind seed powder is that it should have flavouring, when dissolved in water and be free of any burnt or other undesirable flavours, good keeping quality and free from any insect pests, fungal growth or extraneous materials. In India, TKP is used as a source of carbohydrate for the adhesive or binding agent in paper, textile sizing, weaving, jute products as well as textile printing (Khoja and Halbe, 2001).

Tamarind seed gum (TSG) is a new formulation derived from the tamarind kernel powder. The main component of tamarind seed gum was identified as a non-ionic, neutral, branched polysaccharide consisting of a cellulose-like backbone that carries xylose and galacto xylose substituents (Pongsawatmanit *et al.*, 2006).

In conformity with the above principle, the study was aimed to study the influence of age on seed properties and tamarind kernel powder outturn.

Materials and Methods

The tamarind leaves collected in different age-classes *viz*., Age class of 10-20 years, age class of 20-30 years, age class of 30-40 years, age class of 40-50 years and age class of 50-60 years were taken from Paiyur, Kaveripattinam taluk, Krishnagiri district of Tamil Nadu. The tamarind pods collected from different age-classes were processed and analysed at Forest College and Research Institute, Mettupalayam during 2014 - 2016.

Survey has been made to collect tamarind fruits from 5 different age-class trees, where one kilogram of pod from each age-class was taken for pod fractionation. The pods were broken carefully and fractionated into pod shell, fibre, pulp and seed. Freshly collected fruits were de-pulped and seeds were separated from the rind of the fruits carefully. The seeds collected were cleaned and washed in water to remove all the foreign materials. The seeds obtained through pod fractionation in five different age-classes were used for studying the tamarind seed coat to kernel content, seed coat tannin and tamarind kernel powder outturn.

Tamarind seed coat to kernel content

Removal of testa from the seed is a difficult process, the testa was tenaciously held to the endosperms and it should be removed without damage to endosperm. The peeling of testa from the seeds was done by standardised decortication process. The content of seed kernel to testa was estimated by the formula described by Doucette *et al.*, (2001) and expressed a percentage.

$$\text{Seed recovery (\%)} = \frac{\text{Weight of the seed at outlet}}{\text{Total weight of the seed lot}} \times 100$$

Seed coat tannin

The tamarind seed coat powder of 0.5 grams was weighed and transferred into 250 ml conical flask. Then, 75 ml of water was added and heated gently for 30 minutes. Further the solution was centrifuged at 2,000 rpm for 20 min and collected the supernatant in 100 ml volumetric flask and make up the volume. 1 ml of the sample extract was transferred to a 100 ml volumetric flask containing 75 ml water. The solution was added with 5 ml of Folin-Denis reagent (Sadasivam and Manickam, 1992), 10 ml of sodium carbonate solution and dilute to 100 ml with water and

shake well. The absorbance in double beam UV spectrophotometer was recorded at 700nm after 30 min.

Tamarind kernel powder outturn

After the separation of seed coat form seed, the endosperm obtained was subjected for preparation of tamarind kernel powder. The decorticated endosperm was pulverised and tamarind kernel powder was prepared.

The quantity of tamarind kernel powder (TKP) obtained from 1 kg of seed reflects the powder yield.

During the present study, 1 kg of cleaned tamarind kernel was taken and subjected for grinding then the quantity of tamarind kernel powder obtained was estimated by the formula followed by Thyagarajan (1996) as described below. The values were expressed in percentage.

Tamarind kernel powder (%) =

$$\frac{\text{Weight of the seed powder at outlet}}{\text{Total weight of the seed lot}} \times 100$$

Statistical analysis

The experimental data were subjected to statistical analysis for the possible relationship between the different parameters and analysis of variance employing randomized block design as described by Panse and Sukhatme (1985). The data were analyzed using AGRES software developed by Tamil Nadu Agricultural University (TNAU) Coimbatore. The data on every parameter were analyzed separately in single factor analysis, using AGRES software. Then the values of critical difference (CD) at 0.05 and standard error deviation (SEd) were given in the respective tables (Tables 1 and 2).

Results and Discussion

Seed coat to kernel content

The tamarind seed comprises the seed coat or testa of 20-30 per cent and the kernel or endosperm of 70-75 per cent (Shankaracharya, 1998). The above study results concomitant result of present investigation, which concluded that seed in age class of 50-60 years has accounted highest seed coat of 31.66 per cent and highest kernel content of 77.89 per cent in age class of 40-50 years (Table 1).

Tannin content in tamarind seed coat

Tannins are complex secondary metabolites having various medicinal properties but difficult to isolate in pure form.

The age class of 10-20 years was accounted maximum tannin content of 285.13 mg g^{-1} followed by age class of 30-40 years (278.01 mg g^{-1}), age class of 50-60 years (276.49 mg g^{-1}) and age class of 40-50 years (266.63 mg g^{-1}). The minimum tannin content of 259.66 mg g^{-1} was recorded in age class of 20-30 years (Table 2). Tamarind seed is the raw material used in the manufacture of tamarind seed kernel powder (TKP), polysaccharide (jellose), adhesive and tannin by Marathe *et al.,* (2002).

Tamarind kernel powder outturn

The present study was carried out to study the response of different age-classes on outturn of tamarind kernel powder. The highest tamarind kernel powder outturn was attained from the seed harvested in the age class of 40-50 years with the outturn of 80.96 per cent followed by age class of 30-40 years with TKP outturn of 80.34 per cent (Fig. 1).

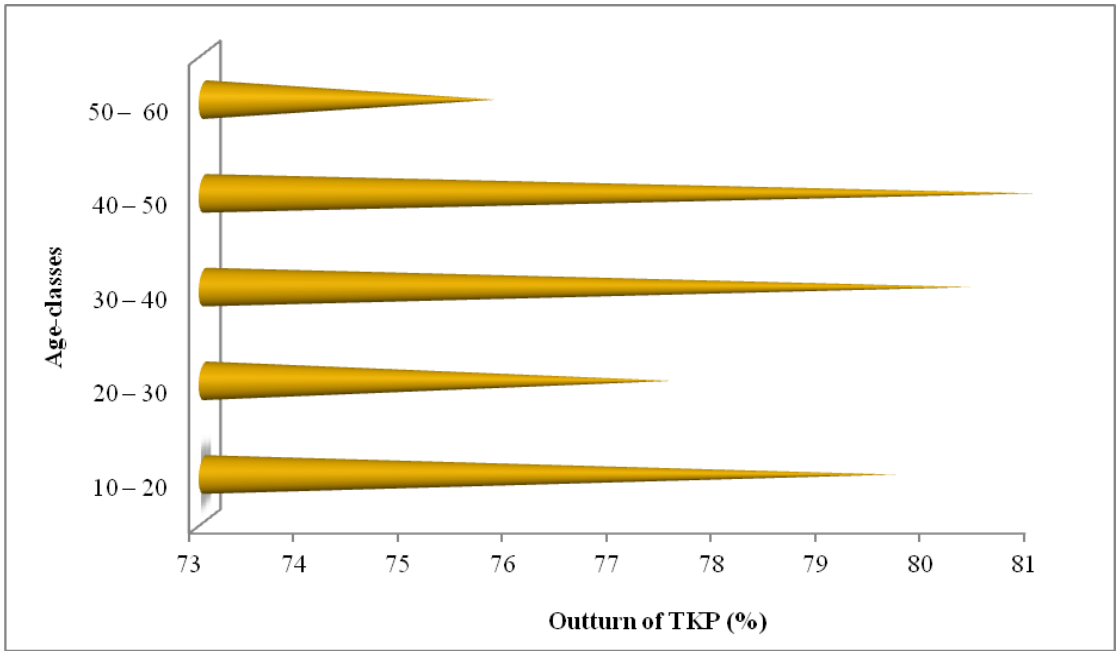
Table.1 Seed coat to kernel content of tamarind seed in different age-classes

Sl.No.	Age-classes (years)	Seed coat (%)	Kernel (%)
1	10 – 20	25.46	74.54
2	20 – 30	27.95	72.05
3	30 – 40	23.73	76.27
4	40 – 50	22.11	77.89
5	50 – 60	31.66	68.34
	SEd	1.003	1.003
	CD (0.05)	2.127	2.127

Table.2 Tannin content of tamarind seed coat in different age-classes

Sl.No.	Age-classes (years)	Tannin content (mg g^{-1})
1	10 – 20	285.13
2	20 – 30	259.66
3	30 – 40	278.01
4	40 – 50	266.63
5	50 – 60	276.49
	SEd	0.645
	CD (0.05)	1.369

Fig.1 Effect of different age-classes on outturn of tamarind kernel powder



The poor outturn of tamarind kernel powder was obtained in age class of 50-60 years. The above study was substantiated with Nair and Fahsa (2013) and Klahal *et al.,* (2013) on tamarind kernel powder outturn. The age class of 40-50 years was found superior in kernel

content of seed and tamarind kernel powder (TKP) outturn in tamarind plantation. However, the age class of 50-60 years was poorly performed in kernel content of seed and tamarind kernel powder (TKP) outturn and hence this age class should be avoided during TKP production.

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