A VISUAL OBSERVATION ON MOULD INFESTATIONS IN CERTAIN ARECANUT CONSIGNMENTS IMPORTED TO INDIA

S. Keshava Bhat*

Arecanut, the seed of areca palm, *Areca catechu* L. (Arecaceae family), is the common masticatory with nearly one fifth of global population indulge in this habit of chewing arecanut. Areca fruit is a drupe with a central endosperm or nut covered by pericarp (husk) which is green when unripe and turns to orange-yellow when ripe. The nut has a characteristic astringent and slightly bitter taste (Ananda, 2004). Arecanut is also called as 'supari' in Hindi. This nut is usually marketed with some minimum processing in most parts of India. One type of processed arecanut is called 'red supari' which is obtained by boiling and drying unripe dehusked nuts at different stages of their maturity. Another type is 'white supari' which is obtained by mere drying ripe nuts and dehusking them afterwards (Selvan *et al.*, 2004).

Arecanut chewing

Chewing of arecanut is a traditional practice dating back to thousands of years in most of the places especially in India and several South and South East Asian Countries. This nut is seldom chewed alone, but generally chewed with betel leaf (the leaf of *Piper betle* L., a tropical vine of Piperaceae family), lime (Calcium hydroxide) and tobacco (*Nicotiana tabacum* L) as betel quid (IARC, 2004). As arecanut is mostly chewed along with the leaf of betel vine, it is misnamed as 'betel nut' in several parts of the world. In recent years, different types of dry, ready to use chewing products containing arecanut as one of the ingredients have flooded the market in different brand names and forms like sweet supari, pan masala, gutka, mava, etc. and these forms of chewing products have taken over the practice of chewing betel quid in most of the areas especially in urban regions as these products are available in sachets and easy to carry (Gandhi *et al.*, 2005). The main problem with such dry chewing products is that the chewers may not be knowing the quality of arecanuts or the actual substances used in such preparations.

Arecanut scenario in India

India produces more than 6.0 lakh tonnes of arecanut annually and most of them are consumed within the country and only a meager quantity of around 2.3 thousand tonnes are being exported (Cheriyan and Manojkumar, 2014). If we see the import figures of arecanut to India, they are really alarming with more than 66.0 thousand tonnes imported annually mainly from Sri Lanka, Indonesia, Bangladesh, Thailand and Myanmar (Chowdappa and Cheriyan, 2016). Hitherto, there was no

* Arecanut Research and Development Foundation, Varanashi Towers, Mission Street, Mangaluru, Karnataka.

stringent quality control over such imported arecanuts as there was no fixed quality standards for this commodity in India. However, in May, 2018 the Bureau of Indian Standards (BIS), New Delhi has fixed certain quality norms for arecanut also. It says that the maximum permissible limit of mould growth in arecanut is 12% by count.

Mould infestations in imported arecanuts

During March, 2019, the Arecanut Research and Development Foundation (ARDF), Mangaluru had tested the quality of arecanut samples from 31 consignments, totalling 573.72 tones of arecanuts, said to be imported from Sri Lanka through Krishnapatnam Port of Andhra Pradesh. One kg of arecanut sample was collected from each container at random and handed over to ARDF by Directorate of Revenue Intelligence (DRI) for testing. For this purpose, ten arecanuts were collected at random from each sample, by blind folding the eyes, cut open and observed for any visible mould infestation inside. It was found that all the 31 samples were infested with moulds more than 12% (by nut count), the maximum limit prescribed by BIS for arecanut (Table 1). Some of the samples of arecanuts provided are so bad that nearly 42% of the samples showed more than 50% mould infestations (Table 2). Several nuts were found heavily infested with moulds, deteriorated completely and appeared totally blackish (Figs 1-31).

Discussion

It was reported that arecanuts if not processed and dried properly are bound to be attacked by several fungi, including *Aspergillus* spp. responsible for the production of aflatoxins which even cause cancer in humans (Misra and Misra, 1981). In arecanut, the central core portion (pith) is very soft and sweet. If the nuts are not processed and dried properly (Nambiar and Reddy, 1979), or harvested prematurely and allowed to dry in heaps the pith invariably gets infested with such fungi which in turn give a dark patchy appearance to that portion of the nut (Mahdihassan, 1987). Chewing or consumption of such mould infested arecanuts are dangerous for human health. It was presumed that in countries such as India and Taiwan where people mostly chew similar type of arecanut, the concentration of aflatoxins consumed may even go beyond the permissible limit and potentially contribute to the reported carcinogenic effects of the chewing products containing arecanut as one of the ingredients on oral tissues (Bijl *et al.*, 1997). Since such sub standard arecanuts are available for cheaper rates there is every possibility that several of the ready to use dry chewing products might contain such mould infested nuts in fairly good quantity and the health researchers are urged to take this aspect into consideration while making the comment on the health effects of chewing arecanut (Keshava Bhat *et al.*, 2017).

Conclusion

This observation clearly shows that a substantial quantity of poor quality and fungal infested arecanuts are being imported to India. Such arecanuts, though available for cheaper rate, might pose serious health problems to chewers. By importing such infested arecanuts there is also a possibility that we also import certain new strains of fungi or new insects to our country as well. Hence, there is an urgent

Table 1. Visible mould infestation (%) in arecanut samples tested

Sl. No.	Consignment No.	Quantity of arecanut imported (in tonnes)	% of mould infestation (by visible counts)
1	Container No. KMTU7226430	16.00	50.00
2	Container No. TGHU0870501	16.00	50.00
3	Container No. ECMU1299594	18.00	60.00
4	Container No. HASU4163785	27.96	90.00
5	Container No. FCIU2624325	18.00	40.00
6	Container No. INBU3814859	18.00	50.00
7	Container No. JHSU2580030	18.00	20.00
8	Container No. DFSU2143339	18.00	40.00
9	Container No. VSBU2006648	17.22	70.00
10	Container No. CNSU2041820	18.00	60.00
11	Container No. DVRU1488802	18.00	20.00
12	Container No. YMLU3063095	18.00	20.00
13	Container No. HLXU3003406	16.75	40.00
14	Container No. TGHU3199974	17.00	30.00
15	Container No. GESU2809200	16.75	40.00
16	Container No. PMLU2038205	17.00	40.00
17	Container No. KKTU7936078	18.00	60.00
18	Container No. CRSU1102240	16.00	70.00
19	Container No. PONU0804215	16.00	50.00
20	Container No. CLHU3291719	18.00	50.00
21	Container No. FCIU2842184	18.00	60.00
22	Container No. GSLU2038742	18.00	60.00
23	Container No. PCIU2067019	17.00	70.00
24	Container No. FSCU7628467	18.00	40.00
25	Container No. TGHU2607773	18.00	40.00
26	Container No. CAXU6377607	18.00	40.00
27	Container No. EOLU3285521	18.00	70.00
28	Container No. MRSU3998619	28.02	70.00
29	Container No. KKTU7918731	18.00	40.00
30	Container No. CRSU1139152	18.00	80.00
31	Container No. PONU8163231	28.02	60.00
	Total	**573.72**	

Fig.1-31. Mould infestations in arecanut samples of 31 consignments.


9
BE Date: 31.01.2019
Container No. VSBU2006648
17,220 Kgs


10
BE Date: 31.01.2019
Container No. CNSU2041820
18,000 Kgs


11
BE Date: 19.01.2019
Container No. DVRU1488802
18,000 Kgs


12
BE Date: 19.01.2019
Container No. YMLU3063095
18,000 Kgs


13
BE Date: 04.02.2019
Container No. HLXU3003406
16,750 Kgs


14
BE Date: 04.02.2019
Container No. TGHU3199974
17,000 Kgs


15
BE Date: 07.02.2019
Container No. GESU2809200
16,750 Kgs


16
BE Date: 07.02.2019
Container No. PMLU2038205
17,000 Kgs


17
BE Date: 09.02.2019
Container No. KKTU7936078
18,000 Kgs


18
BE Date: 09.02.2019
Container No. CRSU1102240
16,000 Kgs


19
BE Date: 09.02.2019
Container No. PONU0804215
16,000 Kgs


20
BE Date: 12.02.2019
Container No. CLHU3291719
18,000 Kgs


21
BE Date: 13.02.2019
Container No. FCIU2842184
18,000 Kgs


22
BE Date: 15.02.2019
Container No. GSLU2038742
18,000 Kgs


23
BE Date: 15.02.2019
Container No. PCIU2067019
17,000 Kgs


24
BE Date: 16.02.2019
Container No. FSCU7628467
18,000 Kgs


25
BE Date: 16.02.2019
Container No. TGHU2607773
18,000 Kgs


26
BE Date: 16.02.2019
Container No. CAXU6377607
18,000 Kgs


27
BE Date: 16.02.2019
Container No. EOLU3285521
18,000 Kgs


28
BE Date: 16.02.2019
Container No. MRSU3998619
28,020 Kgs


29
BE Date: 22.02.2019
Container No. EKTU7918731
18,000 Kgs


30
BE Date: 01.01.2019
Container No. CRSU1139152
18,000 Kgs


31
BE Date: 02.03.2019
Container No. PONU8163231
28,020 Kgs

Table 2. Severity of mould infestations in arecanut samples tested

	Severity of mould infestation (% by number of nuts infested)									
Severity	< 20	20	30	40	50	60	70	80	90	100
Actual no.	Nil	3	1	9	5	6	5	1	1	Nil
% found	0	9.7	3.2	29.0	16.1	19.4	16.1	3.2	3.2	0

need to curb such imports of sub standard arecanuts from other countries. The concerned Government Departments should be more vigil on these facts.

References

Ananda,K. S. 2004. Botany. In: 'Arecanut' (D. Balasimha and V. Rajagopal Eds.) Central Plantation Crops Research Institute, Kasaragod, India. pp. 7-50.

Bijl, V. D. P ., Stockenstrom, S., Vismer, H. F. and Wyk, V. C. W. 1997. Further observations on the incidence of fungi and aflatoxins in arecanut samples. *Ind. J. Exp. Biol.* 35: 796-798.

Cheriyan, H. and Manojkumar, K. 2014. Arecanut production scenario in India. *Ind. J. Arecanut, Spices & Med. Plants* 16(4): 3-11.

Chowdappa, P. and Cheriyan, H. 2016. Arecanut: production, consumption and marketing. *Ind. J. Arecanut, Spices & Med. Plants* 18(4): 6-15.

Gandhi, G., Kaur, R. and Sharma, S. 2005. Chewing pan masala and/or betel quid - fashionable attributes and/or cancer menace. *J. Human Ecol.* 17: 161-166.

IARC, 2004. Monograph on the evaluation of carcinogenic risks to humans. In: Betel quid and arecanut chewing. Lyon, France 85: 37-293.

Keshava Bhat, S., Ashwin, D. and Mythri, S. 2017. Contamination and adulteration in arecanut (*Areca catechu* L) and its chewing forms: the less focused subject by health researchers. *IOSR J. Environment Science, Toxicology Food Tech.* 11(1): 7-12.

Mahdihassan, S. 1987. Betel-nuts as contaminated with a cancer producing fungus. *Ancient Science of Life* 4: 244-246.

Misra, A. and Misra, J. K. 1981. Fungal flora of marketed betelnuts, *Mycologia* 73: 1202-1203.

Nambiar, K. K. N and Reddy, K. 1979. Fungal infection of stored arecanuts. *J. Plantation Crops*, 7: 83-84.

Selvan, M. T, Sivaraman, K. and Manojkumar, K. 2004. Economics, marketing and development. In: 'Arecanut' (D. Balasimha and V. Rajagopal Eds.), Central Plantation Crops Research Institute, Kasaragod, India. pp. 259-301.

***