Production of Edible Copra and the Evaluation of Shelf Life

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Introduction

Short the shelf life and high level of residual sulfur level are the major problem in Sri Lankan Value Added (VA) copra.The acceptable limit of residual sulfur dioxide level in Sri Lanka is 50 ppm (SLS 98:1988). But most of copra manufactured in Sri Lanka contains more t han 100 ppm residual sulfur dioxide levels. Residual sulfur levels allowed in the copra in European Union (EU) is 10 ppm. Therefore it is necessary to reduce residual sulfur level in copra. Another problem in VA copra is short shelf life and changes in color within six month period. Therefore it is necessary to identify the factors limiting shelf life. Production cost of VA copra is high compared with its value in the market. Indirectly heated copra dryers have the ability to produce economical and high quality copra. Therefore this research was done to find out of TPC (total plate count), yeast and mould and during production process and five month storage period, to find out the residual sulfur levels during kiln drying and five storage period, to find out the variation of moisture and temperature of copra during kiln drying and to find out most effective value added treatment like glacial acetic acid and ozone treatment.

Methodology

The study was carried out at the *AdamjeeLukmanjee and Sons (Pvt) Ltd*, Colombo 14, Sri Lanka.Residual sulfur dioxide levels were measured by following Standard No: SLS 98 test method. And test was standardized by using Sodium sulfite Na_2SO_3. Total plate count (TPC) and yeast and mould (Y and M) count were taken by adopting "oxoid" microbiology test methods and SLS 516 part 1 and 2. Study was conducted for residual sulfur dioxide determination, Sodium Meta bi sulfite (SMS) three applications, Glacial acetic acid application (GAA) and Ozone treated copra. For five month shelf life evaluation and for ozone treatment 2013 manufactured vacuum packed VA copra were used. Complete randomized design (CRD) was used. Two trials were conducted in indirectly heated copra dryer which has been installed in *Pannala* permisis belongs to *Adamjee Lukmanjee and Sons (Pvt) Ltd.* Performance was evaluated by using operational cost calculation, TPC, Y and M and residual sulfur dioxide calculation.Data was analyzed by MINITAB 16 statistical package.

Results and Discussion

GAA surface application, controller and indirectly heated copra resulted <10 ppm residual sulfur levels and it was compatible with EU standards. After removing shells application SMS resulted <50 ppm residual sulfur levels and it was still acceptable in Sri Lankan condition (Table 1). Control was maintained without adding any treatment.

The development of TPC during five month storage period increased 230.67/gram to 796.67/gram (Figure 1) but there was not any significant difference (Table 2) in Y and M development in five month storage period (Figure 2). And the residual sulfur dioxide levels reduced 101.67 ppm to 88.40 ppm (Figure 3) during four month storage period in vacuumed packs.Further newly produced 2013 VA copra showed 101.38 ppm residual sulfur dioxide level

and 2011 VA copra 88.4 ppm.TPC can be a factor to limit shelf life and also change the color of VA copra.

Table 1. Variation of mean residual sulfur dioxide levels.

Level	Replications	Mean residual SO_2 in ppm
1 Inner surface application of [a]	3	79.46
2 Inner surface application of [b]	3	60.43
3 Inner surface application of [c]	3	40.00
4 After removing shells [a]	3	107.60
5 After removing shells [b]	3	73.82
6 After removing shells [c]	3	49.00
7 Glacial acetic acid surface application	3	9.55
8 Controller	3	9.97

a, b and c were the three concentrations of sodium meta bi sulfite (SMS).

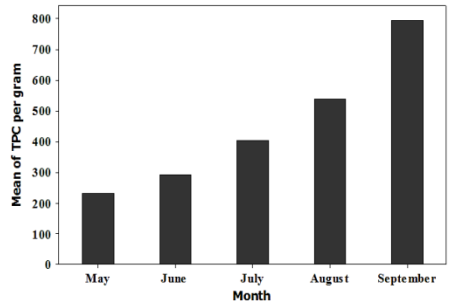

Figure 1. Variation of mean TPC during five month storage

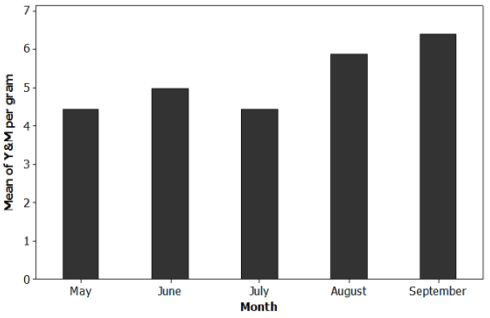

Figure 2. Variation of mean Y and M during five month storage

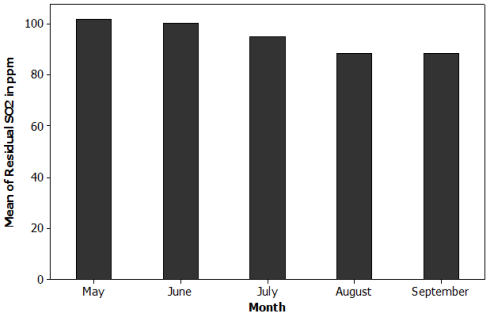

Figure 3. Variation of mean residual sulfur dioxide during five month storage

Table 2.Variation of TPC, Y and M and residual SO_2

Property	P value
TPC	0.000
Y and M	0.077
Residual SO_2	0.103

The trials which were conducted in indirectly heated copra dryer is an economical dryer. MS2 copra can be produced by 54 hours drying in indirectly heated copra dryer. The color of copra was not suitable for VA copra.Further the level of residual sulfur dioxide is <10 ppm.The cost of production was reduced 22.26 Rs/= to 7.52 Rs/=.Quality obtained from copra is highly suitable for MS2 copra. And this copra contains low amount of Poly Aromatic Hydrocarbons (PAH).

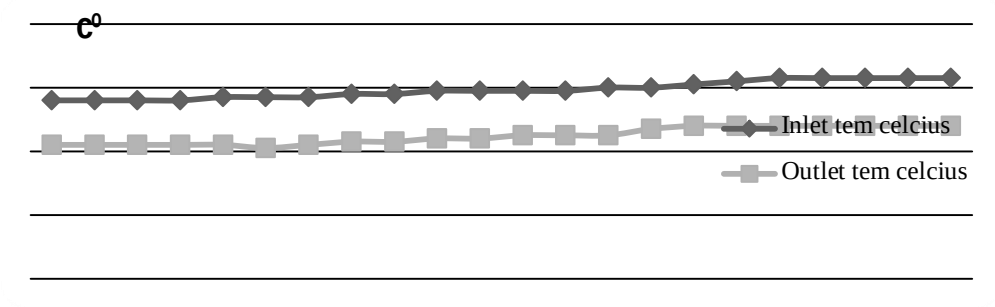

Figure 4. Temperature variation during 24 hours period kiln drying

The variation of inlet and outlet air temperature inside indirectly heated dryer shows in Figure 4. During kiln drying maximum inlet air temperature was 67 ^{0}C and maximum outlet temperature was 44 ^{0}C. Temperature variation inside kiln was not uniform and varies 39 ^{0}C to 64 ^{0}C.

Conclusions

Newly produced 2013 VA copra shows 101.38 ppm residual sulfur dioxide level and 2011 VA copra 88.4 ppm. There was a significant difference in TPC during the five month storage period. However Yeast and Mould counts do not increase in the copra and the residual sulfur dioxide levels found to be reduced. Hence the TPC can be a factor to limit the shelf life and color of VA copra. Ozone treatment and GAA treatment shows less than 10 ppm residual sulfur dioxide level.But the quality of copra not suitable for VA copra. Indirectly heated copra dryer gives economical andlow residual sulfur (below 10 ppm) MS2 (Milling Superior Grade 2) copra.

References

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