

## Application of Quality Index Method, TMA, Histamine and TVB-N to evaluate the quality of *Katsuwonus pelamis* stored in ice

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### Abstract

The aim of the current study was to determine the Quality Index of skipjack tuna (*Katsuwonus pelamis*) stored in ice in relation to the acceptable sensorial, biochemical and microbiological quality. The histamine content of skipjack tuna increased significantly ( $p < 0.05$ ) from 1.38 mg/100g to 95.44 mg/100g during the iced storage. Histamine level of skipjack tuna stored in ice exceeded the rejection limit (5 mg/100g) on day 9. The trimethylamine (TMA) content of skipjack tuna increased significantly ( $p < 0.05$ ) from 1.78 mg/100g to 12.70 mg/100g during the iced storage. TMA-N levels of skipjack tuna was exceeded the rejection limit on day 18, when considering the 10 mg/100g of TMA-N as critical limit. The total volatile basic-nitrogen (TVB-N) content of skipjack tuna increased significantly ( $p < 0.05$ ) from 11.98 mg/100g to 27.85 mg/100g during the iced storage. Nevertheless, the TVB-N levels in skipjack tuna exceeded the rejection limit (30 mg/100g) on 12<sup>th</sup> day of ice storage. In the current study, total aerobic plate count of skipjack tuna reached the  $10^8$  CFU/g levels, which indicates the initiation of spoilage on day 9. The 12 days shelf life (or limits of acceptability) was obtained when chemical and microbiological indices were used to represent the lower limit of acceptability. The calculated Quality Index (QI) evolved linearly with storage time in ice ( $QI = 0.59X$  (days in ice) + 4.70,  $R^2 = 0.96$ ). The Quality Index of skipjack tuna stored in ice is 12, when biochemical and microbiological limits were reached.

**Keywords:** Skipjack, Quality Index, TMA, TVB-N, Histamine, Quality

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### Introduction

Skipjack tuna (*Katsuwonus pelamis*) is an important commercial fish which has a high demand for human consumption. Skipjack tuna plays an important role in the Sri Lankan export market. However, the export value of the skipjack tuna is strictly determined by the quality. Therefore, it is important to investigate a suitable and reliable method for monitoring the freshness of skipjack tuna in order to provide best quality products for consumers. In the current study, sensorial, biochemical and microbiologically acceptable shelf life of skipjack tuna stored in ice was determined. Quality changes during storage were assessed by the Quality Index Method (QIM). The

main objective of this study was to determine the change of quality index, TMA, TVB-N and histamine with days in iced storage. The specific objective of this study is to find the value of Quality Index when with the limits of TMA, TVB-N and histamine in skipjack tuna stored in ice were reached.

### Materials and methods

The Histamine content was determined by spectro fluorometric method. The TMA-N content was determined by the picrate acid method. Determination of TVB-N was done by modified micro-Kjeldhal method. The microbial quality of fish was determined by viable aerobic Total Plate Count (TPC). The sensory evaluation of fish was based on Quality Index Scheme, which was developed for skipjack tuna by using the sensory quality parameters.

### Results and Discussion

The chemical assessment of tuna (*Katsuwonus pelamis*) showed that there was a general increase in TMA and TVB-N values throughout the 20 days storage period (Figure 1a). Such changes in TMA and TVB-N values can be attributed mainly due to the action of bacteria and somatic enzymes digesting the fish tissue after death (HergbondandVilladeen, 1975). The TMA and TVB-N values showed a slight decrease from the 20<sup>th</sup> day (Figure 1a). Such changes in TMA and TVB-N values can be attributed mainly due to the leaching of TMA and TVB-N to the liquid which was formed by melting ice. Histamine increased rapidly and reached the highest level and then began to decrease. The 12 days shelf life (or limits of acceptability) obtained when chemical and microbiological indices were used to represent the limit of acceptability. The calculated Quality Index (QI) evolved linearly with storage time in ice ( $QI = 0.59X \text{ (days in ice)} + 4.70, R^2 = 0.96$ ). The Quality Index of skipjack tuna was 12, when the limits of TMA, TVB-N and Histamine in skipjack tuna stored in ice were reached (Figure 1b).

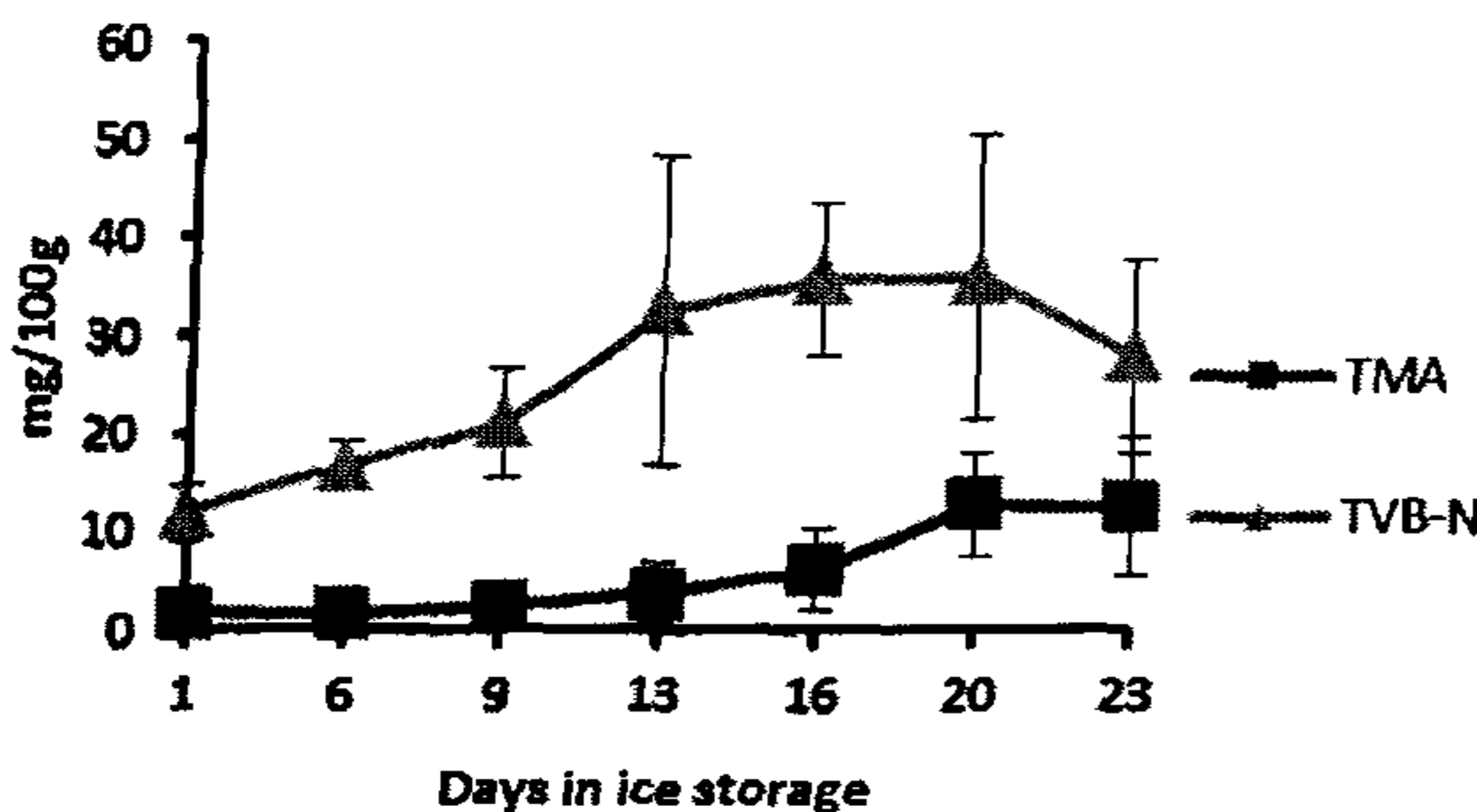


Figure 1 (a)

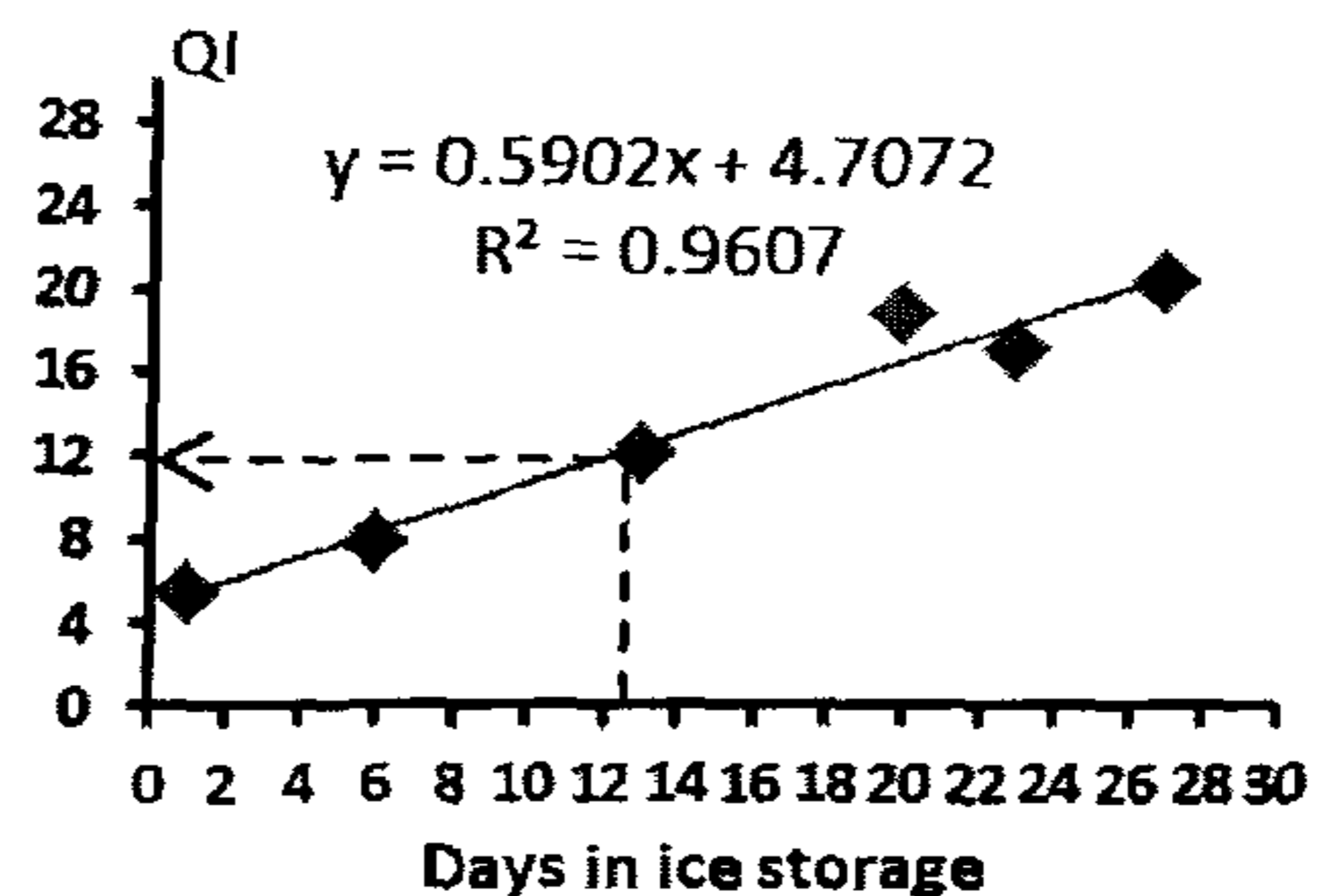


Figure 1 (b)

Figure 1:(a) Trimethylamine and TNB-N productions (mg/100g) of skipjack tuna during storage in ice. (b) Average QI of each storage day analyzed by complete panel, versus days in ice

Table 1: Parameters with days to pass acceptability level

Parameters	Acceptability level	Day to pass the acceptability level
TMA	10-15 mg/100g	18
TVB-N	30-35mg/100g	12
Histamine	5mg/100g	9
TPC	10 <sup>8</sup> CFU/g	9

### Conclusion

The acceptable shelf life for skipjack tuna under ice storage is 12 days of storage. Quality index of skipjack tuna was 12 at the limit of acceptability using biochemical and microbiological parameters.

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