SUMMARY

This work was conducted to study the preservation of two species of fish (Sardine and Silver carp) by smoking for the first and canning for the second. Fresh fish was evaluated as well as, fish products. Nutritional value and physico-chemical properties were determined.

The obtained results were as follows:

A) Sardine fish:

- Nutritional evaluation of smoked-Sardine products:

- Effect of smoking on proximate chemical composition:

* Moisture content of Sardine fish was 72.40% decreased to 56.55%, 56.07% and 55.43% for whole, gutted and dressed smoked-Sardine products, respectively.
* Protein content increased by smoking for all smoked products, the per cent increase was 41.94%, 40.64% and 52.677% for whole, gutted and dressed smoked Sardine, respectively.
* Ether extract increased by smoking for all smoked products.
* Smoking treatment increased the ash content of smoked products.
* GDR for protein increased by smoking while PS/150 g for protein percent decreased in all smoked products.

- Effect of smoking on protein quality of Sardine fish:

* The concentration of all amino acids decreased in the smoked products, the per cent decrease of lysine was 41.88%, 45.19% and 38.46% for whole, gutted and dressed smoked, respectively.
* GDR value is inversely related while PS/150 values are proportionally related to amino acids content.
* The consumption of 150 grams from smoked dressed Sardine was enough to cover 101.19% of the daily requirements for adult man in essential amino acids while the same quantity from smoked-whole and smoked-gutted Sardine covered 92.26% and 83.38% of essential amino acid, respectively.

- ***Physico-chemical evaluation of smoked Sardine fish products:***

1. The total phenols and carbonyls compounds (as mg/100 g) for smoked whole, gutted and dressed Sardine products were (13.00 & 28.62), (16.03 & 32.11) and (16.90 & 32.90), respectively.
2. Smoking decreased pH value from 6.38 in Sardine fish to 5.85, 5.71 and 5.62 in smoked whole, gutted and dressed Sardine products.
3. Smoking decreased W.H.C. as (bond water) % and plasticity as (cm^2/0.3 g sample) or as (cm^2/g T.N.) while W.H.C. increased as (cm^2/0.3 g sample).
4. The per cent decrease of TBA value of smoked Sardine products (in relation to Sardine fish) were 37.82, 59.86 and

73.1% for smoked whole, gutted and dressed Sardine, respectively.

5. The per cent decrease of T.V.N. (mg/100 g) for smoked products (in relation to Sardine fish) were 31.72, 46.92 and 55.07% for smoked whole, gutted and dressed Sardine, respectively.

- Organoleptic evaluation of smoked Sardine products:

- The three smoked products could be arranged descendingly as follows: dressed, gutted then whole fish. Nevertheless, the difference between such products may be negligible based on the overall acceptability score. At the same time the three products ranked "very good".

B) Silver carp fish:

- Canning of Silver carp fish:

1. Nutritional evaluation of canned Silver carp fish:

- Effect of canning on proximate chemical composition:

* Moisture and protein decreased by canning process.

* The fat content and ash in all products increased facing to the raw material which contained 1.97% fat and 1.17% ash.

* Energy value of canned Silver carp fish was higher than flesh fish. It increased from 98.85 to 201.97 kcal./100 g.

* Consumption of 150 grams from canned product provides the adult man with 10.5% and 36.2% of energy and

protein, respectively above 5.1% of energy and 42.3% of protein in fresh fish.

2. Fat quality of fresh Silver carp fish and canned products:
   * The major fatty acids in fresh fish lipids were $C_{18:1}$ (38.51%) and $C_{16:0}$ (26.25%) followed by $C_{16:1}$ (13.31%). While the major fatty acids in all canned samples were $C_{18:1}$ (42.87-51.11%) followed by $C_{18:2}$ (41.24-27.32%) the came $C_{16:0}$ (15.10-9.95%).
   * Total unsaturated fatty acids in fresh fish were 60.54% while in canned products were 81.15-88.32%.
   * Ks and Du values were 1.53 and 0.67 for the fresh Silver carp fish while were (4.25-7.26) and (1.09-1.30) for the canned products, respectively.
   * The canned fish in flavored oil by herbs extracts has a higher unsaturated fatty acids (83.07-88.32% vs. 81.15), Ks (4.90-7.62 vs. 4.25) and Du values (1.14-1.30 vs. 1.09).
   * The best product (higher Ks and Du value) was the canned with flavored oil by peppermint followed by either rosemary or thyme while marjoram came next.

- ***Physico-chemical evaluation of fresh Silver carp fish and canned products:***

1. pH value of Silver carp fish was 5.99 and 6.07 for the canned product using only sunflower oil.
2. Water holding capacity (W.H.C.) as (bound water) % was 82.99% in fresh fish increased by canning to 83.34-85.41% and plasticity from 3.7 as (cm_2/0.3 g sample) in fresh fish to 4.0-4.3 in canned products.

3. The using of flavored oil in canning caused decrease in increasing rate of TBA in canned products after canning.
4. Canning caused a diminution in the contents of TMA-N, on the contrary it led to increase the TVB-N and NH_3-N.

- Organoleptic evaluation of canned Silver carp fish:

- All canned products in flavored oil had very good organoleptic quality properties compared to the canned product oil (good) after canning.

Recommendation

- Production of gutted and dressed smoked Sardine fish on a commercial scale as new products for Egyptian market.
- Production of canned Silver carp fish in jars using a flavored sunflower oil as a media must be encouraged to provide the Egyptian market with a new product.
- Peppermint can be used to produce a high quality properties of flavored oil.