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COMPARATIVE STUDIES OF CERTAIN CANNED
AND FROZEN FOODS WITH RESPECT TO CHEMICAL
AND MICROBIOLOGICAL CHANGES

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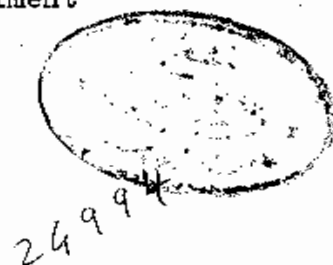
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C O N T E N T S

	Page
INTRODUCTION	1
REVIEW OF LITERATURE	3
MATERIALS AND METHODS	36
1- Materials	36
2- Treatments	36
3- Methods of Analysis	40
a) Chemical analysis	40
b) Microbial analysis	43
RESULTS AND DISCUSSIONS	45
I. Effect of processing steps on the chemical composition of vegetables.	45
a) Effect of Blanching	45
b) Effect of canning	53
c) Effect of freezing	68
d) Effect of storage	76
II. Effect of processing steps on the chemical composition of fruits.	78
a) Effect of preprocessing treatments	78

	Page
b) Effect of canning	84
c) Effect of freezing	89
d) Effect of storage	94
III. Microbial evaluation of canned and frozen vegetables and fruits.	96
SUMMARY AND CONCLUSION	117
REFERENCES	124
ARABIC SUMMARY	-

INTRODUCTION

Food industries play an important role in the national economy of the country, as an important supplier of the foods for its over increasing population. It is also, a valuable source of hard currency through exportation to the near-by Arab and African markets.

The canning and freezing industries are both major sections of the food industries in Egypt. In this respect, there are two major plants; namely El-Nassr Company for preserved foods "Kaha", and Edifina company for preserved foods. On the other hand, the private sector in food preservation is growing rapidly covering most the Egyptian governorates. Thus, the consumption of canned and frozen vegetables and fruits has now grown rapidly and still expected to increase further in the future.

The quality of canned and frozen foods is the reflection of microbiological, enzymatic and chemical activities before, during and after processing. Blanching of vegetables before processing leads to the inactivation of the oxidative as well as other enzyme

activities. Other heating effects include colour changes (conversion of the chlorophyll to pheophytin), reduction of ascorbic acid, ash and minerals content, degradation of carotene and anthocyanin, and reduction of microbial counts.

The aim of this investigation includes:

- (1) The effect of blanching methods (boiling water, water steam, and ammonia steam) on the quality of canned and frozen green beans and peas.
- (2) Comparing the quality of the canned and frozen green beans and peas.
- (3) Effect of processing pretreatments on the quality of canned and frozen apricot and strawberry compotes.
- (4) Comparing the quality of the canned and frozen apricot and strawberry compotes.

- 3 -

REVIEW OF LITERATURE

I. Effect of Canning and Freezing on the Chemical Constituents of Vegetables:

(A) Effect of blanching:

Blanching of vegetables prior to canning or freezing preservation has been recognized as an essential method for enzyme inactivation. The relative merits of steam and water blanching have been widely studied. Steam blanching has been usually found to conserve more soluble nutrients than blanching in water but there is some indication that colour of green vegetables is adversely affected by steam blanching.

The blanching effects on the conversion of chlorophyll to pheophytin and on its oxidation during the blanching treatment and subsequent storage of green beans at -10°C was investigated by Walker, (1964b). Conversion of chlorophyll to pheophytin was observed during blanching without any noticeable oxidation.

Dietrich and Neumann, (1965) mentioned that blanching in water degraded less chlorophyll than steam.

Thus, chlorophyll was more stable in water blanched than in steam blanched brussel sprouts.

Eheart, (1970) announced that the reduction in chlorophyll in microwave blanched spinach was greater than boiling water blanching. Aczel, (1973) found also that blanching of peas reduced the total chlorophyll content by 10-16%.

The use of ammonium bicarbonate improved colour retention during steam blanching of green vegetables as reported by Eheart and Odland (1973).

Von Elbe et al.,(1986)identified pigments in conventional processed beans as pheophytins and pyropheophytins. The green colour of Very-green processed beans was attributed to the formation of zinc complexes due to the formation of the metallochlorophyll complexes, Zn-pheophytin a and Zn-pyropheophytin a.

The effect of blanching methods on total acids, dry matter, ash, minerals, titratable acidity, pH, fiber and ascorbic acid content in broccoli were also studied

by Eheart and Odland, (1973). They mentioned that water blanched samples were significantly lower in nutrients than steam blanching either with or without the addition of ammonium bicarbonate. Ammonia steam blanching improved the retention of the previous components than the two conventional blanching methods.

Marchi, (1974) observed that as pH value was decreased during incubation, the pheophytin formation was increased.

Sistrunk, (1980) found that steam blanched vegetables were higher in ascorbic acid content than water blanched samples. On the other hand, Drake, et al., (1981) noticed that microwave and steam blanched green peas had a similar ascorbic acid concentration and both contained less ascorbic acid than water boiling blanched samples. While, Quenzer and Burns, (1981) showed that microwave blanching was superior in retention of ascorbic acid than steam or boiling water method.

Rao, et al., (1981) determined the kinetic parameters D and Z values for the loss of colour, firmness and vitamin C during the thermal processing of peas.

The D_{250} value for loss of ascorbic acid was 246 min., however, the corresponding Z value was 91°F.

A mathematical model was developed to predict leaching losses of water soluble vitamins during peas blanching (Alzamora, et al., 1985). A parameteric study was then performed for different blanching temperatures and external heat transfer characteristics. Blanching of peas at higher temperature in static water reduced leaching losses.

(B) Effect of canning process:

a- General veiw:

Hiszpamska, et al., (1956) found that the carbohydrates and cellulose contents represent 10 and 2.3% of the total solids of canned peas, respectively.

Pinegiua and Klimenko, (1959) determined the total carbohydrates and monosaccharides for seven varieties of peas and these ranged between 45-64% and 0.10-0.84%, respectively.

Sistrunk and Cain, (1960) showed that texture

of canned beans was affected by the changes which occur during the handling, blanching and retorting operations.

Sweeny and Martin (1960) studied the relationship between the pH of brine solution and chlorophyll stability in canned green peas in which maximum chlorophyll retention was observed at the highest pH value.

Setty and Siddappa (1961) found that starch/protein ratio forms good index for suitability of peas for canning.

Giannone and Porretta (1966) mentioned that during green beans canned in brine solution (1.5%), the pH value decreased from 5.05 to 4.00.

El-Rify, et al., (1975) investigated the changes in moisture content, pH, starch, ash, acidity, dry matter, total sugars and proteins of canned green peas processed at 116°C for 20 min. They noticed a slight increase in moisture content and pH value, and a marked increase in total solids, starch and ash. However, a reversible trend was observed in acidity, dry matter,

total sugars and proteins. During nine months storage at room temperature, there was a gradual increase in acidity, total sugars and total solids, while the other constituents revealed a decreamental trend during storage.

b- Ascorbic acid:

Kopec (1966) showed that the retention of ascorbic acid in stored vegetables varied with storage time, and temperature. However, the presence of ascorbic acid in processed vegetables is considered to be associated with quality due to its relative instability to heat, oxygen and light (Birch, et al., 1974).

Thermal degradation rates of ascorbic acid in peas during a simulated retort operation were investigated at various temperatures by Lathrop and Leung, (1980). The canned peas were processed at 110-132°C for different time intervals. The ascorbic acid degradation was found to be first order reaction with an activation energy of 41 Kcal./mole.

Dequidt, et al., (1981) studied the effect of

canning and subsequent storage for 15 months on the ascorbic acid, and vitamin B group in celery, green beans spinach, peas and brussels sprouts. They noticed a considerable loss in vitamin C content during processing. However, the loss of vitamin C increased with increasing the storage period. The same finding was observed by Lee, et al., (1982).

c- Minerals:

Minerals in food stuff are generally considered quite stable, with losses usually directly related to the extent of leaching in the water used for processing. On the other hand, heat processing affects the loss of minerals in vegetables during the canning operation. The amount of leaching depends on such factors as the nature of the canned materials, packing medium and the length of storage period (Schroeder, 1971).

Thomas, et al., (1974) determined the levels of cobalt, chromium and nickel in a wide variety of fresh and canned vegetables. Statistical analysis indicated that the mean levels of nickel in canned vegetables is significantly higher than those of fresh samples.