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EFFECTS OF IODIZED SALT AND OTHER IODINE
COMPOUNDS ON THE QUALITY OF
PROCESSED VEGETABLES

DISSERTATION

Presented in Partial Fulfillment of the Requirements
for the Degree Doctor of Philosophy in the
Graduate School of The Ohio State
University

By

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ACKNOWLEDGMENT

In recognition of their valuable help during this study the author wishes to express his appreciation and thanks to the following:

Dr. W. A. Gould, Department of Horticulture and Forestry, for his encouragement and advice throughout this investigation.
Dr. H. D. Brown, Department of Horticulture and Forestry, whose advice helped greatly, especially in developing this study.
Drs. F. S. Eowlett and E. H. Weiser for their interest in the study and their constructive criticism of the manuscript.
Cairo University and the Egyptian Government for granting the study leave to carry on this investigation.

The Institute of Nutrition and Food Technology and the Iodine Educational Bureau for providing the research fellowship
The personnel of the Horticultural Products Laboratory of the Horticulture Department for their assistance in preparation and organoleptic evaluation of the samples.

And to my parents whose constant encouragement and advice helped through all the different stages of my education.

TABLE OF CONTENTS

	Page
INTRODUCTION	1
REVIEW OF LITERATURE	4
Coiter	4
Iodized Salt	10
Quality Evaluation	18
Flavor	19
Color	25
EXPERIMENTAL PROCEDURE	31
Processing of Samples	31
Whole Kernel Sweet Corn	31
Preparation of Solutions	32
Sodium Thiosulfate Solutions	32
Potassium Iodide Solutions	33
Tomato Juice	35
Preparation of Solutions	37
Sodium Thiosulfate Solutions	37
Potassium Iodide Solutions	37
Iodine-iodide Mixture	38
Iodophore (Iosan) Solutions	39
Sauerkraut	42
Preparation of Solutions	44
Sodium Thiosulfate Solutions	44
Potassium Iodide Solutions	44
Iodine-iodide Mixture	45
Iosan (iodophore)	46

Table of Contents - Continued

	Page
METHODS	49
Flavor Evaluation	49
Color Determination	51
Subjective Evaluation	51
Objective Evaluation	51
Tomato Juice	51
Sauerkraut	52
Subjective Texture Evaluation	53
Determination of Discoloration and Corrosion of Containers	54
Determination of Titratable Acidity	54
pH Determination	54
Ascorbic Acid Determination	55
Reducing Sugars Determination	55
DATA AND DISCUSSION OF RESULTS	57
Whole Kernel Sweet Corn	57
Flavor Evaluation	57
Color Evaluation	67
Discoloration of the Container	77
pH	80
Reducing Sugars Determinations	83
Tomato Juice	86
Flavor Evaluation	86
Color Evaluation	100
Discoloration of the Container	119
pH and Vacuum	134

Table of Contents - Continued

	Page
Reducing Sugars Determinations	138
Ascorbic Acid Content	142
Canned Sauerkraut	147
Fermentation Process	147
Flavor Evaluation	151
Color Evaluation	165
Texture Evaluation	184
Discoloration of the Containers	198
pH and Vacuum	214
Reducing Sugars Determinations	219
Ascorbic Acid Content	224
GENERAL DISCUSSION	230
SUMMARY AND CONCLUSIONS	244
BIBLIOGRAPHY	248

SUMMARY AND CONCLUSION

Preliminary studies carried out at Michigan State College (3) in 1937, and later studies at The Ohio State University (64, 65) in 1955 enabled the authors, respectively, to recommend the use of iodized salt instead of the ordinary non-iodized one in the processing of some fruits and vegetables, without danger of adversely affecting some quality characteristics of the products. Only iodized salt had been tested by the first group (3). The second group studied the effect of both iodized and iodated salts (64, 65). In the present study an iodide (KI), a stabilizer to affect its stabilization (sodium thiosulfate), an iodine-iodide mixture (Battelle, a preparation containing free iodine), an iodophore (a sanitizer containing both free and organically bound iodine), namely, "Iosan," were investigated. The following findings and conclusions, which might further establish the possible use of these compounds as the source of iodine in the investigated products have been found.

1. The use of (Morton) iodized salt instead of the use of ordinary non-iodized salt did not unfavorably affect the flavor, color, texture, or nutritive value (ascorbic acid content) of the three products investigated; namely, whole kernel sweet corn, tomato juice and sauerkraut.

2. Potassium iodide, at concentrations up to 200 p.p.m., and the use of sodium thiosulfate (pure and commercial) at two concentrations of 50 and 100 p.p.m., did not adversely affect the flavor of the three vegetables investigated.

3. The iodine-iodide mixture (Battelle) at considerably high concentrations (100 p.p.m.) did not affect the flavor of canned sauerkraut, but the application of still higher concentrations (200 p.p.m.) of the same mixture did cause a significant deteriorative effect on the flavor of canned tomato juice.

4. The application of "Iosan" at concentrations up to 200 p.p.m. in tomato juice and up to 100 p.p.m. in sauerkraut did not adversely affect the flavor of either tomato juice or canned sauerkraut.

5. Potassium iodide, iodine-iodide mixture and "Iosan" at varying concentrations (0.5 to 200 p.p.m.) did not adversely affect the color of all the three vegetable products tested.

6. The use of the above mentioned chemicals or mixtures (iodide, thiosulfate, iodine-iodide mixture or Iosan) did not particularly enhance any deterioration in the color of the packed products on prolonged periods of storage.

7. The addition of potassium iodide and sodium thiosulfate (in two concentrations of two types) for its stabilization, the iodine-iodide mixture, the iodophore "Iosan" or iodized salt as compared with the use of ordinary non-iodized salt did not significantly affect either the course of fermentation or the final total lactic acid content in the finished fermented sauerkraut.

8. No free iodine (I_2) could be detected in any of the products treated at the varying concentrations of the different iodine compounds indicating that such form of iodine has combined in one way or the other with other organic compounds in the packed

products. This fact suggests the possible dispensability of iodine-stabilizers, especially when they prove to be of some harmful effect. The effectiveness of such binding compounds needs further investigation depending on finding an easy and sensitive method for the determination of organically bound iodine.

9. The application of the different treatments investigated did not affect the texture of sauerkraut significantly either during processing or during storage.

10. Both pure and commercial sodium thiosulfate did affect significantly the discoloration or corrosion of the inner surfaces of the walls of the cans during different periods of storage.

11. The immediate cause of such discolorative or corrosive effect on the cans was the thiosulfate itself, not the impurities usually accompanying the commercial salt used in the industry for stabilizing potassium iodide in iodized salt.

12. The three tested products (whole kernel sweet corn, tomato juice and sauerkraut) were found to contain reducing sugars (inherent-stabilizer) to affect the stabilization of added iodine compounds (more than the required 0.05 per cent concentration). Thus the use of any other harmful stabilizer (thiosulfate) can be avoided.

13. If the medical safety of such iodine preparations as the iodine-iodide mixture and "Iosan" can be established, their use for fortifying different processed fruits and vegetables with iodine could be recommended. This could be very easily affected by automatically dispensing either one of those two compounds, potassium iodide or even iodized salt, directly in the cans on the processing

line. This could very readily be done especially after the introduction of liquid salt dispensers in the industry. In such a case there would be no need for the addition of any harmful stabilizers as to stabilize the iodide in the processed product, a necessary measure in the stabilization of the iodide in the production and packaging of iodized salt.

14. Iodized salt when applied to the products did not affect their ascorbic acid content as compared with ordinary non-iodized salt.

15. Different iodine compounds (potassium iodide, iodine-iodide mixture and "Iosan") added at varying concentrations did not significantly affect the ascorbic acid content of the products investigated. But when sodium thiosulfate was added to stabilize the iodide, and discoloration or corrosion was induced by its presence, then, a loss of ascorbic acid in the canned products took place. This was due to the catalytic action induced by the liberation of iron ions in the products.