EFFECTIVENESS OF SORBISTAT ON THE STORAGE AND KEEPING QUALITY OF DRIED FISHERY PRODUCTS

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INTRODUCTION

One of the perennial problems that confront our fish processors is the growth of yeasts and molds on dried fish products, which results in the production of low-grade quality commodities. Our storage facilities, our marketing methods and climatic conditions are all conducive to mold growth. With this in view, experiments which would inhibit their growth have been performed in the Microbiological Laboratory of the Bureau of Fisheries.

This investigation aims to look for a way to inhibit or delay the development of yeasts and molds in dried fishery products, which ultimately would improve their keeping quality.

A ready answer to this problem is found in the use of sorbistat, a brand of sorbic acid, an effective, non-toxic and practical fungistatic agent for foods. It is unique among food additives, being a metabolizable food, added for protective purposes to another food.

What is sorbistat? Sorbistat is a brand of sorbic acid. It is an unsaturated fatty acid with six carbon atoms having a formula of CH_3–CH–CH–CH–CH–COOH which is metabolized into carbon dioxide and water when ingested by the body. The penetration of sorbistat solution in fish is superficial, hence, the amino acid content of the fish is not affected by the action of this agent.

Before sorbic acid was used as a fungistatic agent to foods, Deuel, H. J., et al. (1954), Smith, D. P., et al. (1954), and Stephens, M. R., et al. (1952), have demonstrated that it was harmless. Effectiveness of sorbic acid in inhibiting molds has been successfully used in the making of cakes, cheese and in smoked fishery products by Melnick, D., et al. (1956), Boyd,

J. W., et al. (1953), and Geminder, J. J. (1959). The latter states that potassium and sodium sorbate are used because their water solubility is superior to that of sorbic acid and they are approximately equal in antimycotic activity. On the acid surface of the fish, potassium or sodium sorbate is converted into active sorbic acid.

The main reasons of the U. S. Food and Drug Administration for the preferential use of sorbic acid over other fungistatic agents are its effectiveness in extending the shelf-life and the property of retaining natural flavor of treated foods.

Since the climatic condition of the Philippines is very different from that of the United States where the use of sorbic acid is highly acclaimed, experiments have been done in this laboratory to determine the effectivity of sorbistat in lengthening the shelf-life of dried fishery products under local conditions. Two experiments have been conducted; one, utilizing *Sardinella* species, and the other, *Decapterus* species, locally known as sardines and galongong, respectively.

EXPERIMENT I

Materials and Method.—The fish were washed in the round with tap water, soaked in concentrated brine for four hours, drained, and then sun-dried. The dried fish were divided into four batches, one batch was used as control, and the other three were treated with 0.1 per cent, 0.5 percent, and 1.0 per cent, sorbistat solutions, respectively. Each batch was weighed, then dipped for ten minutes in their respective solutions with the concentrations stated above. After this treatment, all the batches were dried to approximately the same as their weight before they were dipped in sorbistat solutions. Half of the samples in each batch was packed in cellophane bags, sealed and stored at room temperature. The other half was exposed to ordinary room temperature.

Discussion and results.—Table 1 shows the results of the experiment with *Sardinella* species. It was noted that the use of 1.0 per cent, solution produced very effective results. Even after five months storage they were negative for mold growth. The use of 0.5 per cent sorbistat was effective up to a limited period. The longevity of storage of the treated samples was increased by the use of cellophane bags. In this investigation, commercially prepared "pure" salt and ordinary solar salt

TABLE 1.—*Showing the average of the experiments of each of the experimental batches including the control group.*

Kind of salt	Concentration of sorbistat solution	Condition of storage	Initial No. of days	Molding	Final No. of days	Molding
				Per cent		*Per cent*
Pure	Control *Per cent*	Exposed	17	11	31	92
		Sealed	35	10	55	25
	0.1	Exposed	19	11	33	88
		Sealed	92	25	104	44
	0.5	Exposed	28	11	48	55
		Sealed	(a)	(a)	(a)	
	1.0	Exposed	81	2.6	94	5.2
		Sealed	(a) *	(a)	(a)	100
Impure	Control *Per cent*	Exposed	17	52.75	26	
		Sealed	30	12.50	48	42
	0.1	Exposed	20	52.60	28	100
		Sealed	89	4	104	44
	0.5	Exposed	86	8	99	50
		Sealed	(a)	(a)	(a)	
	1.0	Exposed	90	3.3	104	6.6
		Sealed	(a)	(a)	(a)	

[2] (a) Means negative.

impure salt all the sealed samples treated with 0.5 per cent and 1.0 per cent sorbistat did not develop any mold growth up to the end of the experimental period, but in the exposed samples the concentration of 1.0 per cent sorbistat solution was more effective in arresting mold growth as shown in Table 1. The use of pure and impure salt did not show any significant difference in their effect on resisting mold growth. However, the use of pure salt is preferrable from the standpoint of yielding a better quality product.

Observation of results was stopped after five months. Usually dried fish in the local markets are disposed long before 5-month period is reached. The initial period was taken when the molds began to develop and the final period was determined when molds ceased to develop.

The molds identified in the investigation were *penicillium glaucum, Aspergillus glaucus,* and *Rhizopus nigricans.*

EXPERIMENT 2

Materials and method.—The fish were split, all internal organs removed and washed with tap water. The cleaned split fish were soaked in concentrated brine (23°Be) for 12 hours. The fish were divided into two batches. They were then taken from the brine solution and subjected to the refreshing meth-

or washing which consists of soaking the fish in tap water, the volume of which is equivalent to twice the weight of the fish. The refreshing method washes away the impurities of the solar salt used and decreases the degree of saltiness. In the control batch, no sorbistat was added to the refreshing water whereas in the other batch, a concentration of 0.5 per cent sorbistat was added. The length of washing in both batches was one hour. They were then drained thoroughly and dried under the sun. Half of the treated and untreated samples was sealed in cellophane bags. The rest were exposed. All the samples were stored at room temperature.

Results and discussion.—Table 2 shows the result of the experiment with *Decapterus* species.

TABLE 2.—*Showing result of experiment with Decapterus species.*

Control			With 0.5 per cent sorbistat solution		
No. of days	Condition of storage	Remarks	No. of days	Condition of storage	Remarks
16	Exposed ---	Samples became too dry, no chance for mold to develop.	16	Exposed ---	Samples became too dry, no chance for mold to develop.
16	Sealed -----	Negative	16	Sealed -----	Negative
25	Exposed ---	Samples discarded	25	Exposed ---	Samples discarded
25	Sealed -----	100 per cent moldy	25	Sealed -----	Negative
128	Exposed ---	Sample discarded	128	Exposed ---	Samples discarded
128	Sealed -----	100 per cent moldy	128	Sealed -----	Negative
12 mos	Exposed ---	Sample discarded	12 mos	Exposed ---	Samples discarded
12 mos	Sealed -----	100 per cent moldy	12 mos	Sealed -----	Negative

After 16 days of storage, all exposed samples with or without sorbistat became too dry to give a chance for molds to develop. The high degree of dehydration may be attributed to the hot weather at that time of the year. These samples were discarded. All the sealed samples with or without sorbistat retained their original dryness, and developed a reddish color. No molds developed.

After 25 days, all sealed samples without sorbistat were moldy. Sample refreshed in 0.5 per cent sorbistat solution for one hour did not develop any mold.

After 128 days the sealed samples with sorbistat became too dehydrated and did not develop any mold growth. They were considered unfit for human consumption.

To further determine the extent of effectivity of sorbistat as a fungistatic agent in this experiment, the sealed samples which developed molds after 25 days and those which did not [illegible] and stored at ordinary room

conditions. After a period of about eleven months, another visual examination was made. Those samples dipped in 0.5 per cent sorbistat solution did not develop any mold growth in spite of their close contact with the contaminants.

SUMMARY

Sorbistat, which is a brand of sorbic acid, was capable of preventing the growth of yeasts and molds among the common dried fishery products, such as the *Sardinella* and *Decapterus* species.

A concentration of 1.0 per cent solution used as a dip for 10 minutes prevented the growth of molds on dried fish in the round for more than five months. The effectivity was further increased when the treated fish were sealed in cellophane bags.

On the other hand, split fish, which were brined overnight and washed or refreshed in water mixed with 0.5 per cent solution for one hour before they were sun-dried, did not develop molds for about a period of one year.

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