OCCURRENCE OF ESCHERICHIA COLI AND OTHER COLIFORM BACTERIA IN UNSHELLED NUT MEATS

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INTRODUCTION -

Members of the coliform group of bacteria, particularly Escherichia coli, have been used for indicators of fecal pollution of water, milk, and a variety of other foods including nut meats, for a good many years. Furthermore, the Food & Drug Administration has condemned a variety of nut meats solely on the basis of the fact that they contain detectable numbers of E. coli. During the past five years, an opportunity presented itself to make a survey concerning the presence of E. coli and other coliform bacteria in unshelled almonds, finished almond products and the equipment used in their processing. Observations also were extended to include samples of inshell English walnuts. The results of this survey are described in the following pages.

METHODS -

The detection of coliform bacteria followed the method in "Recommended Methods for the Microbiological Examination of Foods" (American Public Health Association, 1958, pp. 132-138).

The meats from unshelled almonds and English walnuts were removed from the shell aseptically and transferred directly to tubes of lactose and borate lactose broth. These tubes of lactose broth then were incubated at 30° C, whereas the borate lactose broth was incubated at 42.5 - 43.5° according to the procedure of Vaughn, Levine and Smith (1951). After four days' incubation, the inoculated tubes were examined to determine whether gas had been produced in the Durham tubes. All tubes showing gas production then were streaked on Levine's eosine methylene blue agar. Colonies representative of the bacterial population able to grow on the EMB agar were then picked and purified in the usual manner. After purification, the individual colonies were identified following the methods of Levine, Epstein and Vaughn (1934), Vaughn, Mitchell and Levine (1939), and Vaughn and Levine (1942). Genus and species allocations

follow directly the pattern described in Bergy's Manual of determinative bacteriology. It is to be emphasized that in this study no attempt was made to determine the quantity of coliform bacteria present in any sample.

RESULTS -

A total of 89 samples of shelled almond products and processing equipment swabs were tested. Twenty-six samples gave positive coliform tests. Six of these contained E. coli.

A total of 21 samples representing seven varieties of unshelled almonds were investigated. Of these, seven gave a positive test for coliform bacteria, four of which were confirmed as containing E. coli. Since approximately 25% of carefully shelled, whole almonds contained E. coli, the sanitary significance test for this organism for almonds or almond products was seriously doubted. Therefore, during the following seasons, a qualitative search for E. coli in unshelled almonds was further pursued. In 1960 and again in 1961 the results were similar to those found the first year. Observations at this time also were extended to include samples of inshell English walnuts using the same procedures as described above. A total of 16 samples representing the four major varieties of walnuts were examined. Surprisingly enough, approximately 25% of the carefully shelled walnuts also contained E. coli. In 1961 and 1962 in the off-seasons, that is June through August, 15 retail samples of commercial varieties of unshelled almonds were examined. In no case were coliform bacteria, specifically Escherichia coli, recovered. This raises two questions - what is the effect of storage on the viability of coliform bacteria and E. coli in unshelled almonds and what is the effect of terminal fumigation on the viability of these organisms for it is to be emphasized that in the cases where E. coli and other coliform bacteria were found to be present, the samples of almonds and walnuts had been gathered and examined during the harvest and processing season prior to the Holidays starting with Thanksgiving. It is our opinion, therefore, that without further careful study, the sanitary significance of E. coli in almonds or walnuts has to be considered a moot question.

CONCLUSION -

Although for many years regulatory agencies have used E. coli as an index of sanitation of whole nuts and nut products, because we found approximately 25% of carefully shelled whole almonds and walnuts contained E. coli, we seriously doubt the sanitary significance of positive tests for this organism in nuts and nut products if the presence of E. coli per se is the sole basis for judgment.

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