ZAPATERA SPOILAGE OF OLIVES*

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Zapatera, the name given to one type of spoilage, is a Spanish word meaning, "shoemaker's wife," but the literal translation of the word is "stinkfoot." Its only means of detection is by the offensive odor produced.

In an attempt to discover the cause of Zapatera spoilage a study of types of organisms found in normal and spoiled olive brine was conducted. Microscopic examinations were made of all samples, which revealed the presence of yeasts, associated with rods and cocci. The first observation was on the number of organisms in the brine. Plate counts were made on various agars in order to isolate as many different types of organisms as possible. In all tests the spoiled samples had higher counts than those considered normal.

During the investigation determinations of pH were made electrometrically. All spoiled samples with the exception of three had a pH of 4.0 or above. Normal samples were below this figure. Exposing spoiled samples to air increased the spoilage. A rapid increase in pH also occurred, and the samples became darkened. Normal samples when exposed to the air increased somewhat in pH, but showed no darkening. These results indicate that exclusion of air, and control of pH are important factors in the prevention of the spoilage.

Smyth reported a group of spore forming, aerobic, proteolytic organisms as the cause of Zapatera spoilage. Heat tests were conducted on all samples. Organisms developed from spoiled samples which had approached a pH of 7.0 or higher. Since Zapatera begins at a pH of about 4.2 to 4.3 the possibility of spore forming organisms in the solution is very remote. Vaughn later reported that non spore forming organisms caused Zapatera spoilage.

Some of the organisms isolated from the samples were inoculated into normal samples, but the spoilage was not reproduced.

Tracy and other workers reported a spoilage of olives due to organisms of the genera *Escherichia* and *Aerobacter*. This spoilage can easily be detected by the presence of gas in the samples. No gas was noticed in Zapatera spoilage, however, all samples were inoculated into lactose fermentation tubes, and observed for gas production. Gas was produced in only one sample. It has been exposed to the air for six months, and has a pH above 8.0. Therefore it may have been easily contaminated with gas producing organisms.

A "butyric" spoilage in olives caused by the butyric acid anaerobes has been described by Vaughn. A study of anaerobes that were isolated from the brine is being conducted. As yet they have not been definitely classified. There is a possibility that they are *Lactobacilli*. These organisms play an important role in the normal fermentation of olives. Therefore their presence is essential for a good, vigorous fermentation. Tests of abnormal fermentation of olives were made, by the addition of spoiled olive brine to good olives in a salt, sugar solution with the absence of lactic acid. The flora for two and one half months has consisted of large cigar shaped yeast cells, filamentous rod forms, large and short rods, and some cocci.

An attempt is being made to classify the bacteria and yeasts isolated from samples of Zapatera spoilages.

In conclusion it can be said that the exclusion of air and control of pH would probably aid the manufacturer greatly in reducing Zapatera spoilage in olives. Incidentally this type of spoilage is chiefly a concern and loss to the manufacturer for the consumer seldom finds it in packed olives. Packers would not dare risk their business by selling olives which had this spoilage because of the offensive odor.

More work can and should be done on this type of spoilage.

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