

The Use of Ultraviolet ("Black") Light for Determining Quality in Iced Shrimp¹

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One of the most urgent needs in the shrimp industry is for a rapid and accurate method of testing the quality of iced shrimp. This method must be free from the errors of personal opinion. The industry suffers through the inability of buyers to recognize spoiling shrimp with sufficient accuracy. Lacking objective tests of quality, penalties in the form of lower prices cannot be imposed for poorly handled catches. On the other hand, bonuses cannot be offered careful fishermen or other workers for high quality raw material.

This problem has been studied by scientists of The Marine Laboratory of the University of Miami, as part of the Laboratory's research program for the Florida State Board of Conservation, and for the Quality Control and Research Committee of the Shrimp Association of the Americas.

Work in this laboratory, as well as that reported by others, has indicated that results of standard chemical tests cannot be used to show deterioration in quality of stored shrimp. Thus results of tests for indole, skatole, amino nitrogen, total nitrogen, glycogen, total fat and pH varied independently of simultaneous quality scored by the taste panel.

It was therefore determined to study changes in the fluorescence induced by ultraviolet ("black") light in iced shrimp. It was first observed that the chitinous exoskeleton or shell of the shrimp was intensely fluorescent. This fluorescence is brilliant white and effectively conceals any changes occurring in underlying tissues. It was observed that peeled newly caught shrimp exhibited a purple-blue fluorescence. In shrimp stored for varying periods of time in ice a progressive change in fluorescence was observed. The purple-blue of the fresh shrimp is gradually replaced by an off-white fluorescence which increases in amount with increased time of storage. The white fluorescence appears first at the anterior, or headed, end of the shrimp. This color also appears at breaks in the shell or at the bases of the appendages. It is usually more evident on the ventral (under side) than on the dorsal side.

The ultraviolet light source used in these experiments was one in which considerable visible light was also emitted. Peak transmission was at 2570 angstroms.

Any shrimp, when peeled and exposed to ultraviolet light in the neighborhood of 2570 angstroms, which shows brilliant white fluorescence of the tissue at the headed end, or elsewhere, may be graded as spoiled or rapidly spoiling. A faint white fluorescence in the headed region indicates the first onset of spoilage. In our experience this has generally occurred in from six to ten days when the shrimp have been held in "Rickey" type ice.

It is anticipated that buyers may use this method, using the ultraviolet light to test samples of shrimp taken from catches at the dock, or from shipments of iced shrimp delivered to processing plants.

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