Pickle spoilage bacteria may help environment

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Spoilage bacteria that can cause red coloration of pickles' skin during fermentation may actually help clean up dyes in textile industry wastewater, according to a U.S. Department of Agriculture (USDA) study.

Some species of Lactobacilli-food-related microorganisms-can cause red coloring when combined with tartrazine, a yellow food-coloring agent used in the manufacture of dill pickles. Now Agricultural Research Service (ARS) microbiologist Ilenys Pérez-Díaz and her colleagues have found that these spoilage Lactobacilli also may have environmental benefits. ARS is USDA's principal intramural scientific research agency.

The scientists from the ARS Food Science Research Unit in Raleigh, N.C., noted that several Lactobacilli modify azo dyes, which are used in the textile industry and may wind up in wastewater if untreated. These azo dyes impart vivid and warm colors such as red, orange and yellow to fabric. Though many azo dyes are nontoxic, some have been found to be mutagenic.

This is the first report that food-related microorganisms can transform azo dyes into non-mutagenic substances. The findings from this work have been reported in the *Journal of Applied Microbiology*.

According to Pérez-Díaz, considerable effort has been made to identify microorganisms capable of degrading azo dyes in wastewater. If food-grade Lactobacilli capable of degrading a range of azo dyes were

identified, they might become organisms of choice for wastewater treatment applications.

This discovery was made during Pérez-Díaz's search for the culprit responsible for causing some commercial dill pickles to have red spoilage bacteria. Pérez-Díaz and her colleagues isolated Lactobacilli from spoiled jars of hamburger dill pickles and used those isolates to inoculate non-spoiled jars of hamburger dill pickles. Jars that contained brines with tartrazine developed the red hue on the pickle skins; those that had turmeric or no added coloring did not.

Seven treatments were tested to find a preventive measure for red-colored spoilage. Pérez-Díaz found that adding sodium benzoate prevented bacterial growth and the development of red-colored spoilage in hamburger pickles.

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