

## **Prevalence of multi-antibiotic resistant bacteria on Conventional-produced and Organic-produced Apples in the United States**

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**Introduction:** The overuse of antibiotics has been a public health issue for several decades. A consequence of overuse of antibiotics in human medicine and in food production (animal and crop) is selection of antibiotic resistant bacteria. Antibiotic resistant bacteria have been isolated from agriculture waters and soil. Antibiotics are not permissible for use in organic food production practices. Regardless, antibiotic resistant bacteria may be associated with organic fruits and vegetables the result of application of water or growth in soil harboring antibiotic resistant bacteria or during handling throughout the distribution chain.

**Purpose:** The objective of this study was to determine prevalence of antibiotic-resistant bacteria on conventional and organically grown apples and determine antibiograms for a selected number of recovered bacterial isolates.

**Method:** Nine apples (organic or conventional) grown in the U.S. were used for each experiment. Aerobic Plate Count (APC) was used to determine total bacterial populations. Samples were also plated on agar containing 200 ug/ml streptomycin, 50 ug/ml oxytetracycline, 100ug/ml ampicillin, or 100ug/ml nalidixic acid to determine presence of bacteria resistant to select antibiotics. The disk diffusion method was used to screen 72 isolates obtained from APC plates for multi-antibiotic resistance. A select number of isolates were screened using the minimum inhibitory concentration (MIC) assay. Isolates will be Gram stained and then the API strip and Enterotube used for identification of Gram-positive and Gram-negative bacteria, respectively.

**Results:** On conventional-produced apples, 3.7, 4.4, 3.9, and 3.7 log CFU bacteria/apple were resistant to ampicillin, streptomycin, oxytetracycline, and nalidixic acid, respectively. The APC was 6.5 log CFU bacteria/apple. On organic-produced apples, 5.4, 5.2, 4.8, and 5.5 log CFU/apple were resistant to ampicillin, streptomycin, oxytetracycline, and nalidixic acid, respectively. The APC was 7.4 log CFU/apple. It was expected phytopathogens including *Erwinia amylovor* (cause of fire blight), *Pseudomonas syringae*, *Agrobacterium tumefaciens*, *Agrobacterium Rhizogenes* may be present and resistant to screened antibiotics.

**Significance:** This research suggests organic-produced apples harbor antibiotic-resistant bacterial and that APC and populations of antibiotic resistant bacteria are similar on conventional and organic grown apples.