

A Comparison of the Total Native Microbiota and Lactic Acid Bacteria on Field Grown versus Controlled Environmental Agriculture Grown Leafy Greens

Elizabeth Sargent, Alhan Mehrabi Yazdi, Sadhana Ravishankar

Presenting author: Alhan Mehrabi Yazdi

University of Arizona, Tucson, AZ

The plant native microbiota could vary with the environment, and lactic acid bacteria (LAB) are known for their potential human health benefits. Controlled Environmental Agriculture (CEA) is gaining popularity over traditional agriculture, offering year-round crop growth and increased accessibility to fresh produce. It is unknown if CEA-grown produce will host similar normal microbiota as well as beneficial microbes including LAB, compared to field-grown produce. The objective of this study was to evaluate and compare total microbial and LAB populations on different types of leafy greens grown in the field as well as CEA. Samples were taken from the field-grown leafy greens; chard, romaine hearts, spinach, arugula, and chopped romaine and CEA-grown leafy greens; chard, romaine hearts, frisee lettuce, red leaf lettuce, and green leaf lettuce. We determined the total microbial and LAB populations on/in the leafy greens using serial dilutions and spread plating on tryptic soy agar and MRS agar. Differences in native microbiota populations were observed between field-grown and CEA-grown leafy greens. Field-grown leafy greens had significantly higher total microbial populations ($P < 0.05$) than CEA-grown leafy greens. While LAB populations across both types did not significantly differ ($P > 0.05$), CEA-grown leafy greens exhibited a higher overall percentage of LAB populations. A paired comparison between field-grown and CEA-grown chard and romaine hearts (common in both agricultural conditions) showed that field-grown chard and romaine hearts had significantly higher total microbial population ($P < 0.05$) than the CEA-grown ones. The CEA-grown chard and romaine hearts had significantly higher LAB populations ($P < 0.05$) than the field-grown ones. These results showing CEA-grown leafy greens having significantly lower ($P < 0.05$) total microbial population than the field-grown, from a food safety standpoint, could mean reduced risk of exposure to foodborne pathogens. The results also show that CEA-grown leafy greens could be a good source of probiotics in comparison to field-grown leafy greens.