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Low concentration of chlorine dioxide gas reduced invert sugars and raffinose accumulation in postharvest sugarbeet roots.

Sugarbeet roots are susceptible to postharvest storage diseases in storage piles. During infection, postharvest pathogens metabolize sucrose into invert sugars (i.e., glucose and fructose), raffinose, and other carbohydrate impurities which interfere with the sugar refinery process. Chlorine dioxide gas (ClO_2) is an effective antimicrobial agent commonly used to disinfect surfaces in some industrial and agricultural applications. In this study, we hypothesized that low concentrations of ClO_2 gas would improve the postharvest storage quality of sugarbeet roots and limit the formation of invert sugars and raffinose in treated roots. Sugarbeet roots were stored for 7 weeks at 5°C and treated with dry granules of sodium chlorite compound with an acid activator sachet (ICA TriNova; Marietta, GA) aiming to generate approximately at 0, 25, 50, 75, and 100 mg of ClO_2 per kilogram of sugarbeet roots. Treatment had no significant effect on sucrose content (P > 0.05). But invert sugars decreased significantly (P < 0.05), when the roots were treated with ClO_2 media when compared to the controls across all levels of ClO_2. Raffinose accumulation was also numerically reduced in the sugarbeet roots across all levels of ClO_2, however significant (P < 0.05) reductions occurred in roots treated with 75 and 100 mg of ClO_2 kg^{-1} root. The experiment was repeated in 2024 with slightly aged roots and carbohydrate analysis is underway. Sugarbeet roots treated with all levels of ClO_2 had no visible signs of storage disease in both years. Our data suggest that use of ClO_2 might be a viable option to minimize storage disease and improve storage quality of sugarbeet roots.