Juice clarification by protease and pectinase treatments indicates new roles of pectin and protein in cherry juice turbidity

Industrial juice clarification is accomplished by a combination of enzymatic depectinization, gelatin–silica sol, and/or bentonite treatment. The gelatin–silica sol treatment step is particularly slow, mischievous, and requires comprehensive downstream processing to obtain clarified juice. In this work, alternative, enzymatic clarification strategies of industrially pressed cherry juice were evaluated in a 24–1 factorial design set-up with addition of a pectinase, Pectinex Smash®, a protease, Enzeco, both enzyme preparations derived from Aspergillus spp., gallic acid, and tannic acid as factors, and determination of turbidity, protein, pectin, and phenolics as responses. The effects of the alternative clarification treatments were assessed immediately after the particular clarification treatment (immediate turbidity) and during 14 days of cold storage (turbidity development). The protease treatment resulted in significant reduction of immediate turbidity, but had low clarification impact during the subsequent cold storage. In contrast, pectinase addition exerted a weak effect on immediate turbidity reduction, but effectively decreased the turbidity development during storage. The phenolic acid additions contributed to reduce turbidity when added together with the pectinase or the protease. However, when gallic acid and tannic acid were added together they induced enhanced turbidity formation. Conventionally, immediate turbidity is presumed to be caused by pectin, while turbidity development during cold storage (haze formation) is assumed to be due to protein–phenol interactions. Our results suggest that proteins play a decisive role in the formation of immediate turbidity in cherry juice, and point to that pectin may contribute to turbidity development during cold storage of cherry juice. The data may thus pave the way for development of improved, alternative procedures for cherry juice clarification.