QUALITY CHANGES IN PEANUTS SHIPPED BY RAIL UNDER CO_2

K. HOLD[1] and D. M. WILSON[2]
[1]*Procter and Gamble Company, Lexington, KY, U.S.A.*
[2]*University of Georgia, Coastal Plain Station, Tifton, GA, U.S.A.*

Forty eight loads of peanuts were shipped by rail from May 15 through October 5, 1991, from southern Alabama to Lexington, Kentucky. Forty one of the loads were fumigated with CO_2 in bulk peanut cars and seven companion loads were treated with PH_3 prior to shipment. Rapid CO_2 filling stations were engineered to fill the rail cars to a concentration of 55-80% CO_2 (approximately 410 kg of CO_2 per car) before sealing and shipment. The rail cars were not completely air tight and only from 5-50% of the CO_2 remained after 8-14 days. The maximum CO_2 concentration in the ambient atmosphere around the cars was below 0.5% during filling and no elevated CO_2 was detected during unloading. There was complete insect control in all but two of the cars treated with CO_2 and these had to be refumigated with PH_3 in Lexington. Neither the water activity (moisture content) nor the microflora of the peanuts shipped under CO_2 was different from that found with the PH_3 fumigation. The conclusions of this study are that bulk rail cars can be successfully fumigated with CO_2, that CO_2 fumigation will result in the death of insect adults and larvae during shipment if the CO_2 does not escape too rapidly, and that CO_2 fumigation does not impact peanut flavor, structure, water activity or microflora during shipment. The effectiveness of CO_2 fumigation, however, depends on the retention of CO_2 for several days. Additional shipments are planned by Procter and Gamble and other companies.