The objective of this research was to tailor native tapioca starch by substitution reaction with propylene oxide and then by cross-linking reaction with sodium trimetaphosphate, for use as a thickening agent in low acid canned food. Tapioca starch (40% by dry starch basis, dsb.) was first modified with substitution reaction at pH 11.00±0.10. It was found that temperature (40°,50°C), amount of sodium carbonate (0.25,2.70, %dsb.) and the interaction had significantly effect ($p \leq 0.05$) on hydroxypropyl content of the modified starch. At 50°C amount of sodium carbonate had not significantly effect ($p \geq 0.05$) on average hydroxypropyl content. When starch was substituted at 50°C, with 0.25% Na_2CO_3, it found that amount of propylene oxide (5,7.5,10, %dsb.), reaction time (6,12,24 hrs.) and the interaction significantly increased ($p \leq 0.05$) hydroxypropyl content of the substituted starch. The hydroxypropyl starches had lower pasting temperatures and higher viscosity in heating-cooling cycle than native tapioca starch. Swelling power at 65°and 75°C were increased but decreased at 85°and 85°C. The substituted starches showed good paste stability when storage at 5°-7°C.

Two hydroxypropyl starches (D.S. 0.047,0.075), which showed high paste stability when storage at low temperature were chosen to modify with cross-linking reaction. It was found that phosphate content in the modified starch depended on D.S. and reaction time (1,1.5,2,3,4 hrs.). The hydroxypropyl cross-linked starches had higher pasting temperature and were more resistance to heat and shear force than the uncross-linked starch. Hydroxypropyl cross-linked starches which had low hot paste viscosity and high cold paste viscosity, native tapioca and corn starch were selected as thickening agents in a simulated low acid canned food. The result showed that native tapioca starch and hydroxypropyl cross-linked (D.S.0.047 starch cross-linked 3 hrs.) had more rapid heat penetration than the others. The products which used hydroxypropyl cross-linked starch showed less viscosity change during storage at room temperature for 1 year than those using tapioca and corn starch.