Emulsions of degummed soybean (Glycine max L.) oil were compared to a petroleum oil emulsion for efficacy against winter populations of San Jose scale [Quadraspisidiotus perniciosus (Comstock); Homoptera: Diaspididae] and European red mite [Panonychus ulmi (Xoch); Acari: Tetranychidae] on dormant apple (Malus domestica Borkh,) trees and terrapin scale [Mesolecanium nigrofasciatum (Pergande); Homoptera: Coccidae] on dormant peach [Prunus persica (L.) Batsch.] trees. In laboratory tests, more than 94% of San Jose scale was killed on stems dipped for 1 second in 5.0% or 7.5% soybean oil or 5.0% petroleum oil. Mortality of terrapin scale exceeded 93% on peach stems dipped for 1 second in 7.5% soybean oil or 5.0% petroleum oil. No European red mite eggs survived on apple stems dipped for 1 second in 2.5%, 5.0%, or 7.5% soybean oil, or 5.0% petroleum oil. In field tests, >95% of San Jose scale died on apple trees sprayed with one application of 2.5% petroleum oil or 5.0% soybean oil; two applications of these treatments or 2.5% soybean oil killed all San Jose scales. One or two applications of 2.5% petroleum oil or 5.0% soybean oil killed 85% and 98%, respectively, of the terrapin scales on peach trees. Soybean oil shows promise as a substitute for petroleum oil for winter control of three very destructive fruit tree pests.