A time-dependent model of fire impact on fruits

G.N. MERCER[1], A.M. GILL[2] AND R.O. WEBER[1]

[1] Mathematics Department, University College, University of NSW, Australian Defence Force Acadamy, Canberra, 2601 ACT, Australia.

[2] CSIRO Division of Plant Industry, GPO Box 1600, Canberra, ACT 2601 Australia.

Abstract

Many plants rely on the seed in woody fruits for their post-fire regeneration. Therefore, seed survival during fire is critical. A model for the survival of seeds in woody fruits is constructed using heat-flow equations with time-dependent temperature inputs. The model is used to predict the survival of seed in fruits exposed to both laboratory heating and field fires as reported in the literature. The inclusion of thermal arrest in the inputs to the model gives the upper bounds for estimated times of seed survival. The model gives reasonable predictions of seed fate. It is shown that

seed location in the fruit is not a critical factor provided the seed is within the central core of the fruit. The applicability of the model is also demonstrated using time-temperature curves at two heights from experimental fires burning in different fuel types.