Modelling *Tradescantia fluminensis* and the effect of biological control agents

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Summary *Tradescantia fluminensis* Vell. (Commelinaceae) is a concerning invasive weed within Australasia. Our aim is to use branching process models to examine the interactions and population dynamics of *T. fluminensis* and different types of biological control agent. We will utilise the model to explore possible management strategies.

Keywords *Tradescantia fluminensis*, branching process, biological control.

INTRODUCTION

Tradescantia fluminensis is detrimental in large dense patches, it is devastating to native forest re-growth and difficult to remove (Standish *et al.* 2001). It not only changes the macroscopic interaction profile of any invaded forest, but it even affects the rate of decomposition on the forest floor (Standish *et al.* 2004). The sheer weight of the information published has established *T. fluminensis* as invasive.

The extent of the invasion is such that one biological control agent, *Neolema ogloblini*, has been approved for release and several others have been identified. The approved agent is stuck in the quarantine process. This raises the question, should we wait for this agent to clear or should we investigate clearing other agents? In order to make an informed decision we would like to compare the relative merit of all potential agents.

MATERIALS AND METHODS

We are modelling the growth and population dynamics of *T. fluminensis* using branching processes. The time of an event is chosen randomly. The kind of event is chosen randomly from a list of possible events; in this case growth, death from the back of the plant, branching (at the tips or further back on the plant), or death at the tips of the plant. Branching processes are usually used in disease epidemic modelling.

RESULTS

In order to determine solutions from our model we closely examine the parameters of our model. It is important to know what states are achievable within constraints of the system and the biological parameters possible.

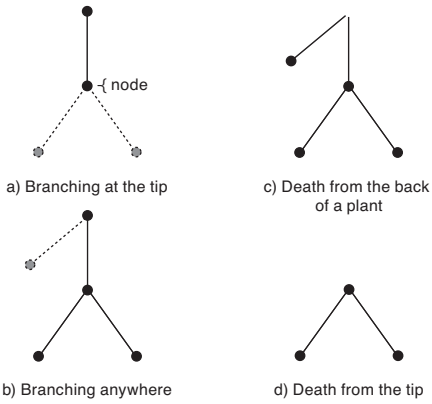

Figure 1. A schematic of a branching process for an individual *T. fluminensis* over time.

DISCUSSION

Once solutions have been found we can compare that to the states made possible by the biological control agents. With the base model established we aim to model the biological control agents' population dynamics and analyse them with relation to those of *T. fluminensis*. The first step in choosing a biological control agent will be finding which produce the least growth in *T. fluminensis*.

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