

A SIMPLE MATHEMATICAL MODEL TO INVESTIGATE SHOOT:ROOT
PARTITIONING IN RESPONSE TO LIGHT AND NITROGEN

S.I.Cameron¹

¹Natural Resources Canada, Canadian Forest Service–Atlantic Forestry Centre,
1350 Regent St. South, Fredericton NB E3B 5P7, Canada

A simple mathematical model has been developed to describe growth and partitioning in conifer seedlings in response to nitrogen fertility, daily light and ambient or elevated carbon dioxide levels. In order to do so, the activities of two PGR's – a cytokinin and an auxin – produced by the root and shoot, respectively, are invoked to control protein synthesis, carbohydrate transport and the formation of cellulose structure (the majority of the plant dry matter). The model equations are presented as phenomenological rather than mechanistic process descriptions. The model plant has only seven compartments or pools, and it is a goal-seeking model. As a growth resource (e.g., light, nitrogen) becomes more limiting, the proportioning of the new mass in the growing plant shifts to accumulate shoot or root mass in order to “acquire” more of the limiting resource. In this way partitioning is accomplished in response to environmental cues. Selected examples of model behavior will be presented.