Natural Resources and Environmental Issues

Volume 7 *University Education in Natural Resources*

Article 77

1998

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Recommended Citation

Wilson, E. R.; McIver, H. W.; and Malcolm, D. C. (1998) "Teaching forest stand dynamics or what happens when you thin your Marigold plantation," *Natural Resources and Environmental Issues*: Vol. 7 , Article 77.
Available at: https://digitalcommons.usu.edu/nrei/vol7/iss1/77

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TEACHING FOREST STAND DYNAMICS OR WHAT HAPPENS WHEN YOU THIN YOUR MARIGOLD PLANTATION

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ABSTRACT: Teaching forestry students about forest stand dynamics can be an abstract activity. Very quickly concepts are reduced to mathematical formulae, graphs and diagrams, all with relatively complicated explanations. Alternatively, computer simulation and individual tree models can be used to demonstrate important concepts such as the '3/2 Power law' of self thinning. Students can also be taken to visit plantations to talk about practical issues of density management and perhaps produce a thinning prescription. However, no single teaching strategy enables students to have 'hands on' practice at manipulating a real plant population while being able to wait and see the results of their work.

Density-mortality relationships were largely developed from research on agricultural crops, where growth and development proceeds at a quicker pace than in forestry. In theory, the application of different spacings and/or thinning regimes should follow similar density-mortality relationships regardless if the crops is pine or wheat. In this paper we outline an exercise that has been used successfully at the School of Forestry, University of Edinburgh and the Faculty of Forestry, University of Toronto to demonstrate principles of stand dynamics with the aid of young plants of marigold (Tagetes patula L.).

Seed is sown in seed trays in plots of 6 x 15 rows at 2.5 cm spacing. After a month of growth, when the leaves of plants are just beginning to overlap, the trays are brought into the class and a range of treatments is applied. These include a control (no thin), thinning from above, thinning from below, removal of one row in three, and removal of 2 rows in 6. Density in all cases is reduced by one third, but the pattern of removal means that different dynamic processes should ensue. The plants are left to grow for another month, after which the plots are harvested and plants are individually oven dried and weighed. Students are then encouraged to plot graphs of plant-size distributions and mortality and write a report explaining the differences between the various treatments. Ambitious students may want to pursue more complicated statistical analyses.

In addition to providing an opportunity to observe dynamic processes in detail, this exercise also introduces students to the concepts of experimental design, replication and statistical analysis. By incorporating discussion and presentation of the results the exercise can serve as a focus for several academic and practical learning objectives. From a teaching perspective it is a very effective and efficient tool. As a student-centred activity, each participant makes an important contribution to the success of the whole exercise, and gains experience of density-dependent mortality and stand dynamic processes in action.