

## **Abstract**

There was created an overview of key aspects for a correct understanding of the dynamics between bark beetle and Norway spruce, especially the way of life of the beetle and the time course of its life cycles. It is absolutely essential to understand this interaction for a timely and effective solution to the bark beetle calamity. Furthermore, the mutual interaction of beetle and tree is discussed in detail in the text. Great emphasis is placed on the description of the spruce's defense mechanisms and the consequences of the attack. In particular, biophysical changes in the needles, which cause a change in the spectral behaviour of the leaves and thus the entire forest stand. Using sensor capable of measuring the reflectance of surfaces, it is possible to detect a bark beetle-infested tree much earlier than changes in the needles could be detected by the naked eye and remove it while it is still colonized by the beetle and not spreading further into surrounding trees. This is key to managing not only the current bark beetle calamity. An overview of case studies is given in the thesis, where the use of spectral methods at different hierarchical levels was applied and satisfactory accuracy in the identification of early infested trees was achieved.

### **Key words:**

Norway spruce, bark beetle, bark beetle calamity, bark beetle gradation, drought, elevated temperatures, spectral curve, reflectance measurement, early detection of infestation, green attack phase