The effects of herbicide, stump size and various thinning treatments on the resprouting ability of woody plants in a savanna

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Introduction

• Tree thinning has always been among the control measures for woody plant encroachment to increase grazing areas.

• However, woody plants' ability to resprout after cutting may render these physical methods costly, labor-intensive, and ineffective in a long-term run.

  ✓ Resprouting is a strategy by woody plants that allows them to regenerate after tree cutting

    o Stump diameter and shading are some of the factors that may influence resprouting

• To prevent tree stumps from regenerating after tree cutting, the cut stumps are frequently treated with chemical herbicides - success of which may depend on a number of factors.

This study aimed to determine the combined effects of tree species, removal treatments, stump diameter, and herbicide application on resprouting patterns of 12 species.

Methodology

• Location: Agricultural Research Council’s Roodeplaat Experimental Farm, South Africa (25° 56’S 28° 35’E)

• Trees were removed to the approximate equivalents of 10%, 20%, 50%, 75% and 100% per plot during the wet season, where half of the tree stumps were supplemented with herbicide.

• To determine the regrowth patterns for each resprouting stump, we measured the following variables:

  ✓ (1) total number of resprouting shoots per stump,

  ✓ (2) number of leaves on the leader (longest) shoot,

  ✓ (3) shoot length on the leader shoot, and

  ✓ (4) shoot diameter on the leader shoot

Discussion and Conclusion

• Our findings provide evidence that woody species in this study area are capable of resprouting after cutting

• However, different levels of tree thinning were not a major determinant of resprouting success in this study. This is because competition among savanna trees usually results in reduced plant densities and sizes, and leads to a more regular pattern of tree distribution. Thus, shading may not limit resprouting ability in savannas.

• The effects of herbicides to prevent tree stumps from resprouting are species-specific and may be ascribed to timing of application and amount of herbicide applied. Some species may need higher amounts of herbicides than others (Enloe et al. 2015). Also, Enloe et al. (2018) showed that woody plants are controlled better during the dry season than during the wet season.

• Stump diameter was the most important factor affecting resprouting capabilities of woody plants. Our results demonstrated that woody plants are more likely to resprout and survive disturbances as juveniles than as adults.

Fig. 1. The relationship between stump diameter and new shoot production of study species

All tree species resprouted after cutting

We found a significant effect of herbicide application on resprouting patterns of five of the 12 study species (P < 0.001)

Significant effects of herbicide application were found on E. rigida, V. robusta, V. tortilis and Z. mucronata (P < 0.05).

Different intensities of tree thinning did not have any significant effects on the resprouting ability of the study species

Stump diameter significantly affected the resprouting patterns of 11 of the 12 study species (P < 0.001)