

**Description and Layout of the Alien Grass Eradication Trial, Nieuwoudtville  
Wildflower Reserve.**



**Plant Conservation Unit**

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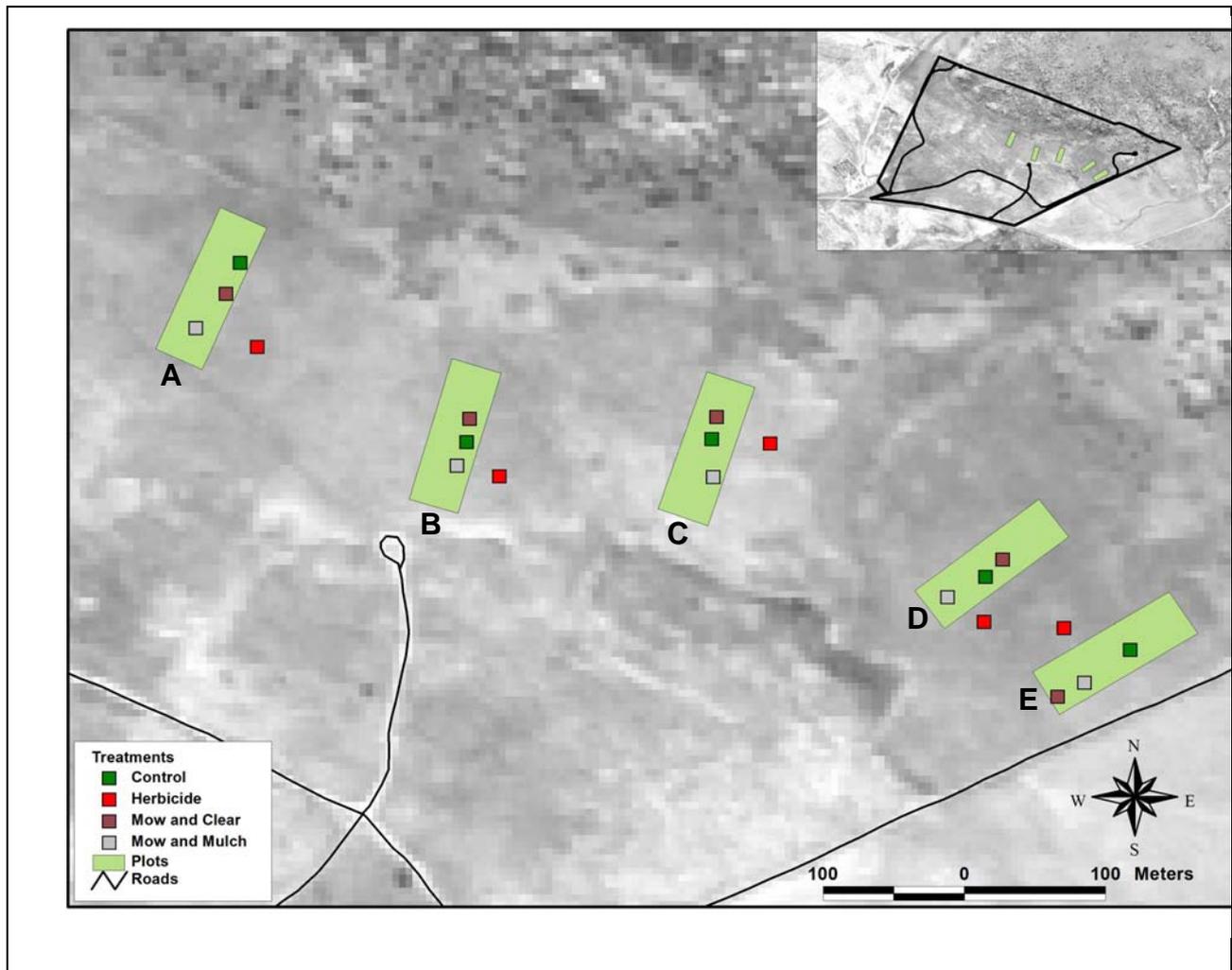
## Introduction & Background

Alien species and in particular alien annual grasses have been identified as a particular threat to Renosterveld (Milton 2004, Musil et al. 2005). Various methods such as burning and clearing have been used to control the abundance of these grasses in renosterveld in the southern Cape (Musil et al. 2005). However, information on the most appropriate control methods for alien grasses on the Bokkeveld Plateau is lacking. Alien grasses are one of the greatest threats to the biodiversity of the Bokkeveld Plateau, an area that has been identified as an area of exceptional diversity and endemism (van Wyk and Smith 2001). It is to these ends that a trial has been initiated in 2007 in the Nieuwoudtville Wildflower Reserve to investigate various options for the control of alien grass species in the area.

## Trial Layout

An area of approximately 20 ha has been identified on the dolerite plains within the Nieuwoudtville Wildflower Reserve for this experiment. The area is heavily invaded by alien grasses, in particular Wild Oats, *Avena fatua*, but ryegrass *Lolium rigidum*, Wild Barley *Hordeum murinum*, and Brome *Bromus diandrus* are also common. With the exception of five 30x100m plots which have been laid out within it, the entire area will be sprayed with selective herbicide at the appropriate growing phase of the alien grasses during the 2008 growing season. The selective herbicide kills annual grasses but does not affect perennial grasses or other types of plants. Each of the 30x100m plots has been marked out with metal stakes, the co-ordinates of the corners recorded on a GPS and each plot labelled from A-E. Within each of these plots, three subplots (treatments), each of 10x10m, has been randomly located and assigned to one of three treatments as follows: Mow and Clear; Mow and Mulch, Control. In the Mow and Clear treatment, the 10x10m plots are mowed using a handheld 'weedeater' and the plant residue raked up and removed from the plot. In the Mow and Mulch treatment, the plots are similarly mowed, but the residue is left where it falls. In the control treatment, the vegetation is left undisturbed. An additional treatment is located outside each one of the five plots, in the area which is to be sprayed with selective herbicide, and which will assess the impact of the selective herbicide as compared to the other mowing treatments. The timing of the mowing treatments also appears to be a crucial factor, since it must be conducted when the Wild Oats has commenced flowering, but before the seed has begun to set. The

selective herbicide also needs to be applied at the appropriate time since, if applied too late, it will not kill the plants and if applied too early, will not prevent additional plants from germinating.



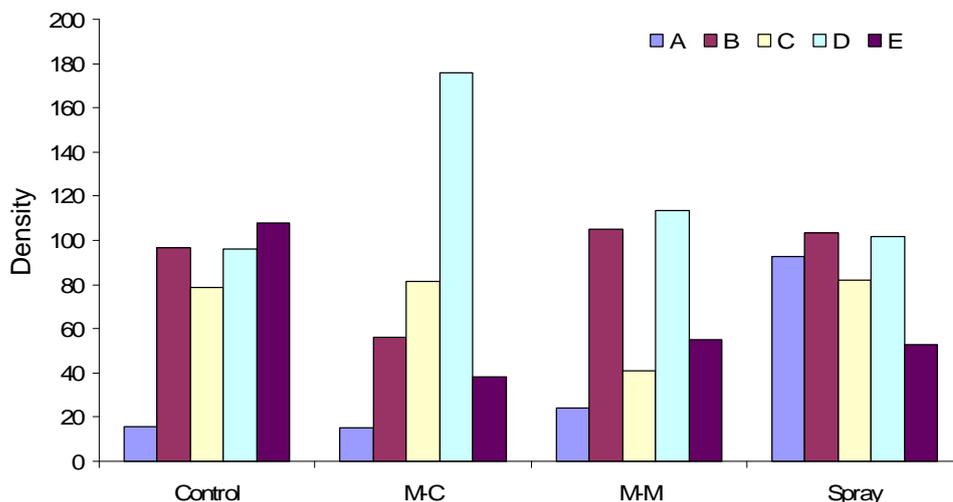
**Figure 1.** The layout of the alien grass eradication trial within the Nieuwoudtville Wildflower Reserve (Inset). Five 30x100m plots have been marked out and three treatments randomly located within each. An additional selective herbicide treatment has been located outside of each 30x100m plot, within the larger area that is to be sprayed with selective herbicide.

## Sampling Design

In terms of the actual data that will be collected within each treatment, five 1x1m plots have been laid out within each treatment, and the density and composition of the vegetation recorded within each of these samples. As the density of alien grasses is very high, the density of grasses has been assessed using a 20x20cm quadrat placed at the centre of each 1m<sup>2</sup> quadrat. The centre of each of these quadrats has also been

individually marked with a peg, such that the same site can be sampled from year to year, thereby reducing sampling variability and increasing the ability of the sampling design to detect changes in grass density and plant species composition and diversity. The final data matrix collected from each treatment thus consists of a species list of all species that occurred within the 10x10m treatment plots, as well as the cover of each species as recorded from the five 1m<sup>2</sup> samples and the density of alien grasses as recorded from the five 20x20cm quadrats placed at the centre of each 1m<sup>2</sup> quadrat. The data is collected during the flowering season such that the presence of the annuals and geophytes which dominate the flora can be accurately assessed.

## Preliminary Data



**Figure 2.** The mean density (No. per 400 cm<sup>2</sup>) of Wild oats, *Avena fatua*, in each of the four treatments from the five plots that have been laid out within the Reserve.

The density of wild oats as recorded in the plots (Figure 2) varies from less than 20 to more than 170 plants per 400 cm<sup>2</sup>, which translates to a density of less than 400 to more than 4000 plants per square meter. These results illustrate the extent of the problem and the potential Wild Oats has to dominate communities and overshadow shorter species. As expected, there are no consistent differences between the treatments at this stage. In future, the relative reduction in the density of Wild Oats between the different treatments will reveal the effectivity of the different treatments. This approach allows the effect of the different treatments to be assessed despite annual differences in rainfall and other climate variables which also influence the density of Wild Oats.

## References

- Milton, S.J. 2004. Grasses as invasive alien plants in South Africa. *South African Journal of Science* 100, 69-75.
- Musil, C. F. Milton, S. J. Davis, G. W. 2005. The threat of alien invasive grasses to lowland Cape floral diversity: an empirical appraisal of the effectiveness of practical control strategies. *South African Journal Of Science*, 101; 337-343.
- Van Wyk, A.E. & Smith, G.F. 2001. *Regions of Floristic Endemism in southern Africa: a review with emphasis on succulents*. Umdaus Press, Hatfield, South Africa.