

Establishment and management of Caucasian clover

LAKE HERON STATION – CANTERBURY

The Caucasian clover trials at Philip and Anne Todhunter's Lake Heron Station investigated Caucasian clover responses to fertiliser, lime and rhizobia inoculation. The objective was to improve understanding of the agronomic performance of Caucasian clover in high country grasslands.

This research was undertaken as part of The New Zealand Merino Company (NZM) and Lincoln University's high country forage project. The overall goal of this work is to improve productivity and sustainability in high country grazing systems.

Establishment of a new stand of Caucasian clover

In the establishment trial, Caucasian clover was direct drilled into undeveloped pasture with fertilisers containing different amounts of nitrogen. After 11 months, the plants were small (indicating an inoculation failure) and not showing a meaningful response to the different rates of nitrogen. Plant analyses indicated that the Caucasian clover plants were nitrogen deficient. This led to further glasshouse trials to determine the causes of the nitrogen deficiency.

First, it was found the rhizobia that nodulate Caucasian clover were not naturally present in the soil. Second, the original inoculant used on the Caucasian clover seed was ineffective. Additional work in the glasshouse found that the commercial rhizobial inoculant (CC283b) was effective; all plants grown from inoculated seed formed nodules and their leaf nitrogen was optimal regardless of fertiliser and lime.

Following the successful glasshouse experiment, it was decided to re-drill Caucasian clover into the same site at Lake Heron and compare its establishment with lotus. Both species were freshly inoculated with effective inoculants before sowing. While the plant populations were low for both species, the Caucasian clover plants were well nodulated. These results indicate that if Caucasian clover is inoculated with effective rhizobia, enabling atmospheric nitrogen fixation, successful establishment of Caucasian clover is possible by direct drilling into native pastures.

Superphosphate and lime responses of a mature stand of Caucasian clover

An additional trial at Lake Heron investigated the superphosphate requirements of an existing stand of Caucasian clover, including whether liming affected these requirements.

The trial found that pasture production increased as the rate of superphosphate application increased, regardless of the absence or presence of lime. As superphosphate application increased from zero kilograms per hectare to 400 kilograms per hectare, the pasture production increased from 1.5 tonnes of dry matter per hectare (t DM/ha) to 2.1 t DM/ha.

While the Caucasian clover had been able to survive previously without any fertiliser inputs on the infertile acid soil, adding 200 to 400 kilograms per hectare of superphosphate (as well as five tonnes per hectare of lime) maximised its growth potential.