

## THE SUCCESS OF THE LUCERNE MESSAGE IN MARLBOROUGH

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### *Abstract*

This paper, as well as being a testimonial to the benefit the writer has received from the Grassland Association, shows how the knowledge of scientists has been used to increase lucerne seed yields by methods of growing resistant cultivars especially for seed production as opposed to growing for hay, silage or grazing. It shows how new cultivars can be multiplied quickly by growing two crops in one year, one in each hemisphere, by using low seeding rates, wide plant spacing and very good weed control. Increased flowering of the crop has been achieved by the use of boron and the choice of time of closing; better pollination has been achieved by the use of more efficient bees — two varieties of which have been imported from North America. Weed and insect pest control and the use of a desiccant at harvest are contributing to a four-fold increase in seed yield, which should double again soon,

### INTRODUCTION

**THE** first twenty years of my farming career was on a small seeds and cropping farm near Blenheim, but when the Wairau River diversion was carved through my farm I moved in 1965 to Wairau Valley, some 50 km west of Blenheim. The property of 170 ha comprises 64 ha of highly developed hill country, 60 ha of lucerne (*Medicago sativa* L.) and 46 ha of flat land composed of wetlands, shelterbelts and pasture used as isolation barriers between cultivars of lucerne.

As I quickly realized that our valley was not good cropping country, and yields of lucerne seed averaging 70 kg/ha (which was only slightly below the district average at that time) were not very rewarding, I concentrated on a Corriedale flock and dairy beef. By 1973 I was carrying 2 610 stock units, or 15.3 SU/ha, when the worst drought in 100 years made me realize that I was overstocked; in addition, returns for wool and meat had dropped sharply. It will be remembered that in the late 1960s and

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early 1970s many scientists and advisers were advocating maximum stocking rates or production per hectare.

Therefore, I was in a despondent mood when I went to the Grasslands Conference at Oamaru. While there, N. Cullen offered me a pure Booroola ram for \$50 — provided I kept some records — but I could not see the point in producing extra lambs if my ewes did not have the milking or mothering ability to rear them. This is being remedied by using the Border Leicester over the Corriedale and then bringing in the increased fertility factor — the Booroola. The Borderdales are certainly proving their mothering ability, but their progeny with Bodroola blood will not lamb until 1981.

#### PROBLEMS OF LUCERNE SEED PRODUCTION

Although Marlborough is noted for lucerne seed production, yields are low by American standards (800 to 1000 kg/ha) and are erratic except for odd areas such as Grassmere. Some of the contributing reasons for these low yields are:

- A catch crop attitude of farmers using lucerne stands designed for grazing or hay — i.e., high seeding rates.
- Poor pollination because of low bee populations or bees with poor pollinating ability.
- Insect pests, weeds, harvesting problems, or poor harvesting techniques.
- Inadequate fertilizer requirements and time of closing for seed.

#### CULTIVARS

With pests and diseases such as lucerne aphids and lucerne wilt the choice of cultivars becomes important.

Also at the Oamaru Conference was T. P. Palmer of Crop Research Division, and Dr B. J. Donovan, Entomology Division, DSIR, Lincoln. Mr Palmer persuaded me to grow a new wilt-resistant lucerne cultivar (Saranac) that he had obtained from Cornell University, U.S.A. He taught me the technique of harvesting lucerne seed in the first year by sowing in mid-September to early October, using low seeding rates (1 kg/ha), wide row spacing (30 cm to 90 cm), very good weed control (both pre- and post-emergence), and harvesting in April/May.

In 1976, Dr Mike Dunbier, a plant breeder at Crop Research Division, DSIR, Lincoln, was given the task of producing an

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aphid-resistant lucerne. Rere was produced in the glasshouse, thus obtaining two harvests a year, one in Idaho, U.S.A., and the other in New Zealand. Using the first-year harvesting technique described above, commercial quantities of seed were produced in 4 years — an operation from breeder to farmer which previously took from 12 to 14 years.

The implementation of Plant Breeders' Rights has enabled seed to be multiplied across the hemispheres, but caused grower dissatisfaction locally (mainly over the contract price system), but I am hopeful that confidence will be restored.

#### FLOWERING AND POLLINATION

I discovered through my own trials that a shortage of boron inhibited flowering in drought situations and, in spite of repeated enquiries throughout New Zealand, I have been unable to obtain scientific information on when, how, how much or how often to apply boron.

In 1963 Stan Orchard of Seddon, an innovative farmer and bee-keeper, heard of the potential of using leaf-cutting bees (*Megachile rotundata* Fabricius), for lucerne pollination, at about the same time that Mr Palmer saw leaf-cutting bees in the U.S.A. However, it was not until 1971 that permission was obtained, and the first leaf-cutting bees were imported and Dr Donovan was engaged to research the management and multiplication of these bees.

Dr Donovan introduced 2500 leaf-cutting bees to my farm in January 1975 and our inland climate of summer heat and cold winters, being similar to Canada, -apparently suited the bees, 1 66 times multiplication being experienced in the first year. Since 1977, Durclite shelters have been used to protect the hives, and the mean increase per season has been 2.4 times. The site is now a major producer of bees for distribution elsewhere, and there are now sufficient bees in New Zealand to effectively pollinate 50 ha of lucerne.

Alkali bees (*Nomia melanderi* Cockerell), a native of the western salt deserts of North America, have also been introduced for lucerne pollination. Although the preparation of the nest site pits and roof is expensive, very little is required in the way of maintenance, and these bees are multiplying steadily.

A high natural population of the short-tongued bumble-bee (*Bombus terrestris*) does a good job pollinating my early lucerne fields. Dr Rod MacFarlane of DSIR, Lincoln, has obtained colon-

ies of this species on my farm each season since 1976-7 and is working towards increasing numbers by providing suitable hives and managing the colonies.

#### HARVESTING AND SEED QUALITY

The use of a desiccant (diquat) at harvest to allow direct heading has resulted in higher seed yields. As the desiccated crop stands erect and is not in contact with or near the ground, it dries more quickly after rain or overnight dew, allowing longer harvesting hours each day. A cleaner seed sample is obtained, fewer tailings are shed on the ground, and higher ground speeds are possible compared with mowing and using a pickup front on the combine, thus keeping costs down.

Because of the incidence of flat and brown seed in our sample I suspected that all was not well with our seed production, and wondered at the cause. In March 1980, Dr V. Marble of the University of California, while on holiday in New Zealand, identified a sucking insect (*Sidnia kinbergi*) similar to the American Lygus bug which caused blasted buds, flower drop and flat seeds. Hurried communications with Dr C. Johansen of Washington State University, an authority on the use of chemicals and biological control of insect pests in the presence of leaf-cutting and honey bees, resulted in recommendations which, although rather late for the 1980 harvest, should be helpful in combating this pest in the future. The Plant Health Diagnostic Station sent a team from Lincoln to investigate the problem and, together with local MAF and DSIR, Lincoln? personnel, further study on this pest will continue. It appears that mature stands were less susceptible, but up to 90% loss was reported in first-year stands, and large losses in some two-year stands.

#### THE MIDDLE MEN

N. Ibbotson, a former adviser to the Marlborough Farm Improvement Club, and now a private consultant, has been instrumental in promoting the improved techniques amongst his clients. Seed producer field-days and farm discussion groups are also valuable means of disseminating further knowledge gained by advisory officers and leading producers. Scientists and advisers must not only have degrees in science, but also degrees in practicalities, and these come only from experience or an ability to listen and observe at grass-roots level,

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Although Ministry of Agriculture records show Marlborough lucerne seed production fluctuates markedly according to season, with the above information our yields have been more consistent, and although at 300 kg/ha they are four times our former average, I think yields of 600 kg/ha are possible.

Progress has been made in improved agronomy, pollination, weed control, harvesting and speed of multiplication, but research into pest control, trace elements and fertilizers, and marketing still presents a challenge.

With the knowledge gained, largely from people I have met through the Grassland Association, and favourable climate and land, we can benefit in several ways. We are able to produce lucerne seed at a cheaper price, for the developing countries in particular, to compete on world markets, and can produce new cultivars quickly for the benefit of farmers and the country.

The transfer of knowledge from scientist to farmer, in my case, has been a successful one which, I hope, will benefit many.

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