

Technology transfer and the seed industry: a success story

J. S. Rowarth, P. T. P. Clifford, W. J. Archie and B. R. Guy¹

AgResearch Lincoln, PO Box 60, Lincoln, Canterbury, New Zealand.

¹ Challenge Seeds, Kimihia Research Centre, PO Box 939, Christchurch, New Zealand.

Abstract

A partially Government funded technology transfer programme (Technology for Business Growth) allowed AgResearch staff to work directly with Challenge Seeds staff, Wrightson's field representatives and small-seed growers of five Grasslands cultivars for which Challenge Seeds is head licensee. The programme involved visits to individual growers approximately every six weeks to advise on crop management. Written reports after each crop visit, newsletters and field days were a feature of the programme. Production problems became the focus for research, and results were taken to the growers as they were achieved.

Average and top seed yields of all cultivars increased during the programme and in the white clover crops major advances were made in reducing the number of crops rejected from certification. Areas highlighted for research included weed control in all crops, nitrogen and water use in chicory and browntop, and post-harvest management in browntop. The success of this programme lay not merely in the fact that seed yields increased, but also in the close working relationship that was created between the growers (who felt a high sense of involvement), representatives from Challenge Seeds (who reached the point of being able to do the advisory work themselves) and AgResearch staff (who saw production problems at first hand, and could then focus research accordingly).

Additional key words: *browntop, chicory, irrigation, pollination, seed yield, soil type, weeds, white clover*

Introduction

In October 1989 a partially Government funded technology transfer programme (Technology for Business Growth) began, allowing AgResearch (then DSIR Grasslands) staff to work directly with Challenge Seeds staff, Wrightson's field reps. and small-seed growers of five Grasslands cultivars for which Challenge Seeds is head licensee. The five cultivars involved were 'Grasslands Kopu' and 'Grasslands Tahora' white clover (*Trifolium repens* L.), 'Grasslands Puna' chicory (*Cichorium intybus* L.), 'Grasslands Egmont' browntop (*Agrostis capillaris* L.) and 'Grasslands Tiki' brome (*Bromus inermis* Leyrs.).

Methods

The programme involved AgResearch and Challenge Seeds staff, plus Wrightson's field representatives, visiting individual growers at critical stages in the life of their crop. In practice this meant a visit approximately every six weeks to advise on such things as closing

dates, fertiliser application, herbicides and pesticides, irrigation, bee stocking, harvesting and post-harvest management. However, 'problem' crops were visited whenever requested. Written reports were given to the Wrightson's field representatives (Wrightson is the procurement arm for Challenge Seeds) and growers after each visit; the field representatives then followed up the advice with the growers. Newsletters were sent to chicory and browntop growers twice a year and field days were held for each cultivar at least once a year.

Results

During the three years of the programme average seed yields of all the cultivars increased. Average seed yields of Tahora, a small-leaved white clover increased by 10 % in year one and 12 % in year two (Table 1). In contrast, average seed yields of Kopu, a large-leaved white clover increased 260 % in year one and 9 % in year two (Table 2). Although climatic conditions may have played a part, most of the large increase in year one was a dramatic demonstration of technology transfer reflecting

the fact that many farmers were accustomed to growing the small leaved 'Grasslands Huia' (the traditional white clover cultivar for the industry) new technologies were required to maximise yield potential from the large-leaved white clover.

With white clover major advances were made in reducing the number of crops rejected from certification. This required re-education of farmers accustomed to growing Huia, and moving sowing dates from spring to autumn to allow better weed control. By year three only two (1 %) crops were spring sown (against advice); both were rejected.

In 'Grasslands Puna' chicory seed yields more than doubled in the first year, and the top grower produced 697 kg/ha (Table 3), exceeding the previous best research yield of 510 kg/ha. Soil type and irrigation were identified as major determinants of seed yield, as was the requirement for bees for pollination (Hare *et al.* 1990; Archie *et al.* 1991, 1993). At the end of the programme average Puna yields were 350 kg/ha compared with 200 kg/ha before the programme.

Average seed yield of 'Grasslands Egmont' browntop in the first year of the programme was almost 80 % more than the previous best average, and the top grower produced 100 % more than in the previous season (Table 4). As with chicory, soil type and irrigation were identified as major factors influencing seed yield (Guy *et*

Table 1. 'Grasslands Tahora' white clover seed yields.

Year	Average seed yield (kg/ha)	Top seed yield (kg/ha)
1987/88	215	n/a*
1988/89	n/a	n/a
1989/90	370	n/a
1990/91	407	690
1991/92	455	678

* not available

Table 2. 'Grasslands Kopu' white clover seed yields.

Year	Average seed yield (kg/ha)	Top seed yield (kg/ha)
1988/89	76	n/a*
1989/90	125	n/a
1990/91	322	741
1991/92	350	844

* not available

al. 1990). At the end of the programme Challenge seeds had 44 growers of browntop; 32 of them with irrigation, in comparison with the beginning of the programme when only four of the 21 growers had irrigation. Average yields for 1991/92 were almost double those pre-programme (227 kg/ha vs. 118 kg/ha).

After the first year of the programme the main production problems for the growers became apparent. These problems then became the focus for research and results were taken to the growers as they were achieved. Areas highlighted for research included weed control in all crops, nitrogen and water use in chicory and browntop, optimum harvesting time in chicory and post-harvest management in browntop. Research continues but results from some trials are already in use. For example, results from weed control trials for browntop were put into practice. Seed lots contaminated with mouse-ear chickweed decreased from 100 % to less than 10 %; similar success was achieved with field madder in clovers.

Grasslands Tiki brome did not feature in the technology transfer programme as there was only one Tiki grower.

Table 3. 'Grasslands Puna' chicory seed yields.

Year	Average seed yield (kg/ha)	Irrigated average seed yield (kg/ha)	Non-irrigated average seed yield (kg/ha)	Range (kg/ha)
1987/88	229	229	-*	223-235
1988/89	199	199	-	121-338
1989/90	429	473	341	27-697
1990/91	215	405	162	39-631
1991/92	348	391	262	85-738

* no crops in this category

Table 4. 'Grasslands Egmont' browntop seed yields.

Year	Average seed yield (kg/ha)	Irrigated average seed yield (kg/ha)	Non-irrigated average seed yield (kg/ha)	Range (kg/ha)
1986/87	107	107	-*	21-138
1987/88	147	147	-	14-327
1988/89	118	118	-	4-410
1989/90	262	430	200	15-533
1990/91	187	218	163	54-490
1991/92	227	252	225	50-568

* no crops in this category

However, AgResearch staff did run trials on some of the problems facing this grower (Rowarth and Archie 1993).

Discussion

Each crop visit cost the programme about \$70 in direct consultancy fees; this meant an investment of about \$420 per grower per year. On top of this the growers received reports, newsletters and attended field days. At the same time, 19 staff from Wrightson and Challenge Seeds were 'trained' in methods of seed production for the cultivars. This compares very favourably with commercial consultancy rates at \$50 a visit to a grower. In contrast, three field days run in conjunction with Federated Farmers last year cost \$120 per grower and a seminar for seed industry personnel was \$60 per person. Although the amount of money outlaid per grower was largest in the technology transfer programme, mostly because of the number of visits made, there was no question that the growers thought it worthwhile. One to one communication is still the best way to impart information; for the growers the fact that the information pertained directly to their crop was of major benefit.

The success of this programme lay not merely in the fact that seed yields increased, but also in the fact that the performance of the cultivars was such that Challenge Seeds had no difficulty in increasing areas sown to meet production targets. The number of Kopu crops doubled to 150 during the programme; Egmont crops increased from 23 to 85.

An initial concern that the programme would detract from science has been allayed. To date five papers (Guy *et al.*, 1990; Hare *et al.*, 1990; Archie *et al.*, 1991, 1993; Rowarth and Archie 1993) covering the results of various trials in the programme have been published, thereby acknowledging the underlying science involved.

Another indication of success was the close working relationship that was created between the growers (who

felt a high sense of involvement), representatives from the Challenge Seeds (who reached the point of being able to do the advisory work themselves) and AgResearch staff (who saw production problems at first hand, and could then focus research accordingly).

The end of the programme has not marked the end of contact, with AgResearch and Challenge Seeds staff liaising whenever there are problems. News of the success of the programme has spread to other firms and members of the AgResearch team have been asked to advise on other crops and to speak at Federated Farmers field days. For the AgResearch Seed Production team this means a high profile within the farming community and, most importantly, that the scientific results we labour to achieve are not only focussed and appropriate, but also used by the industry.

References

- Archie, W.J., Rowarth, J.S., and Guy, B.R. 1992. Grasslands Puna chicory seed production: seed yield and quality. *Proceedings of the Australian Seeds Research Conference 4*, 188-190
- Archie, W.J., Rowarth, J.S., and Guy, B.R. 1993. Studies in germination and thousand seed weight in Grasslands Puna chicory. *Proceedings of the XVII International Grasslands Congress*, 1676-1678
- Guy, B.R., Archie, W.J., and Rowarth, J.S. 1991. Browntop seed production: past, present and future. *Proceedings of the New Zealand Grassland Association 52*, 87-89
- Hare, M.D., Rowarth, J.S., Archie, W.J., Rolston, M.P., and Guy, B.R. 1991. Chicory seed production: research and practice. *Proceedings of the New Zealand Grassland Association 52*, 91-94
- Rowarth, J.S., and Archie, W.J. 1993. Reproductive initiation, closing dates, nitrogen requirements and harvesting of smooth brome cv. Grasslands Tiki. *Proceedings of the XVII International Grasslands Congress*, 1674-1675