

Ryegrass 2000: technology transfer in ryegrass seed production

M.P. Rolston and B.L. McCloy¹

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

¹NZ Arable, P.O. Box 16-101, Christchurch

Abstract

Ryegrass 2000, a technology transfer programme in ryegrass seed crops, was initiated in 1994 with the aim of having the best seed growers achieving seed yields of 2000 kg/ha by the year 2000. Five Ryegrass 2000 Clubs were established, each involving about 20 seed growers. Each Club met three to four times a year using a discussion group format with field visits to three to five farms at each meeting. Growers kept detailed crop input records and seed yield results which were analysed at the end of the season. Seed yields of Club members increased an average by 25% between 1995/95 and 1995/96. The average seed yield was 1410 kg/ha, compared to the NZ average of 1110 kg/ha. This increase was associated with an increase in N fertiliser use and increased usage of fungicide and plant growth regulators. A national Awards programme had entries for 4 (1995) and 5 (1996) crops with yields more than 2000 kg/ha. The best second year crop had a yield of 1895 kg/ha.

Additional key words: *chlormequat, fungicides, Lolium perenne, nitrogen.*

Introduction

Ryegrass 2000 is a technology transfer and research programme developed to assist New Zealand perennial and hybrid ryegrass (*Lolium perenne* L.; *L. x boucheanum* Kunth) seed growers to achieve consistent high yields of quality seed, with the goal of having the best seed growers achieving 2000 kg/ha by the year 2000. Over ninety percent of the ryegrass seed crop is grown in Canterbury. The New Zealand average perennial and hybrid ryegrass seed yield for the five years 1992-1996 was 940 kg/ha (ranging from 750 to 1170 kg/ha), based on Seed Certification Statistics for kilograms certified and the area (ha) entered for certification. The average perennial and hybrid ryegrass area entered for certification over these five years was 9990 ha (ranging from 7070 to 14220 ha). The project was developed in 1994 (Rolston, 1995) to create a linkage between seed growers, researchers and seed companies. This coincided with the establishment of a series of new research projects on ryegrass seed production starting in the early 1990s (Rolston *et al.*, 1994; Rowarth and Archie, 1995), after a period of nearly 10 years with minimal New Zealand research on ryegrass seed production.

Ryegrass 2000 Clubs

Five Ryegrass 2000 Clubs were formed in Canterbury during 1994, each with 20-25 members, and usually involving a seed company and associated field representatives. The Clubs covered an area of 10000 km² and represented about 10% of ryegrass seed growers in the area. The involvement of seed company field representatives meant that field days resulted in on-the-job training for them, and they were then able to transfer technology to non-Club members. Each Club had a co-ordinator and a seed production scientist to provide technological support. Clubs met 3 to 5 times a year, with the members visiting 3 to 5 seed crops at each half day meeting to discuss the members' crop and management options over the following months. Discussions focused on the operations for that period with nitrogen being important in early spring, disease management and irrigation in late spring and harvesting methods in early summer. Visiting speakers were also involved, including seed researchers from Lincoln University and agri-chemical company representatives. Within a week of each meeting growers received a newsletter containing a detailed summary of the paddocks visited, key discussion points, and comments on latest research findings.

In the first year, establishment funding was provided by the national farmer seed growers' organisation (Herbage Seed Subsection of Federated Farmers / Foundation for Arable Research). Each grower also paid a membership fee.

Crop Records

Growers received a "Grower's Crop Record" notebook to record inputs, rates, timings, observations, seed yields and seed testing results. A spread sheet summary was produced for each Club (Table 1), plus some preliminary gross margin analysis based on inputs and results. From the summary growers could see how their performance compared to other crops they had seen. In some Clubs, members agreed that these summaries should include members' names. Ryegrass growers belonging to Ryegrass 2000 Clubs achieved seed yields from their better paddocks that averaged 1410 kg/ha (1995/96) and were 22% higher than the national average. Ryegrass 2000 members increased seed yields from 1994/95 to 1995/96 by an average of 25%. The Club based at St. Andrews, South Canterbury, an area which the seed industry has historically regarded as having poor seed yields (L. Rosevear, Ashburton, pers. comm.), increased seed yields 66%, from 970 kg/ha (1994/95), to 1240 (1995/96) and 1620 kg/ha (1996/97), with three crops achieving 2000+ kg/ha in the 1997 year. Rosevear (pers. comm.) noted a considerable increase in growers interest in ryegrass seed production over this period.

The inputs for growers producing crops with seed yields of more than 1500kg/ha was compared to crops yielding less than 1500 kg/ha (Table 1). Between years the main difference was an increase in N, and a higher percentage of crops receiving the plant growth regulator (PGR) chlormequat (Cycocel applied at 2.25 to 3.0 kg ai/ha) (Table 1). The increase in yields between years for the below 1500 kg/ha crops was also associated with an increase in fungicide usage. A range of triazole fungicides registered for ryegrass (especially propiconazole and tebuconazole) were used from half to full label rates at each application. Within years there was little difference in the inputs of above and below 1500 kg/ha crops. In 1994/95 N inputs of the below 1500 kg/ha crops were 9 kg more than the higher yielding crops, demonstrating that either inputs other than N are also important, or that timing of N is as important as the amount applied. What is apparent is a wide diversity of practice used by growers achieving good yields, including good results from late sowing dates (e.g., 1610 kg/ha from a 7 June sowing date in South Canterbury) demonstrating that at this site good yields can be achieved from spring tillers. The similarity in the level of inputs between high and low yielding crops suggests that in general, profitability is determined by yield and not by the cost of inputs, and that both the timing of inputs and site factors, especially environmental mis-adventure (frosts at head emergence/flowering; hail, and high winds at harvest) may be the main determinant of seed yield variation.

Table 1 Comparison of high and low seed yield ryegrass crops over two years, expressed as means for the variables. Range are given in parenthesis.

Variable	1994/95		1995/96	
	Crops over 1500 kg/ha	Crops under 1500 kg/ha	Crops over 1500 kg/ha	Crops under 1500 kg/ha
No. of crops	8	35	17	26
Seed yield (kg/ha)	1720 (1580-2130)	980 (400-1430)	1720 (1520-2175)	1300 (480-1490)
Seed quality ¹	99.7/94	99.6/91	99.7/91	99.6/93
Paddock area (ha)	N/A ²	N/A	10.2	9.7
Sowing date	11 April (15 Mar-7 June)	4 April (23 Feb-6 May)	23 March (28 Feb-2 May)	25 March (7 Feb-10 May)
Sowing rate (kg/ha)	11.0 (9-12)	11.4 (4.5-18)	10.6 (4-17)	10.0 (6-20)
Nitrogen (kg/ha)	144 (50-198)	153 (92-232)	177 (119-244)	168 (77-240)
Fungicides (no. of applications)	1.8	1.5	1.9	1.8
Irrigated (% crops)	50	37	18	38
PGR (% crops)	25	25	47	38

¹ purity and germination; ² not available; ³ plant growth regulator

Research

The technology transfer programme was supported by a research programme based at Lincoln. During each of the last four years the best treatments in our trials have achieved seed yields of 2000 to 2800 kg/ha. The Ryegrass 2000 programme also ensured that members were also up to date with results from international trials, published in the Journal of Applied Seed Production, the newsletter of the International Herbage Seed Production Research Group, conferences and from an E-mail network of seed researchers with interests in weed control that was established during the 3rd International Herbage Seed Conference in 1995.

Awards

Annual awards for the best first year dryland and irrigated crop and for second year ryegrass seed crops, were made for the 1994/95 and 1995/96 harvests (Tables 2 and 3). The awards, open to all growers, were based on nominations, with forms widely circulated to all seed merchants. Nominations were accompanied by a MAF Seed Testing Station seed analysis certificate, and all entries were at the recognised trading quality of a minimum 90% germination and 98% purity. Paddocks from the top entries were re-measured to verify the area. The 1996 Awards were sponsored by agrochemical manufacture Rhone Poulenc, and included a farmers' field day at the farm of one of the top growers. Over the

two years, eight different cultivars (all New Zealand bred forage cultivars) were represented in the top 10 first year crops. There is no evidence to suggest that any of these cultivars are better in dryland or under irrigation. The cultivars represented in Table 2, have about a two week spread in flowering. While management for these cultivars is similar, some inputs, especially the timing of N and the application of a PGR will be 7 to 14 days earlier on the early flowering types compared to cv. Grasslands Nui. While New Zealand ryegrass breeders have not generally selected for seed yield, these results suggest that the forage germplasm in use has good seed yield potential. In 1994/95 irrigated crops dominated the Awards, partly because frost had affected crop yields in the main dryland area around Methven. In contrast the 1995/96 season was wetter than normal and dryland crops dominated the Awards. In both years the highest yielding crops were grown in a restricted geographical area: Lowcliffe-Longbeach area of coastal Ashburton in 1994/95; and Barhill-Methven in 1995/96, indicating that environmental conditions have an influence on achieving 2000 kg/ha seed yields.

The Award presentations gave an opportunity for technology transfer to reach a wider grower audience, incorporating both a public field day and press coverage.

The Ryegrass 2000 Awards also demonstrate the progress farmers are making with the management of second year ryegrass seed crops (Table 3), with seed yields that are approaching top first year ryegrass seed yields.

Table 2 Seed yields of first year crops from Ryegrass 2000 Awards 1995 and 1996.

1994/95			1995/96		
Seed Yield (kg/ha)	Water	Cultivar	Seed Yield (kg/ha)	Water	Cultivar
2625	irrigated	Ellett	2260	dryland	G. Nui
2478	irrigated	G. Greenstone	2173	dryland	G. Nui
2135	irrigated	Embassy	2067	dryland	Yatsyn
1965	dryland	G. Marsden	2037	dryland	G. Marsden
1933	irrigated	Yatsyn	1940	dryland	G. Marsden
1922	irrigated	Banks	1922	dryland	G. Greenstone
1807	irrigated	Yatsyn	1916	irrigated	Ellett
1782	irrigated	Yatsyn	1910	dryland	Embassy
1758	dryland	Ellett	1890	dryland	Yatsyn
1755	irrigated	Yatsyn	1852	irrigated	Dobson

Table 3 Seed yield of second year ryegrass seed crops from Ryegrass 2000 Awards.

Seed Yield (kg/ha)	Cultivar	Year
1895	Ellett	1995/96
1795	Vedette	1995/96
1599	Ellett	1994/95

Conclusion

The Ryegrass 2000 groups provided a forum where information could be exchanged between farmers and researchers. Seed yield increases occurred and were associated with the transfer of technology developed from new ryegrass seed research programmes that were established in the early 1990's including grower-industry funded trials. The programme generated renewed interest in ryegrass seed production both by Club members, and also the wider ryegrass seed growing community.

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