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New Zealand's herbage seed industry: an overview

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Abstract

Herbage seed production for the period 1980-89 has averaged 20 600 metric tonnes (MT) (range 13 360-34 590). Canterbury has 82% of the total seed area. Production area (1989-90) by species are perennial ryegrass (*Lolium perenne)* 44%; white clover (*Trifolium repens*) 33%; tall fescue *(Festuca arundinacea)* 6%; cocksfoot *(Dactylis glomerata*) 5 %. New Zealand exports seeds to over 40 countries with Australia, USA and the European Community representing major markets. Proprietary cultivars have increased in number from 5 (1980) to 62 (1989) and in volume from 0.1 to 27.0%, a trend we predict will continue, with proprietary cultivars being an estimated 60-65% of seed volume by 1995. The development of 'Endosafe' novel endophytes in ryegrass is expected to double seed usage in New Zealand for a decade as pasture renewal is increased from 250 000 ha to 500 000 ha per year. Opportunities and threats to the New Zealand industry, seed quality training and research are discussed.

Keywords herbage seed, ryegrass, white clover, endophyte, exports, marketing, seed quality, training

Introduction

New Zealand's herbage seed production for the IO-year period (1980-89) averaged 20 600 metric tonnes (MT), with a range from 13 360 MT (1989) to 34 590 MT (1988). These production figures are similar to the 50-year average of 22 000 MT (Rolston & Clifford 1989), over which period production has fluctuated in cycles of high and low production (Figure 1). The farm gate value of herbage seed produced is currently estimated as $NZ40 million.

The Canterbury region has 24 800 ha (1988-89) to 45 600 ha (1987-88), being 82% of the total seed area. The production area (1989-90) is still dominated by two species, perennial ryegrass (*Lolium perenne)* 44%, and white clover (*Trifolium repens*) 33%, which is a feature of the New Zealand seed industry (Rolston & Clifford 1989). New Zealand is the world's main white clover grower, producing an average of 5000 MT out of an estimated world total production of 9000 MT (Clifford & Rolston 1990). After the introduction of European white clovers in 1985-86, the area in 'Grasslands Huia' has declined from 87% (1987-86) to 79% (1989-90) of the total white clover area, a trend that will continue as a range of new New Zealand-bred cultivars are released over the next 2 years. Compared with Huia and 'Grasslands Pitau', many European white clover cultivars have produced poor yields in dry seasons (Clifford & Muscroft-Taylor 1990). The next most important species are tall fescue (Festuca *arundinacea)* 6%, and cocksfoot *(Dactylis glomerata)* 5%. Tall fescue has increased from 450 ha to 1800 ha, largely from the multiplication of turf cultivars for re-export to the USA.

Exports

A feature of the New Zealand herbage seed industry is the importance of exports, with seed sales to over 40 countries. World prices, demands and shortfalls have a major impact on production, contributing to the cyclic production (Figure 1). Exports have averaged 12 500 MT (1984-89), with a range from

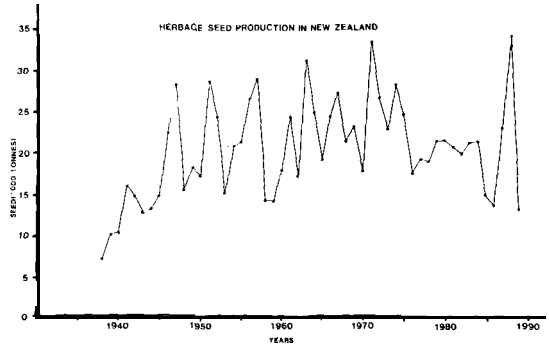

Figure 1 **Annual** machine cleaned **herbage** seed production from 1939 to 1989.

Table 1 Herbage seed exports by region (% total weight), and total tonnes exported,

	Percentage of total					
	1984-85	1985-86	1986-87	1987-88	1988	1989
N. America	8	21	49	52	41	35
Europe	39	39	27	25	30	36
Australia	18	26	15	16	13	16
S. America	7	4	4	3	3	5
Asia	17	6	4	3	3	5
Others	11	4	1	1	10	3
Total MT (000)	7.3	6.5	14.2	18.7	18.9	9.6

6530 (1985-86) to 18 950 MT (1988) (Table 1). Exports represent 60% of production, with an F.O.B. value from $NZ16m (1984-85) to $NZ33m (1988). Despite large year-to-year fluctuations in export tonnes, the distribution between major markets is similar (Table 1). During the last 6 years the North American market has grown dramatically from 8% to 35-50% of exports, while European and Australian markets have been relatively stable (Table 1);

Major markets for ryegrass are the USA and Australia (Table 2) and for white clover the UK, with Germany, Japan, France, and Italy all being major buyers (Table 2). Of interest is the importance of Spain (which also imports large tonnages of Huia via other European buyers), Japan (a major seed importer especially from the US), and Chile. These countries represent good prospects for market expansion of New Zealand seed. Recent annual promotions in Australia by the NZ Seed Promotion Council in conjuntion with the Trade Development Board was associated with a doubling in export tonnage. Australian buys a wider range of seed from New Zealand than any other country.

Table 2 Major importing countries of New Zealand ryegrass and white clover in 1989.

Ryegrass (MT)		White clover (MT)	
USA	2850	U K	700
Australia	1040	Germany	440
Spain	300	Japan	390
Chile	240	France	360
Netherlands	110	Italy	340
Japan	90	USA	320

Constraints to expanding exports of herbage seed include the need for the industry to remain competitive on the international market (Rolston *et al.* 1987). Factors influencing competitiveness include:

1. Producing high yielding seed crops which generally have low costs per kg of seed. This will require New Zealand plant breeders to match the progress being made by US breeders who have increased seed yields by 5% per year over the last 5 years.
2. Having competitive prices which are influenced by on-farm costs, and off-farm costs such as shipping, inflation and exchange rates. The trade reports strong inquiries at $NZ = $US0.55, while the telex/fax machines become silent at $US0.60.
3. Maintaining high quality standards of seed lots for purity, germination, vigour and cultivar genetic purity.
4. Having cultivars placed on Recommended Lists and protected in their markets.
5. Having appropriate New Zealand cultivars with agronomic features required by the consumer or having access to overseas cultivars for re-multiplication.
6. Having effective marketing, promotion by trials and on-farm demonstrations,
7. Receiving good market intelligence on seed supplies, production and consumption trends.
8. Having a research, technology and extension base to overcome production constraints on new species and cultivars (Hampton et al. 1991).

Domestic market

Any growth in the domestic market will be beneficial to the industry. Pasture renewal have averaged 250 000-300 000 ha per year, representing about 3% of the New Zealand improved pasture land. Dairy farmers and mixed cropping farms in Canterbury are major users of seed in pasture renewal (Belgrave *et al.* 1990). Belgrave et *al.* also found that the general level of farmer knowledge and use of new species and cultivars (other than ryegrass and white clover) was poor.

The recent development of 'Endosafe' novel endophytes (*Acremonium lolli*), which have nil or low lolitrem levels (a chemical associated with ryegrass staggers), is expected to double seed usage in New Zealand for a decade (Fletcher *et a/.* 1991) as farmers renew old ryegrass pastures with 'Endosafe' ryegrasses.

Grower returns

Grower prices for Huia white clover and 'Grasslands Nui' ryegrass from a 1983 base line have been adjusted for inflation using the producers' price index (Table 3). White clover prices in real terms have held better than ryegrass. In 1990 prices, white clover at $3.20/kg and perennial ryegrass at $1.35/kg

Table 3 Growers' price and inflation adjusted real prices.

Year	White clover Growers' price cents/kg	Real price 1983	Perennial ryegrass Growers' price cents/kg	Real price 1963
1982	190	190	81	81
1984	220	205	70	65
1985	245	198	100	81
1986	270	206	115	88
1987	215	145	80	54
1989	350	219	110	69

would equate in real terms to 1983 prices. As with other primary industries, seed growers need to keep increasing yields per/ha and/or lowering costs per/kg seed produced to maintain economic returns

Proprietary cultivars

Since the introduction of the Plant Variety Rights Act in 1973, there has been a large increase in the number of propriety cultivars, which accounted for 27% of the certified seed weight in 1989 (Table 4). We predict that during the next 5 years 60-65% of production will be from propriety cultivars. From the grower's perspective, propriety cultivars alter seed trading patterns completely, with seed prices being more stable, giving more consistent returns, and production tonnages being managed to match market requirements. Growers, however, are not always willing to be locked into contracts signed before seed paddocks are sown, 12 months or more in advance of harvest, and are concerned that fixed price contracts tend to be based on older or outclassed cultivars and may not reflect the true retail value of the new cultivar over an older public cultivar. Many growers are looking for participatory contracts that will allow them to share the risk, and profits or losses that may occur.

Many smaller companies are not involved with propriety cultivars and feel threatened as the market share of public cultivars declines. A challenge for the industry is to develop sub-licensing and multiplication agencies that allow small seed companies to participate in propriety cultivars.

Table 4 Cultivars in certification and percent of total certified seed weight.

	Public		Propriety	
	Number	% Weight	Number	% Weight
1980	21	99.9	5	0.1
1985	17	72.0	17	18.0
1989	17	63.0	62	27.0

Specialised seed production

The traditional 'catch' crop production of herbage seed has almost gone in New Zealand, with the removal of 'permanent pasture' seed grade from certification, a change to-using basic seed as the lowest grade of seed for sowing of certified seed, and an increasing emphasis from buyers for named cultivars. The future will see and increase in specialised seed production of ryegrass and tall fescue with increased areas of amenity cultivars; an expansion in white clover cultivars even though there is a change-in-cultivar requirement of 5 years clover-free cropping history (Clifford et al. 1991); and a wider range of alternative species (Hampton et *al.* 1991).

Opportunities and threats

1. Oregon, USA, is the world's largest seed producer (214 000 MT in 1988 and any changes in that industry will affect us. The Oregon seed industry is facing considerable pressure on environmental issues, including reductions in field burning, and pesticide restrictions, both of which will increase costs and depress seed yields.
2. Australia will see a marked increase in legume usage with the Land Bank programme, but white clover production will be threatened by recent increases in South Australian production on new clover-free irrigated land. The formation of 'Austseed', a specialist company to exclusively manage new cultivars from public breeding demonstrates that the Australian industry is becoming more organised.

Recent Australian moves to further restrict the amount of ***Rumex*** in seed (possibly to a nil tolerance) is a considerable threat to red clover exports (especially 'Grasslands Hamua'), and growers must take action to control ***Rumex*** in the field.

3. The recent political changes that have swept Eastern Europe may result in new markets for New Zealand seed, but there is also the threat that Poland and other countries will become major seed producers. Opportunities do exist for New Zealand because our industry has an international reputation for quality seed. It is essential that we continue to produce high quality seed.

Herbage seed quality

Seed quality refers to a collection of seed components considered to be important for the value of seed for eventual sowing purposes, and New Zealand has a very effective seed quality assurance system--(Scott----&- -Hampton-1985). Occasional problems wth the traditional quality components, i.e. germination and analytical purity, do occur, particularly as a result of heating damage (Hill & Johnstone 1985) and failure to control weeds effectively (Scott & Hampton 1985). However, more recently attention has been drawn to other seed quality components, in particular cultivar purity and vigour.

The proliferation of propriety herbage cultivars (Table 4) and the move by MAF from a 'hands on' quality control to 'hands off' monitoring (Hampton & Scott 1990) have necessitated sbme changes to the methodology for maintaining cultivar purity during production (e.g. for white clover (Hampton ***et al.*** 1987)) and for assessing cultivar purity (e.g. electrophoretic techniques), particularly as difficulties with the traditional field inspection and plot testing system have become apparent (Scott & Hampton 1985; Miller & Hampton 1988). Modern quality management practices will be required to ensure that the New Zealand seed certification scheme keeps pace with industry needs, international

developments and government policies, and current indications are that its future will continue to be influenced more by user's needs than by bureaucratic requirements (Hampton & Scott 1990).

Problems with maintaining germination of prairie grass (*Bromus willdenowii*) seed lots during shipping overseas led to an investigation of their vigour status (Hampton & Bell 1989). Now, vigour can be related to the extent of physiological deterioration (or aging) of the seed lot (Hampton & Hill 1991). Further work in other herbage species has confirmed that seed lots of the same cultivar and chronological age, and with similar high germination capacity, may differ significantly in their ability to perform, particularly under stress in both the field and storage (e.g. Wang & Hampton 1989; 1990). The effects of seed production and processing practices on herbage seed vigour require investigation.

Training and research

One of the advantages of the New Zealand seed industry is the experience and expertise of its researchers. Training opportunities are available through the Seed Technology Centre at Massey University (Rolston et *al.* 1987). Demand for the training offered at the Centre is evidenced by the fact that in 14 years, 509 students have completed postgraduate, certificate or short course programmes, but less than 3% of these have been New Zealanders. It is rather ironic that while some of our seed producing competitors and international agencies such as FAO recognise the value of the training available in New Zealand (through this Centre, DSIR Grasslands and Lincoln University) the New Zealand seed industry appears to consider that such training is not required. This rather short-sighted viewpoint will make it increasingly difficult for New Zealand seed producers to be provided with the technical support they deserve.

New Zealand seed growers have been strongly supported by good research (Rowarth 1989), but Government policy in relation to agricultural research has changed. As a consequence, seed growers and merchants will need to be involved in research funding. *Growers* have an opportunity under the Commodities Levy Act 1990 to provide research funds and to direct research to the problems they see as being important.

Conclusion

The New Zealand herbage seed industry has the challenge of expanding seed tonnages and reducing the magnitude of variation in annual production. The joint co-operation of all sectors of the industry – breeders, producers, quality assurance, researchers, consultants, educators, merchants and marketers – will be required.

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